INNOVATION IN THE TEACHING OF SUSTAINABLE DEVELOPMENT IN LIFE SCIENCES IN EUROPE

PROCEEDINGS OF THE STATE OF THE ART INFORMATION

FOLLOW-UP AND EVALUATION MEETING

TERAMO, ITALY, FEBRUARY 22-25, 2011

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The works described in this volume has been realized in the frame of the **ISLE** Erasmus Thematic Network (Innovation in the teaching of sustainable development in Life Sciences in Europe) which is co-financed by the European Community in the framework of the Lifelong Learning Programme.

Full Applicaton Number of the project: 177267-LLP-1-2010-1-FR-ERASMUS-ENWA

Web site: http://www.isle-project.eu/

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STATE OF THE ART OF THE SUSTAINABLE DEVELOPMENT EDUCATION IN EUROPE. BRIEF SUMMARY OF THE INFORMATION PRESENTED IN THE SECOND WORKSHOP OF THE I.S.L.E. THEMATIC NETWORK.

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1. Introduction:

This paper is a brief summary of the information presented in the second workshop of the ISLE Thematic Network that it was held in Teramo (Italy) from 22 to 25 of February of 2011. It corresponds to the activities of the Work Package 2 titled "State of the Art: information collection concerning sustainable development in Life Sciences in Europe".

Two activities were carried out to collect the information about the state of the art of the Sustainable Development Education in Europe, the first was to develop a paper by each ISLE partner about de current situation of the Sustainable Development in the higher education of its country, and the second was to survey students, academic staff and people responsible for Sustainable Development affairs in each participant institution. The first was developed from November 2010 to January 2011 and the results were presented in Teramo in February 2011. The second activity has not finished yet and it will be presented in Malta in July of 2011.

In order to make uniform the information presented in the different papers, the guidelines were developed in the kick-off meeting that it was hold in Dijon in November of 2010. The content of these guidelines was the following:

1.- Sustainable Development (SD) policies in the country:

1.A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…). The following indicators must be included in the description:

- ✓ *Existence of specific national institutions about SD*
- ✓ *Existence of specific national policies about SD*
- ✓ *Existence of specific national legislation about SD*
- ✓ *Existence of specific subventions about SD*

1.B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation

systems, subventions…). The following indicators must be included in the description:

- ✓ *Existence of specific educational national institutions about SD*
- ✓ *Existence of specific educational national policies about SD*
- ✓ *Existence of specific educational national legislation about SD*
- ✓ *Existence of SD criteria in the accreditation systems of the university degrees*
- ✓ *Existence of specific subventions about education in SD*

1.C. *University policies and experiences (Obligation and possibilities of include SD competences or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process). The following indicators must be included in the description:*

- ✓ *Existence of specific university policies about SD*
  - ♦ *In the majority of the universities*
  - ♦ *In some universities*
  - ♦ *In few universities*
- ✓ *Existence of specific units or departments about SD*
  - ♦ *In the majority of the universities*
  - ♦ *In some universities*
  - ♦ *In few universities*

1.D. *Research policies related to SD (Specific programs, grants…). The following indicator must be included in the description:*

- ✓ *Existence of specific programs about SD*

2.- SD University Studies in the country:

2.A. *Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…). The following indicator must be included in the description:*

- ✓ *Existence of specific studies about SD:*
  - ♦ *In the majority of the universities*
  - ♦ *In some universities*
  - ♦ *In few universities*

2.B. *SD specific subjects in Life Sciences university studies (Not mentioned before, difference levels). The following indicator must be included in the description:*

- ✓ *Existence of specific subjects about SD in the degrees:*
  - • *In the majority of the degrees*
  - • *In some degrees*
  - • *In few degrees*

2.C. *SD practical activities (practices in enterprises or in institutions, course works, etc). The following indicator must be included in the description:*

- ✓ *Existence of specific practical activities about SD in the degrees*
  - • *In the majority of the degrees:*
  - • *In some degrees*

- *In few degrees*

2.D. *How do you think education in LS contribute to SD in your country.*

2.E. *Barriers for the integration of the SD and problems in the teaching methods*

3.- Relevant Institutions related to SD in the country:

3.A. *Research centers, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education,…)*

4.- International cooperation in ESD (Education in SD) the country:

4.A. *Policies (State and local governments, university...)*

4.B. *Experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...)*

5.- Good practices and relevant experiences in the Higher Education Institutions in your country:

5.A. *Activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD...)*

6.- Possible future actions in your country:

6.A. *How could be improved the education and research in SD in your country?*

6.B. *How could be integrated the concept of SD in the Life Science Studies?*

7.- References

These guidelines were accompanied with the following definitions:

- *Definition of Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other. The essence of this form of development is a stable relationship between human activities and the natural world, which does not diminish the prospects for future generations to enjoy a quality of life at least as good as our own (Mintzer, 1992)*

- *Definition of Life Sciences: The life sciences comprise all fields of science that involve the scientific study of living organisms, like plants, animals, and human beings. Studies considered as belonging to Life Sciences must be specific of these fields.*

In was also included the following list as an example of fields that fit to the previous definition of “Life Sciences”:

- *Agronomy and Agrotechnology*
- *Anatomy*
- *Animal Science*
- *Behavioral Sciences*
- *Bio (or agro)-engineering*
- *Biochemistry*
- *Biocomputing*
- *Biocontrol*
- *Biodynamics*
- *Bioinformatics*
- *Biology*
- *Biomaterials*
- *Biomechanics*
- *Biomedical sciences*
- *Biomolecular engineering*
- *Biomonitoring*
- *Biophysics*
- *Biopolymers*
- *Biotechnology*
- *Botany*
- *Cell biology*
- *Cognitive neuroscience*
- *Computational neuroscience*
- *Conservation Biology*
- *Developmental biology*
- *Ecology*
- *Entomology*
- *Environmental science*
- *Evolutionary biology*
- *Evolutionary genetics*
- *Fisheries*
- *Food science*
- *Forestry*
- *Freshwater Biology*
- *Genetics*
- *Genomics*
- *Health sciences*
- *Horticulture*
- *Immunogenetics*
- *Immunology*
- *Immunotherapy*
- *Limnology*
- *Marine Biology*
- *Medical devices*
- *Medical imaging*
- *Medicine*
- *Microbiology*
- *Molecular biology*
- *Morphology (biology)*
- *Mycology*
- *Nanotechnology*
- *Neuroinformatics*
- *Neuroscience*
- *Oceanography*
- *Oncology*
- *Optometry*
- *Ornithology*
- *Personalized medicine*
- *Parasitology*
- *Pharmacogenomics*
- *Pharmacology*
- *Physiology*
- *Plant sciences*
- *Proteomics*
- *Soil Science*
- *Structural biology*
- *Systems biology*
- *Tissue engineering*
- *Toxicology*
- *Veterinay Science*
- *Zoology*

The total number of analyzed countries was thirty, these countries were the following:

- *Austria*
- *Belgium*
- *Bulgaria*
- *Cyprus*
- *Czech Republic*
- *Germany*
- *Denmark*
- *Estonia*
- *Spain*
- *Finland*
- *France*
- *Greece*
- *Hungary*
- *Ireland*
- *Iceland*
- *Italy*
- *Lithuania*
- *Luxembourg*
- *Latvia*
- *Malta*
- *Norway*
- *Poland*
- *Portugal*
- *Romania*
- *Sweden*
- *Slovenia*
- *Slovak Republic*
- *The Netherlands*
- *Turkey*
- *United Kingdom*

Further information of each country can be found in the corresponding papers that have been also included in these proceedings.

2. Sustainable Development (SD) policies in Europe:

Most countries have a National Strategy for Sustainable Development, based on the guidelines defined in the Sustainable Development Strategy of the EU (SDS). The overall aim of the renewed EU SDS is "*to identify and develop actions to enable the EU to achieve continuous improvement of quality of life both for current and for future generations, through the creation of sustainable communities able to manage and use resources efficiently and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion".* Those countries that have not a National Strategy of SD yet, have institutions to develop it in the near future.

Figure 1 shows the percentage of countries studied in the I.S.L.E. project with policies related to Sustainable Development.

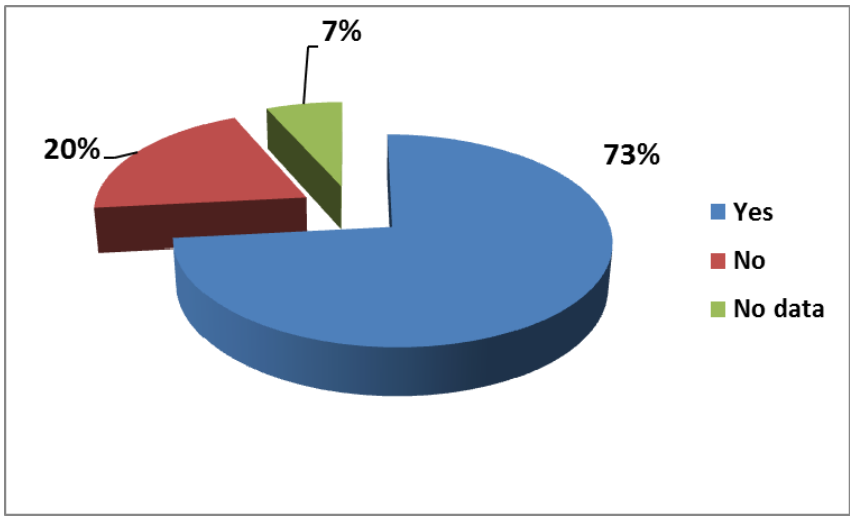

Figure 1. I.S.L.E. countries with policies related to Sustainable Development

Their national strategies have approximately the same priority areas: climate change and clean energy, sustainable transport, sustainable consumption and production, public health challenges, management of natural resources, social inclusion, demography and migration, and global poverty combating. They give priority to those which refer to the environmental dimension. Each state has different sustainable development commitments what in clearly reflected in their respective national strategies.

Most states have adopted their specific national strategy in the decade of 2000-2010. Those more veterans have renewed and strengthened their plans, so that in the later versions some of them have sustainability indicators that allow monitoring of the actions and policies undertaken. Some countries have institutional regular reporting based on these indicators.

A constant in the submitted papers is the implementation in the countries of the Agenda 21, used for the territorial plans, mainly at local level.

Those countries that have some type of federal, regional or autonomous territories follow sustainable development strategies similar to the national ones. It is rare that political responsibility of SD rests in only one ministry, but when this happens it is usually the ministry with greatest responsibility for the environment. This responsibility can also be taken by the institution in charge of economic matters.

Figure 2 shows the percentage of countries studied in the I.S.L.E. project with institutions related to Sustainable Development.

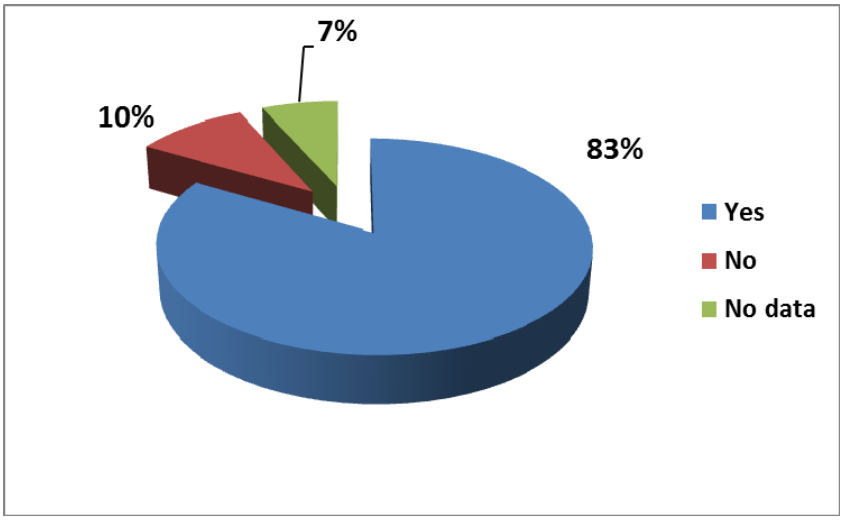

Figure 2. I.S.L.E. countries with institutions related to Sustainable Development

Most countries have a national commission with multi-departmental representation which coordinates the management and decision making oriented to political or legislative actions. It is also very common the figure of a High Council as an adviser of the national or regional government for SD affairs.

Many European states have legislation with environmental and sustainable development implications, which include the majority of the priority areas. However, only some countries have specific legislation on SD.

Figure 3 shows the percentage of countries studied in the I.S.L.E. project with legislation related to Sustainable Development.

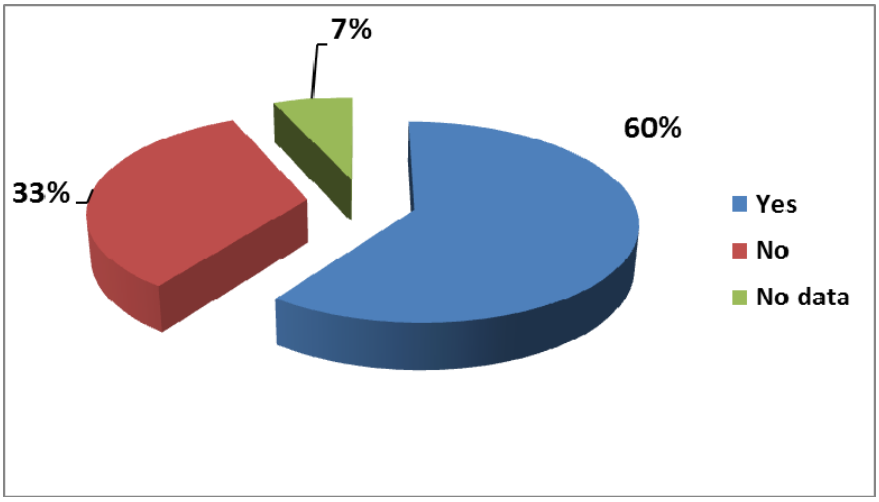

Figure 3. I.S.L.E. countries with legislation related to Sustainable Development

The grants related to SD are rarely specific for sustainable development. However they cover most economic sectors with implications in SD, such as energy, transport and production processes. These grants are offered by the state or regional administrations (coordinated solution is quite common) In some cases these grants are financed through the European Cohesion Policy. National Strategies for Sustainable Development highlights the importance of education in achieving sustainability goals, in some cases there are specific references to higher education at university. Several countries have policies of Education for Sustainable Development, which focuses on sustainability in any level of education.

Figure 4 shows the percentage of countries studied in the I.S.L.E. project with grants related to Sustainable Development.

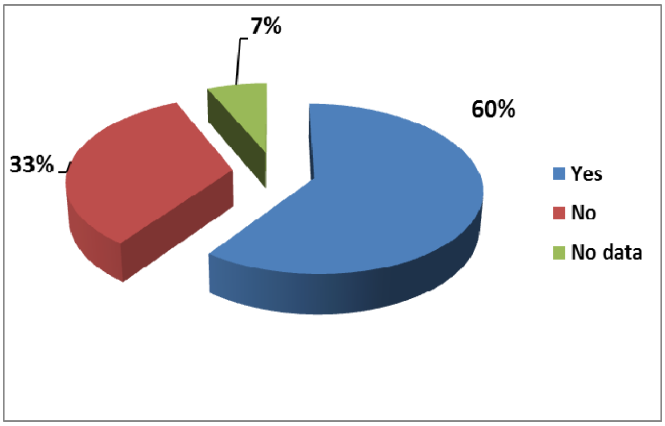

Figure 4. I.S.L.E. countries with grants related to Sustainable Development

3. National Higher Education Policies related to SD:

National Strategies for Sustainable Development highlights the importance of education in achieving sustainability goals, in some cases there are specific references

to higher education at university. Several countries have policies of Education for Sustainable Development, which focuses on sustainability in any level of education.

Almost all have an education strategy, which refers to the importance of Sustainable Development. In the majority of the cases this item is included in the field of environmental education. Usually to follow the proposal of UNESCO in its declaration of the Decade of Education for Sustainable Development (2005-2014).

It is increasingly common to see a council that coordinates and promotes the presence of concepts related to Sustainable Development in the curriculum at university level, although it could not be defined as a specific institution in this area.

Figure 5 shows the percentage of countries studied in the I.S.L.E. project with higher education policies related to Sustainable Development.

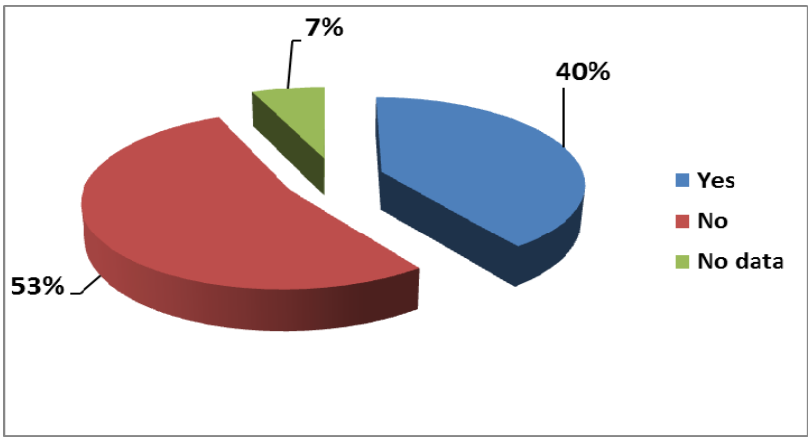

Figure 5. I.S.L.E. countries with higher education policies related to Sustainable Development

Despite specific legislation in Education for Sustainable Development is not common, this is usually implicit in environmental policies or strategies about general education or sustainable development.

There are some experiences about the introduction of SD concepts as a basic compulsory contents in at least one academic year and in all university degrees. However, more often this pattern is restricted to those degrees related to the environment, the economy or the territorial planning. Besides, it starts to appear some proposals to assess or certificate studies with Sustainable Development contents.

Figure 6 shows the percentage of countries studied in the I.S.L.E. project with higher education institutions related to Sustainable Development.

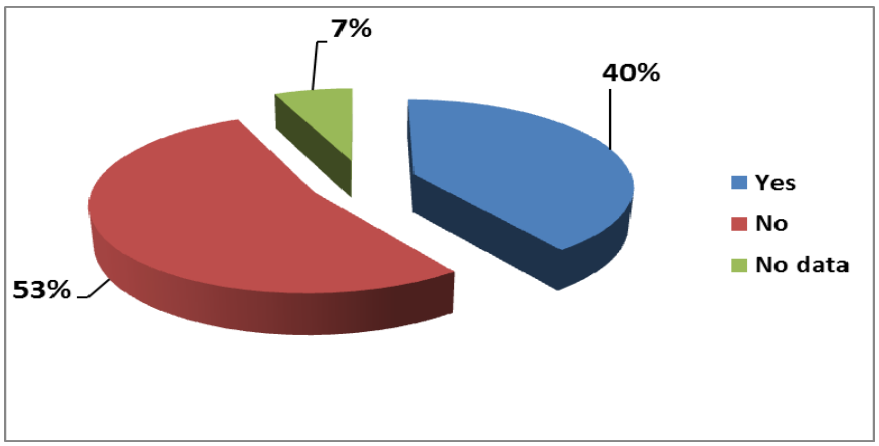

Figure 6. I.S.L.E. countries with higher education institutions related to SD

Figure 7 shows the percentage of countries studied in the I.S.L.E. project with higher education legislation related to Sustainable Development.

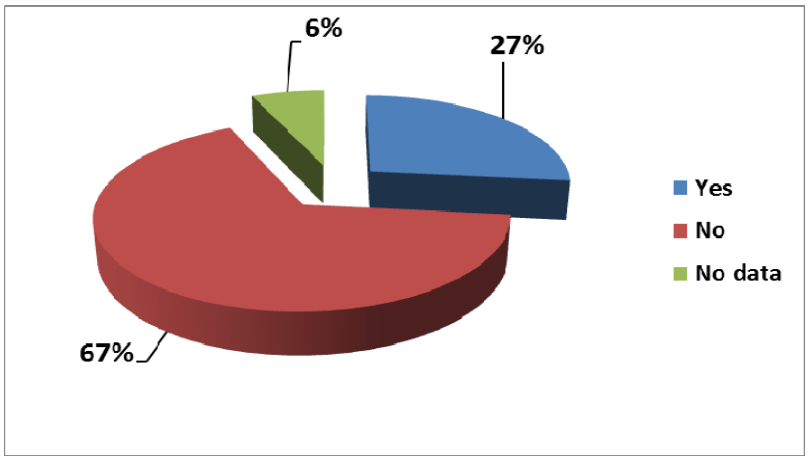

Figure 7. I.S.L.E. countries with higher education legislation related to SD

It is not common that the studied countries take into account sustainability criteria for the accreditation of higher education studies. In some cases this is considered indirectly.

In the papers it cannot be seen specific grants for education in Sustainable Development, although there may grants for environmental education as a concept that includes environmental sustainability as a basic principle.

Figure 8 shows the percentage of countries studied in the I.S.L.E. project with specific grants for education in Sustainable Development.

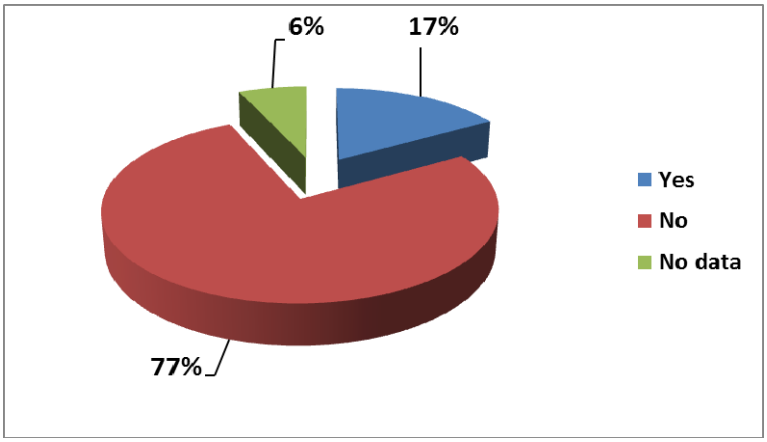

Figure 8. I.S.L.E. countries with specific grants for education in SD

4. University Policies related to SD:

Most universities have adopted institutional policies of sustainability and there are very few countries who do not express any kind of policy in this regard in any of their universities. On the contrary, there are some universities that are very advanced in adopting a comprehensive policy on university education based on the principles of Sustainable Development. There is a particular case in which by law will force universities to revise the syllabus and introduce at least the foundations of sustainable development in them.

Exceptionally, some universities have sought the level of excellence on this campus focused on sustainability. Also exceptionally, some universities adopt sustainability principles to join to the International Sustainable Campus Network (ISCN): http://www.international-sustainable-campus-network.org/index.php?id=78

Although there are not many university departments specifically devoted to the study, teaching or research on Sustainable Development, there are many departments that include the sustainability principles in their activities.

Figure 9 shows the different responses of the ISLE partners about the existence of university policies related to SD in each country.

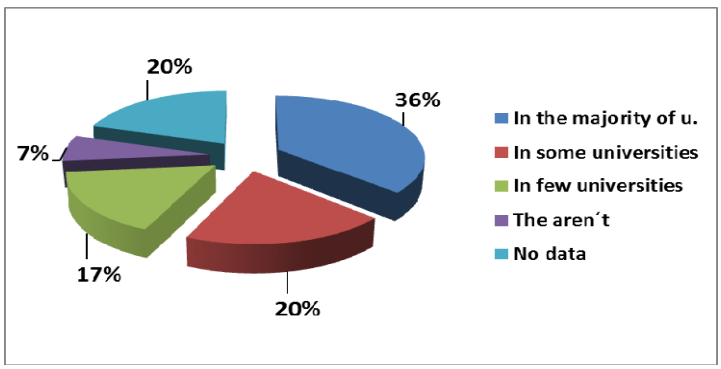

Figure 9. University policies related to SD in the participant countries

Figure 10 shows the different responses of the ISLE partners about the existence of SD departments in the universities of each country.

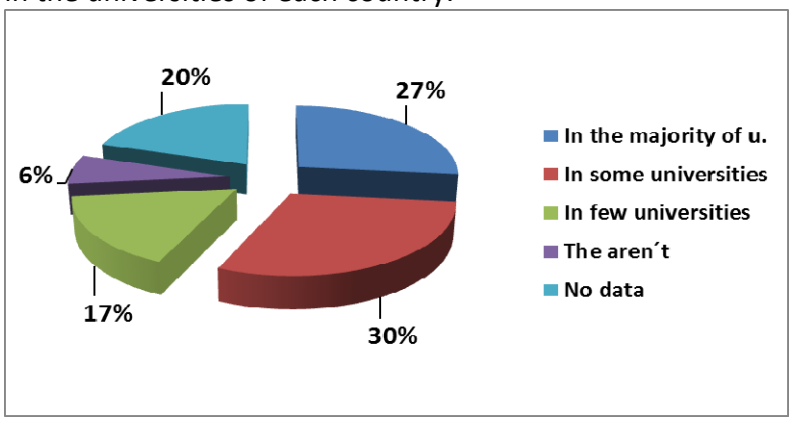

Figure 10. Specific units or departments about SD in the participant countries

5. Research policies related to SD:

Almost all countries and their universities have research programs for Sustainable Development or closely related topics. The funding of the research projects in most cases comes from the national or regional institutions with competences in research. At present Sustainable Development aspects are considered among the priority areas by the national institutions for research funding.

Figure 11 shows the percentage of studied countries with national research programs on SD.

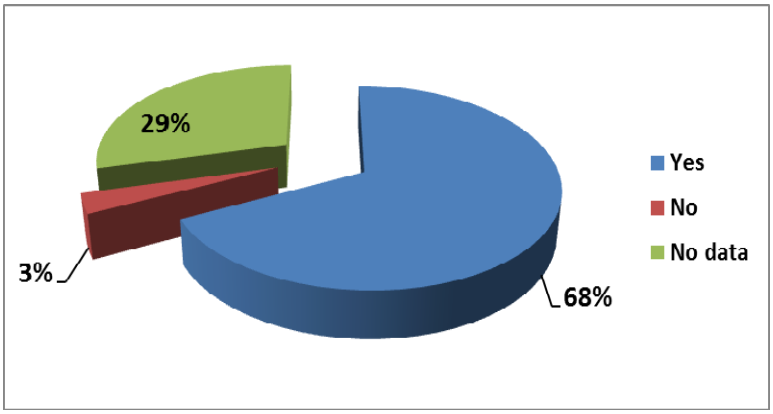

Figure 11. Percentage of studied countries with national research programs on SD

6. University Studies on SD in Europe:

Figure 12 shows the percentage of countries that have universities with Life Sciences studies about SD. For those countries which have these studies the number of universities is grouped in three intervals: the majority of the universities of the country, some universities of the country and few universities of the country.

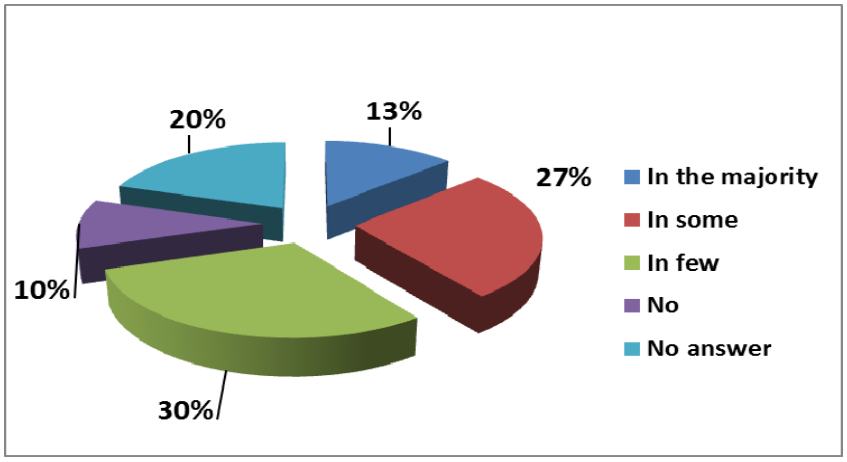

Figure 12. Percentage of countries that have universities (the majority, some, few) with Life Sciences studies about SD.

Figure 13 shows the percentage of countries that have universities with subjects about SD. The number of universities is also grouped in the three previous intervals: the majority of the universities of the country, some universities and few universities.

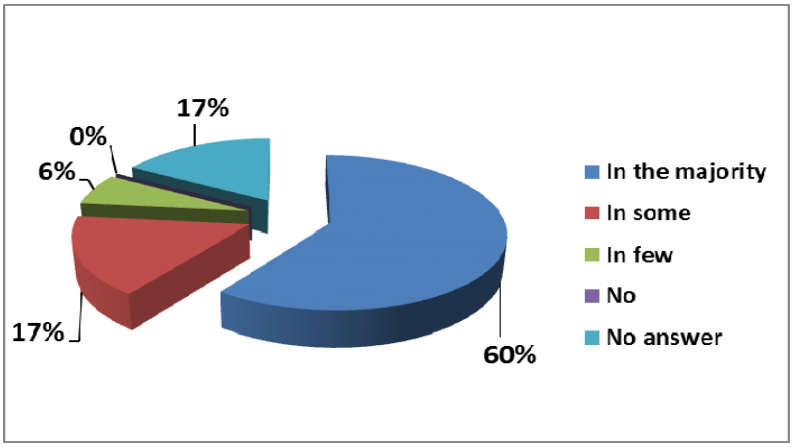

Figure 13. Percentage of countries that have universities (the majority, some, few) with subjects of SD.

Figure 12 reveals that in Europe there are few universities that have Studies of Life Sciences directly related to Sustainable Development. However, as can be seen in figure 13, there are many universities that have subjects about SD. Therefore it can be concluded that SD is a very common concept that is included in many studies of the Life Sciences field. This is due to SD is general and cross-cutting concept for many of these studies. However there are few countries with compulsory basic cross contents of SD in their studies of Life Sciences.

Figure 14 shows the percentage of countries that have universities with practical activities about SD. The number of universities is also grouped in the three previous intervals: the majority of the universities of the country, some universities and few universities.

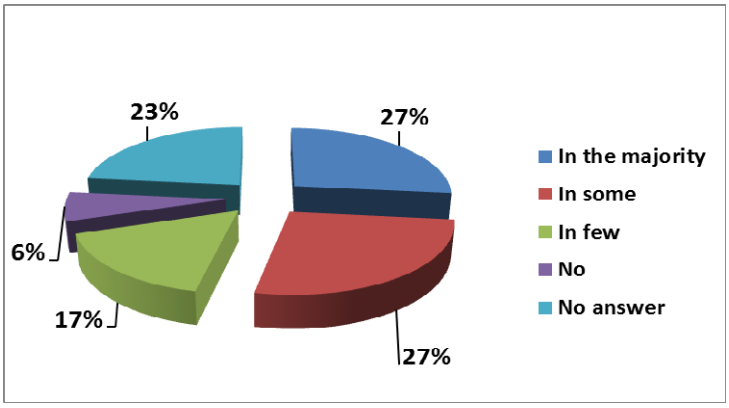

Figure 14. Percentage of countries that have universities (the majority, some, few) with practical activities about SD.

The previous figure has a high percentage of no answered questions due to the difficulty of obtaining information about the teaching activities of each subject. This has caused many authors could not concluded how many universities have this kind of activities.

The specific studies about Sustainable Development usually are postgraduate or specialized studies. The disciplines with more contents of SD are:

- Environmental Sciences
- Agronomy and Agricultural Engineering
- Health Sciences

Figure 15 shows the percentage of partners that think education in Life Sciences contribute to Sustainable Development in their countries.

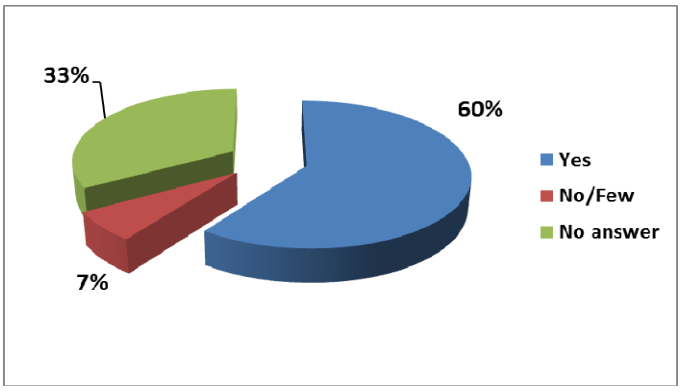

Figure 15. Percentage of partners that think education in Life Sciences contribute to Sustainable Development in their countries.

Figure 16 shows the percentage of partners that think there are barriers for integration of Sustainable Development in the Life Sciences Education.

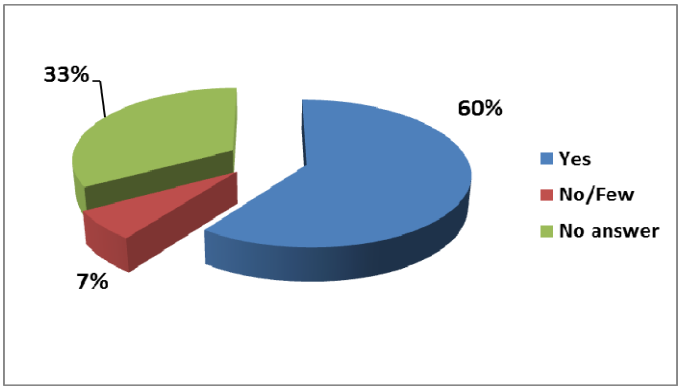

Figure 16. Percentage of partners that think there are barriers for integration of Sustainable Development in the Life Sciences Education.

The identified barriers are summarized in the following list:

- Few Flexible Education Structures
- Lack of comprehensive guidelines
- Lack or inadequate regulations
- SD is a General and Multidisciplinary Concept (less attention to specific field of study)
- Lack of cooperation between the different involved departments
- Lack of specialists
- Lack of academic staff training
- Lack of funding
- Production, consumption and waste patterns in the industrialized countries
- The concept of rational use of resources is not well understood
- Lack of awareness about the meaning and benefits of SD
- Lack of cooperation between the HE Institutions and their stakeholders
- Inadequate cooperation between industry and academia
- Lack of systematic ways for integrating SD in the teaching methods
- Concerns regarding an anticipated increase in workload
- Funding and support more oriented to specialized fields than to general ones like SD
- Excessive bureaucracy
- Lack of sense of urgency
- Quality and accreditation systems don't focus on SD

7. Relevant Institutions related to SD:

It has been obtained information of twenty seven countries from a total of thirty. All of them has relevant institutions related to Sustainable Development.

Most of countries have research centers, governmental institutions or NGOs. Sometimes these institutions are specific of Sustainable Development and others no. In Germany there are 194 research centers and governmental institutions focused on SD from which 64 do research elated to Life Sciences.

Some partners say there are companies or private institutions involved in this field (Lithuania, Portugal, Netherlands, Sweden...)

8. International cooperation in ESD (Education in SD):

Figure 17 shows the percentage of studied countries with policies about International cooperation in ESD.

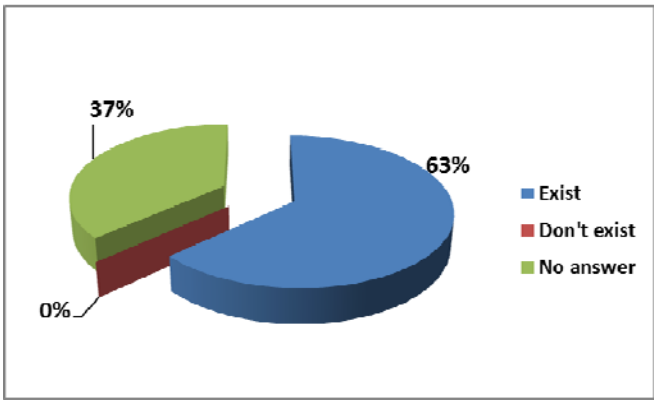

Figure 17. Percentage of countries with policies about International cooperation in ESD.

Figure 18 shows the percentage of studied countries with international experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...).

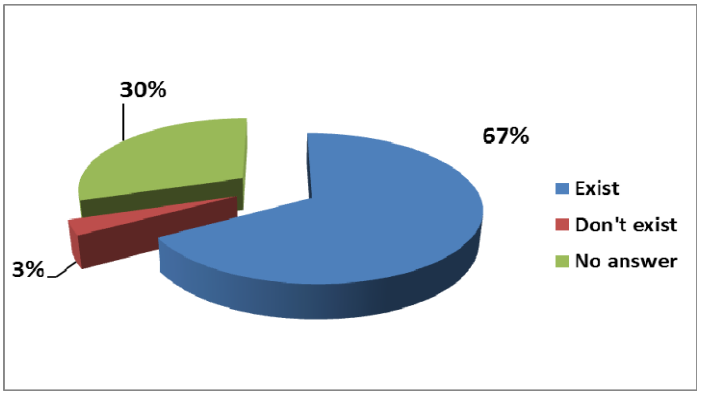

Figure 18. Percentage of studied countries with international experiences in ESD in Life Sciences.

Therefore it can be concluded that the majority of the studied countries have this kind of policies and experiences.

9. Good practices and relevant experiences in the Higher Education Institutions:

Most countries (80%) have responded this part of the study. Figure 19 shows the percentage of studied countries with information about good practices and relevant experiences related to Sustainable Development in the Higher Education Institutions.

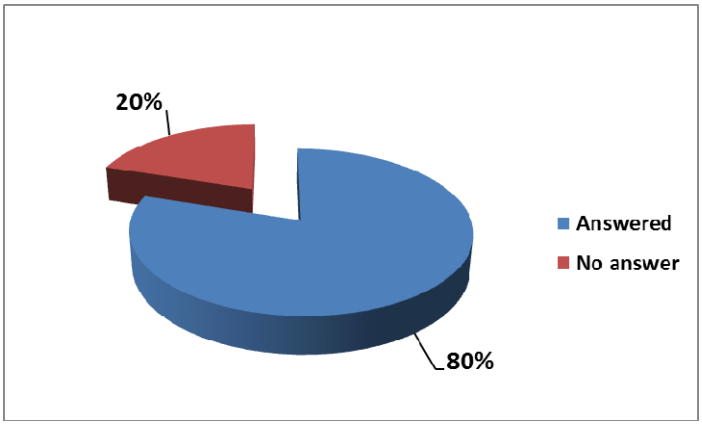

Figure 19. Percentage of studied countries with information about good practices.

The identified good practices and relevant experiences are summarized in the following list:

- Environmental management systems and certifications
- DHO (Dutch Foundation and Network for sustainable higher education) have developed an audit instrument called AISHE
- Methodology for material and energy flow accounting (MEFA) (Czech Rep.)
- Governmental programs for promoting and increasing awareness of sustainability
- Students associations and their activities
- Voluntary activities
- Research and educational innovation projects
- Courses and training activities about SD
- Conferences, seminars and meetings
- Subventions, competitions and awards for different sustainability aspects
- Responsible consumption policies and activities
- Waste management and pollution control policies and activities
- Energy saving and efficiency policies and activities
- Water saving policies and activities
- Sustainable Mobility initiatives
- Use of sustainable criteria in purchase decisions
- Multimedia projects
- Networks about ESD
- Agenda 21 implementation
- Websites, books and manuals about sustainable development
- Associations and institutions to promote good practices
- Tours to visit good experiences examples
- Exhibitions and open days
- Define and publish indicators
- Observatories about SD
- Learning scenarios
- Involvement of students in the teaching methods

10. Possible future actions:

73% of authors have included possible future actions oriented to improve the education and research in Sustainable Development in their countries. These actions are summarized in the following list:

- Implementation of the results of Thematic Networks like ISLE TN.
- By using the accumulated experience in this field of other EU universities.
- Increase cooperation between universities
- Tackling the barriers
- Plans or strategies for the SD integration in the university studies
- Address cross-sectional contents or transdisciplinary approaches
- Comprehensive learning programmes
- Optimisation of the organisation of studies and administration processes (Better integration of SD)
- Programs for working professionals
- Increase funding for education and research in SD
- Flexible educational structures
- Improve coordination between de involved departments, institutions, professors,…
- Consider ESD like a living and dynamic field
- Develop guidelines with indicators and publish them
- Periodic evaluation of the initiatives about SD
- Create a place for sustainable development in education and/or curricula.
- Develop and implement assessment, audit and certification systems, institutions and tools
- Develop observatories of SD
- Cooperation of HEI-s with NGO's and local communities dealing with various issues of SD
- Include SD in primary and second level schools
- Show to students, professors and in general to the society the benefits of SD
- Creation of institutions about SD in education
- Include SD criteria in the accreditation systems of the university studies
- Include SD criteria in the evaluation of calls for research or innovative educational projects
- Consider SD as a cross topic in Research
- Stimulate Research in SD
- Consistent longterm policies and adequate long-term instruments
- Incorporation of a SD subject as a complex of subjects realized as a project work or case study
- Probably future employers will demand that students with competences SD
- Teaching on sustainable development has to be related to actual trends in culture, research/education in business and public work.
- Academic Staff training in SD
- Involve companies and private institutions
- Integration of research and innovative methodologies in teaching
- Create university council and policy for SD
- Review curricula to identify, coordinate and improve SD aspects

Otherwise, the recommendations for the integration of the SD concept in the Life Science Studies are listed below:

- Implementation of the results of ISLE
- By using the accumulated experience in this field of other EU universities
- If employers state the demand on SD issues students will focus on such topic.
- Emphasize the significance of SD in Life Sciences within the elementary and secondary educational programs.
- Development of specific educational programs concerning SD in the Life Sciences at a University Level.
- Motivate professionals of Life Sciences to adopt the concepts of SD
- Include SD in the LS educational objectives
- Definition of guidelines and the promotion of good practices
- Encourage students to build a SD curriculum
- Increase practical experiences in SD in the university studies
- Defining guidelines and create projects for "sustainable campus", involving teachers and students
- Recommendations and examples of SD for different science areas
- Include a special subject of SD as a holistic matter.
- Promote and develop joint study programs related to SD
- Integration of social and economic aspects in Life Science Studies
- Review curricula to identify, coordinate and improve SD aspects
- Development of a concrete curriculum on SD topics

11. Conclusions

There was a very high participation of the partner institutions in the activities of the workpackage 2. Many data have been collected and will permit to establish the starting point of the ISLE works.

Most countries have a National Strategies for SD (73%) and institutions related to SD (83%), 60% of them have legislation about SD and also 60 % have grants about SD

Only 40% of the studied countries have higher education policies about SD, 40% have higher education institutions about SD, 27 % have legislation about ESD, 20 % have sustainability criteria in the accreditation systems of the higher education studies and 17% have specific grants for ESD. 68 % of the studied countries have research programs about SD.

Approximately one half of the universities have their own policies about SD and little less universities have specific departments about SD. There are few universities that have specific studies of SD but many universities that have specific subjects about SD. This is due to SD is general and cross-cutting concept for many of the Life Sciences University Studies. Due to the difficulties obtaining the information there are few information about the universities that have practical activities about SD. However given the collected data can be said that many universities have this kind of activities.

Most ISLE members think LS contribute to SD. However 60% ISLE members, 89 % from those that have gave their opinion; consider that there are important barriers for the SD integration in the LS studies. This barriers has been listed and commented.

Most countries have relevant institutions related to SD and most of them (63 %) have international cooperation policies and experiences (67 %) about SD

80% of partners have collected information about good practices. These practices has been listed and commented. In addition 73% of partners have given their opinion about how to improve the education in SD and its integration in the LS studies. The proposed measures have been also listed and commented.

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN AUSTRIA

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1.- Sustainable Development (SD) policies in Austria:

Sustainable Development as special strategy has already a long tradition in Austria's forest management and moved even to agricultural management for a considerable time before it became a common and modern notion in other branches and sectors of daily life. The Federal Governmental Inaugural Speech of 2008 [6] states that in all relevant fields of policy activities should focus on sustainability (economical, ecological, social, ethics and gender specific).

The Austrian Strategy for Sustainable Development, an initiative of the Austrian government [4] was based on work done by representatives of various ministries and experts of the social partners in Austria. An updated common framework for actions of the federal state and the provinces in Austria on the base of the EU-strategy for Sustainable Development was given in the government decision in June 2010 about the Austrian Strategy of Sustainable Development, ÖSTRAT [5]. It should give a common direction to the sustainable development activities of federal ministries and provincial governments in various sectors and enable a cross-level process.

Every two years from 2011 on a report ha s to pass the provincial and federal governments, combined with a monitoring with specific federal and also regionalised indicators. An external evaluation shall take place every four years and will give information about the effects of sustainability policies and activities.

Priority is given to climate protection, energy, transport, education for sustainable development (ESD), social inclusion, promotion of sustainable consumption and production patterns and good governance with corresponding activities in 7 fields and cross cutting policies. The core activities in the field of education comprise for example the elaboration of an Austrian strategy for Education for Sustainable Development on the base of the UNESCO 2004 guideline scheme, the Communication of the UN Decade for Education for Sustainable Development 2005 – 2014, a school network focusing on ESD, an eco label for schools and teacher training colleges, an award for sustainable universities, a two years train the trainer university course and an environmental education forum.

The institution at the centre of the official Austrian Sustainable Development activities is the Federal Ministry for Agriculture, Forestry, Environment and Water Management in Vienna which is responsible for the "Austrian Strategy for Sustainable

Development". It runs the homepage www.nachhaltigkeit.at. Together with the Federal Chancellery [3] it coordinates other committees for the coordination of SD. A list of ministries focused also on SD can be found in Annex A, p 30.

Therefore, the values of the indicators "1.A" of the guidelines for Austria are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

At the level of higher education a quick development took place in the last years in Austria. Several colleges of higher education or universities of applied sciences deal with sustainable development in life sciences. Concrete examples are given, as follows in Annex A, p 30.

Therefore, the values of the indicators "1.B" of the guidelines for Austria are:

- ✓ Existence of specific educational national institutions about SD
- ✓ Existence of specific educational regional (not national) policies about SD
- ✓ Existence of specific educational regional (not national) legislation about SD
- ✓ Existence of SD criteria in the accreditation systems of the university degrees
- ✓ Existence of specific subventions about education in SD

The majority of Austrian universities in Life Science has been taking in the challenges which go along with the concept of SD. Firstly, their research includes all fields of SD - starting with resource use, through with mobility concepts to social or cultural sustainability. These experiences are included in the teaching and education of future generations. Since the implementation of the University Law 2002, universities have revised their curricula so that SD themes of were included, new degree programs, courses and lectures with the focus on SD or partial aspects of SD were developed and the aims of a "sustainable university" were fixed in their development plans, strategic aims, mission statements and especially in their internal organization. Additionally, the existing knowledge is used by universities as "first user", for instance to improve their resource efficiency. Thus, other public and private universities can take a leaf out of the universities' book. Concrete examples are given, as follows in Annex A, p 34.

Therefore, the values of the indicators "1.C" of the guidelines for Austria are:

- ✓ Existence of specific university policies about SD: In the majority of the universities
- ✓ Existence of specific units or departments about SD: In the majority of the universities

The concept of sustainability is a constituent element of future-oriented research and development. Research plays a key role in the process of sustainable development. In addition to innovation in the field of technology, structural and social innovation will be of great importance. Also the Integration of Networks and cooperation's to support sustainable development are gaining importance at national and at EU level.

In Austria the FORNE-Initiative was established to enhance and support the research for sustainable development. The Austrian Ministries (BMVIT, BMBWK, BMLFUW) together with the Council for Research and technological development developed a common strategy and a steering committee to coordinate the activities of the programs concerning research for sustainability.
The establishment of the Austrian Research Promotion Agency (FFG) has brought a greater degree of order into the funding landscape, which in the past has frequently been criticised for its complexity and fragmentation. This institution is also creating synergies by bundling the rich tradition of bottom-up funding with programmes that set thematic priorities and optimize the co-operation structures within the innovation system. It now concentrates a highly diversified funding portfolio under a single roof: from funding upon application to support for the networking activities of small and medium-sized companies, from the competence centres to the university spin-off programme AplusB, from thematic programmes such as the NANO Initiative or the Impulse programmes on sustainability or traffic technologies, to consulting services regarding participation in European and international research programmes and co-operations.
The FFG thus forms a triumvirate of research and technology promotion together with the Austrian Science Fund (FWF), and the Austria Wirtschaftservice Gesellschaft (AWS). The FWF is the biggest financier of basic research beside the universities, while the FFG focuses upon application-oriented research.
The National Foundation for Research, Technology and Development was established as an instrument of sustainable research financing with a focus on supporting long-term, interdisciplinary research programmes. Since 2004 it has distributed EUR 25 million annually. The Foundation is financed from interest income from the capital of the Austrian National Bank and the ERP Fund dedicated for this purpose.

Concrete examples of programs are given in Annex A, p 36.

Therefore, the value of the indicator “1.D” of the guidelines for Austria is:
- ✓ Existence of specific programs about SD

2.- SD University Studies in Austria:

Austrian universities in Life Science are obliged to implement SD in their teaching and have developed further their didactic as demanded. As a result, there are a few degree programs which are directly treating SD but a large number of lectures in many courses actually treat aspects of SD and there are only few practical activities with a special focus on SD – as described in the following paragraphs. An overview is given in Annex A, p 37ff.

Therefore, the value of the indicator “2.A” of the guidelines for Spain is:
- ✓ Existence of specific studies about SD: In few universities

Therefore, the value of the indicator “2.B” of the guidelines for Austria is:
- ✓ Existence of specific subjects about SD in the degrees: In the majority of the degrees

Practices or practical seminars at universities see Annex A, p 38. Furthermore, since 1993 a lot of enterprises and institutions have been EMAS[1] certified, also BOKU [1]. Furthermore, enterprises and institutions compile a sustainability report[2] (for instance University of Graz) and active in Corporate Social Responsibility (CSR, Initiative **CSR Austria** - today **respACT**[3]).

Therefore, the value of the indicator "2.C" of the guidelines for Austria is:

- ✓ Existence of specific practical activities about SD in the degrees: In the majority of the degrees

Education in Life Science plays an important role in Austrian society – lessons learned, for instance, deal with aspects of resource use and a human health. They are the education facilities for future decision and policy makers, and their students have an important multiplying function. At educational institutions in Life Science there is not only teaching (and research) alone but also things are written, heated, cleaned and eaten. As a result, educational institutions in Life Science have a model role for the whole educational region. They are a social, technological and political knowledge base for the future. So there is a very wide range of courses at the BOKU covering various issues of the very nature orientated Austria. For example in the field of agriculture lot of courses are dealing with sustainable farming and using of regional resources. According to these functions, educational institutions in Life Science should act to perform as pioneers in SD of society at the local as well as the global level. Additionally, educational institutions in Life Science contribute, through their actions, to the implementation of various international strategies and processes, such as the Lisbon and Gothenburg strategies of the European Union or the Bologna process as well as to the European learning and research region.
The concept of SD is a very complex one and so far still a theoretical one. One may say that there is the nature of the concept of SD which makes it difficult to put it in every single subject. So it is a two edged sword. Nevertheless, partial aspects are very well integrated but the interactions and links between the single aspects are not well analysed. A main challenge is to move onwards from multidisciplinary, then to interdisciplinary, and to end with transdisciplinary approaches in research and teaching. Each approach offers the students a progressively more holistic view of the world, making them understand that their decisions whether economic or political can have repercussions on society and nature. Barriers are based on (i) the lack of information and the availability of and access to knowledge, (ii) the willingness and ability to think contextually, and (iii) the acceptance and courage to change behaviour.

1 http://www.emas.gv.at/

2 http://www.nachhaltigkeitsbericht.at/nachhaltigkeitsbericht/berichte.php?oew=372&uid=372

3 http://csr-news.net/directory/category/world/europe/western-europe/austria

3.- Relevant Institutions related to SD in Austria:

Beside the institutions mentioned in chapter 1 various other public and private research centres, enterprises, associations and NGOs are involved in sustainable development and mostly are also linked to in education in life sciences, relevant examples

- Austrian Business Council for Sustainable Development (www.respact.at)
- Austrian Institute of Economic Research (Wirtschaftsforschungsinstitut, www.wifo.at)
- Environmental Agency Austria (Umweltbundesamt, www.umweltbundesamt.at)
- Federal Institute for Less Favoured Areas and Mountainous Areas (BABF, Bundesanstalt für Bergbauernfragen, www.berggebiete.eu)
- Federal Institute of Agricultural Economics (AWI, Bundesanstalt für Agrarwirtschaft, www.awi.bmlfuw.gv.at)
- LFZ Raumberg-Gumpenstien (Research and education institute for alpine agriculture, www.raumberg-gumpenstein.at)
- International Institute for Applied Systems Analysis (IIASA, www.iiasa.ac.at/)
- Sustainable Europe Research Institute (SERI, www.seri.at)
- Umweltdachverband (www.umweltdachverband.at)
- Das Ökosoziale Forum: The Ecosocial Forum, a Think-tank and non-profit organisation in Austria, chaired by the former EU Commissioner Franz Fischler, is devoted to promote the concept of an "Ecosocial Market Economy". Ecosocial Market Economy refers to an economic model, which is based on establishing a balance between economic, ecological und social sustainabilty in the respective cultural context. (http://www.oekosozial.at/)
- BFW Federal Research and Training Centre for Forests, Natural Hazards and Landscape http://bfw.ac.at/
- The Austrian Society for Environment and Technology (OGUT) is a non profit organisation, formed as a scientific platform for environment, economy and administration. It was founded in 1985 with the goal to overcome the communicational barriers in the conflict areas of economy and ecology.
- The Robert-Jungk-Bibliothek für Zukunftsfragen (JBZ) is a centre for Information and Dialogue for sustainable future issues.
- SOL – People for solidarity, Ecology and Lifestyle, www.nachhaltig.at
- www.iufe.at a transdisciplinary think tank for discussion , information, education and dialog

Further links are

- www.nachhaltigkeit.at
- www.oekoweb.at
- www.portal.ac.at
- www.nachhaltigkeit.info/artikel/europaeische_politik_6/EU_Staaten_67/sterreich_995.htm
- www.viacampesina.at

- www.attac.at
- www.fian.at

4.- International cooperation in ESD (Education in SD) in Austria:

Austria is as member of the European Union is obliged to EU directives and regulations concerning SD at al levels of institutions. Beside this various associations and NGOs are linked to their corresponding international organizations very well.

Experiences in ESD in Life Science, which are worth mentioned, are
(i) In summer term 2007 the doctoral school Sustainable Development has started at the University of Natural Resources and Life Sciences Vienna. After a three years period the project come to an end. The Doctoral School was an initiative of the University of Natural Resources and Life Sciences (short BOKU) and the research program proVISION of the Federal Ministry for Science and Research (bm.wf), the provinces of Vienna, Lower Austria and Styria and the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). The projects were framed within the concept of sustainable development, focusing on different aspects concerning climate change, quality of life, spatial development and tourism. The program consisted of 16 doctorate projects and post-doc project. In the course of the doctoral school the participants attended an inter- and transdisciplinary doctoral study program at the BOKU. Furthermore they could benefit from writing a dissertation in connection to a great research network. Due to the success of the first phase (2007-2010) efforts are currently made in order to continue the doctoral school and start the next phase October 2011.
(ii) The Euroleague for Life Sciences (ELLS) is a network of universities, which focus on resource management, agriculture and forest science, life science, veterinary science, food science and environmental science. In the network resources and expertise are arranged that possibilities and skills of the included institutions are optimally used and systematically enhanced. Euroleague offers international master programs, summer schools/intensive programs, scientific conferences of students, exchange programs and awards, international networking and training and trainer mobility. Included in this network is University of Natural Resources and Life Sciences, Vienna (AT); University of Copenhagen, Faculty of Life Sciences (DK); University of Hohenheim (DE); Swedish University of Agricultural Sciences (SE); Wageningen University (NL); Czech University of Life Sciences Prague (CZ); University for Life Science in Warsaw (PL).
(iii) With the initiative Sustainability4U (http://www25.uni-graz.at/rceaawww/intro.html) four universities of Austria (University of Graz, Medicine University, Art University and University of Technology) cooperate to act local, national and international as a model network for sustainability in Graz.

5.- Good practices and relevant experiences in the Higher Education Institutions in Austria:

Over the last years a lot of initiatives and projects which are a benchmark in the case of **sustainable** higher education at universities of LS have been carrying out. Concrete examples are mentioned under topic 2.
Activities to implement or promote SD, which are worth mentioned, are (i)The **Austrian Sustainability Award** is a joint initiative of the Federal Ministry of Agriculture, Forestry, Environment and Water Management and the Federal Ministry of Science and Research and was established in 2007 as a means of promoting and increasing awareness for sustainability processes within Austrian universities (www.nachhaltige-uni.at) and (ii) **Ecosocial Students Forum** (OESSFO) is a group of students and graduates who get involved with concerns about Global Marshall Plans and Ecosocial Market Economy and makes those ideas tangible amongst students via events and actions as well as the project Master thesis portal "Go EcoSocial" (http://www.oessfo.at/).

6.- Possible future actions in Austria:

In the future, teaching has to increasingly address cross-sectional issues or transdisciplinary approaches. An example for this is the first series of lectures offered by the Centre for Global Change and Sustainability which was met with great interest from students. A similar approach is to be applied in the areas of risk and safety, biotechnology and nanotechnology as well as energy and climate change. Furthermore, the inter-institutional teaching cooperation has to be intensified in terms of consolidation and thematic extension. Teaching collaboration is also envisaged for the area of risk and safety research. Further propositions for teaching include: (i) Broadening of the doctoral programs and intensive integration of doctoral candidates into teaching activities; (ii) a comprehensive lifelong learning programme in the core thematic fields at educational institutions is to be developed in collaboration with external partners; (iii) optimisation of the organisation of studies and administration processes. A goal should be to develop a database to support admission processes and the recognition of study credits; (iv) in the coming years, there is a need for study programs for working professionals which will be continuously extended.

Austrian institutions in Life Science will give exclusive priority to those research areas that are deemed promising by the international scientific community. For this purpose, Austrian institutions in Life Science will commission peers to evaluate future research projects prior to implementation. This is to ensure that future research projects are in tune with modern times.

In Austria the concept of SD has already been integrated in Life Science studies. Evidence is given by sustainability reports, development plans or knowledge balances of universities and the establishment of departments and institutes dealing with SD,

additionally aspects of SD, as well as the concept as a whole, are implemented in lectures and further actions such as Austrian Sustainability Award.
Furthermore, it is the market that drives. Students are doing degrees for their future jobs. If they feel that SD issues give them good job opportunities they will learn more about SD issues. If employers state the demand on SD issues students will focus on such topics.

7 References

[1] BMLFUW (2010), IV. Bericht an den Nationalrat über die Anwendung der EMAS-Verordnung und die Vollziehung des Umweltmanagementgesetzes, www.emas.gv.at/filemanager/download/66908/, 14.12.2010

[2] BOKU WISSENSBILANZ 2008 (2008), http://www.boku.ac.at/fileadmin/_/H13/Publikationen/Wissensbilanzen/Wissensbilanz_2008/WB08_screen.pdf

[3] Federal Chancellery and Federal Ministry for Agriculture, Forestry, Environment and Water Management (2007), First National Report on Implementing the EU Strategy for Sustainable Development, Vienna, http://www.nachhaltigkeit.at/article/articleview/72527/1/26470, 9.12.2010

[4] Federal Ministry for Agriculture, Forestry, Environment and Water Management (2002), Strategy for Sustainable Development, an initiative of the Austrian government, Vienna, www.nachhaltigkeit.at

[5] Federal Government of Austria (2010), Österreichische Strategie für Nachhaltige Entwicklung, Ministerratsbeschluss Juni 2010, http://www.nachhaltigkeit.at/article/articleview/84404/1/25541, 10.12.2010

[6] Regierungsprogramm 2008-201, Republik Österreich, http://www.bka.gv.at/DocView.axd?CobId=32965, 13.12.2010

Annex A

List 1 Ministries with relevance for SD in life sciences

Federal Ministries with direct relevance for sustainable development in life sciences, higher education:

- Federal Ministry for Agriculture, Forestry, Environment and Water Management is directly responsible for strategies and coordination of forestry, agriculture, rural development, water management, and environment, http://www.bmlfuw.gv.at/en
- Federal Ministry of Health has an eye on sustainability in health, quality of food, genetic engineering, animal protection, veterinary medicine, http://www.bmg.gv.at/
- Federal Ministry of Labour, Social Affairs and Consumer Protection deals with sustainable consumption, certifications, http://www.bmask.gv.at/cms/siteEN/

Federal Ministries with indirect relevance for sustainable development in life sciences:

- Federal Chancellery (http://www.bka.gv.at/site/3521/default.aspx, coordination of networks, see below)
- Federal Ministry of Finance (http://english.bmf.gv.at/Ministry/_start.htm, financing programs, policies)
- Federal Ministry for Economy, Family and Youth (http://www.bmwfj.gv.at/Seiten/404.aspx, sustainable economic development)
- Federal Ministry for Education, Arts and Culture (http://www.bmukk.gv.at/, education on sustainable development in schools)

9 Provincial governments with sustainable development coordinators**:**

- Government Burgenland (www.burgenland.at)
- Government Carinthia (www.umwelt.ktn.gv.at)
- Government Lower Austria (www.noe.gv.at)
- Government Upper Austria (www.umweltakademie.at, www.agenda21-ooe.at)
- Government Salzburg (www.salzburg.gv.at)
- Government Styria (www.nachhaltigkeit.steiermark.at)
- Government Tyrol (www.tirol.gv.at/nachhaltigkeit)
- Government Vorarlberg (http://www.vorarlberg.at/zukunft/)
- Government Vienna (www.umweltschutz.wien.at)

Sustainability Coordination Conference: Coordination of activities on federal and provincial level, with a special group for Local Agenda 21.
Committee for a Sustainable Austria: Coordination various activities on federal level.
Forum for a Sustainable Austria: Cooperation among governments, representations of interests, unions and management, science and society.
Stakeholder network of Sustainable Development: coordinated by the Federal Ministry for Agriculture, Forestry, Environment and Water Management and the provincial coordination responsible at the government of Lower Austria

List 2 Higher education or universities of applied sciences dealing with sustainable development in life sciences

1. http://www.fachhochschulen.at/FH/Studium/Nachhaltige_Energiesysteme_2848.htm
   http://www.fh-burgenland.at/pdf/infopool/lvuebersicht_ma_nes.pdf
   FH-Burgenland (Pinkafeld)
   Study Course Master Level "Sustainable Energy Systems" (Nachhaltige Energiesysteme), 4 Semester
   Modules for choice include Biomass, water as energy source, sun as energy source, wind as energy source, geothermy (each module 9-11 ECTS)

2. http://www.technikum-wien.at/fh/institute/erneuerbare_energie/team/schidler/publikationen/
   http://www.technikum-wien.at/studium/

http://www.technikum-wien.at/en/study_programs/master_s/environmental_management_and_ecotoxicology/

FH-Technikum Wien

Study Course "Urban Renewable Energy Technology" (Bach.) "Urban Renewable Energy Systems" (Mas.), focus on renewable energy with emphasis on urban requirements. "Institute of renewable energy" at the FH-Technikum Wien

The Institute of renewable energy involves into research and consultant projects in renewable energy in accordance with future demands. Partner in the "Internal Energy Agency"

Study Course "Environmental Management and Ecotoxicology" (Mas.)

The course provides skills and knowledge necessary to combine technical, economic, scientific and legal aspects in order to develop sustainable solutions.

"Economic growth is determined in large part by factors such as competitiveness and quality of location. When these factors are defined as goals, however, they carry with them risks for the environment, because achieving them usually involves the increased consumption of resources, higher production output and larger volumes of waste, and the use of hazardous materials and technologies that harm the environment. More and more companies from a wide range of industries are recognizing these risks and their responsibilities, and are utilizing the opportunities that arise from implementing environmental engineering and management systems and ecotoxicological methods." (Study course description)

Sustainable business practices (1.5 ECTS)

Life cycle management (3.0 ECTS)

3. http://wwww.tulln.fhwn.ac.at/index.php?id=137
http://www.tulln.fhwn.ac.at/pdf/Degree_programme_description.pdf

FH-Wiener Neustadt (Campus Tulln)

Study Course "Biotechnical Processes" (Bach. & Mas.), main focus on Environmental Technology and Monitoring. Development of sustainable monitoring systems (Biochips, "New mobile system for organic carbon water monitoring without Freon")

Module "Environmental Biotechnology" and "Cell factory":

Energy from renewable sources, clean-up of pollution, biotechnology in the production chemical compounds (replacement of conventional processes

4. http://www.fachhochschulen.ac.at/de/studienangebot/europaeische_energiewirtschaft_1
http://www.fh-kufstein.ac.at/eng/Bachelor/Unsere-Studiengaenge/Europaeische-Energiewirtschaft-VZ

FH-Kufstein

Study Course European Energy Business (Bach. & Mas) (Degree in art of business), focus in developing long-term solutions for a safe, climate-friendly and above all economic energy supply.

Deepening insight into the energy business, renewable and fossil energy. Sustainability as rationale concept for resource saving energy use. Innovation in energy use as management tool for success in the management of future challenges.

5. http://www.fachhochschulen.at/FH/Studium/Nachhaltigkeit_in_der_Bautechnik_3210.htm
http://www.fh-campuswien.ac.at/en/studies/construction_engineering/master/sustainability_in_civil_engineering/overview/
http://www.fh-campuswien.ac.at/en/the_fh/news/?full=1147&news_filter=als_ba_bioeng

FH-Campus Vienna

Study Course "Sustainability in Civil Engineering" (Mas.), sustainability is geared to the needs of people and the environment, it is forward-looking and is also ever more demanded in the construction sector - a continuous market growth is to be expected. “Sustainable construction” requires cross-linking of the complex network of technical, ecological, economic and social aspects.

Sustainable sourcing (3.0 ECTS), Sustainable urban engineering concepts (3.0 ECTS)

Sustainable construction (3.0 ECTS)

Typical working areas for graduates are the maintenance and renovation of buildings, dealing with environmental and energy questions and material and resources management, such as recycling and disposal of waste building materials.

Study Course "Bioengineering" (Bach.)
The degree programme “Bioengineering” is a practically-orientated complement to the courses on offer at the University of Natural Resources and Applied Life Sciences, with which a close cooperation exists. The biotechnology industry’s demand for well-trained experts with a good scientific background is high also in the international job market. We prepare committed young students ideally for these demands from business and research.

Study "Molecular Biotechnology" (Bach. & Mas.)
Medicinal Biotechnology in cooperation with the University Vienna

6. http://www.fh-salzburg.ac.at/no_cache/bachelor/wirtschaft-tourismus/innovation-management-im-tourismus/news/news-detail/news/Touristisches_Know_How_fuer_Asien/
http://www.fachhochschulen.ac.at/de/studienangebot/holztechnologie_holzwirtschaft
http://www.fh-salzburg.ac.at/en/master/wood-biogene-technologies/forest-products-technology-management/facts/
http://www.fhs-forschung.at/index.php?id=17
FH-Salzburg
Study Course "Innovation and Management Tourism" (Bach.), 2nd prize "Sustainability Award 2010" (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft sowie das Bundesministerium für Wissenschaft und Forschung) for participation in the research project "Asia Invest – Strengthening the Capacities of SMAPs (Small and Medium Sized Accommodation Providers)"

Study Course Forest Product Technology & Management (Mas.)
Focus on production and development of sustainable products and implementation of corresponding technologies. It covers also bio-energy issues.
"The effective utilization of materials and energy resources is becoming an increasingly important challenge for the economy and society. One way companies can react to this situation is to develop new materials and products from available and sustainable natural resources. Improvements in profitability and efficiency (cost effectiveness) as well as the modernization of existing methods and technologies is and will be crucial for leading companies."
Centre for future studies (Zentrum für Zukunftsstudien)
Research projects in the area "Future: Quality of Life".
Research for tools to study futurology systematically

7. http://www.studium.at/31480-unesco-auszeichnung-fuer-projekt-nachhaltige-tourismusentwicklung-der-fh-joanneum
http://www.fh-joanneum.at/aw/home/leitbild/Standorte_FH/~bedc/badgleichenberg/?lan=en
FH Joanneum
Campus Bad Gleichenberg
Study Course "Health Management in Tourism" (Bach. & Mas.), change Management und Sustainability (2 ECTS)
Project Sustainable development in tourism (UNESCO award and winner "Sustainability Award 2010").

Campus Graz/Kapfenberg
Study Course "Energy, Transport and Environmental Management" (Bach.)
Project "Ökotopia" (Various aspects of resource conservation and feasibility studies for sustainable urban development)

8. http://www.fachhochschulen.ac.at/de/studienangebot/tourismusmanagement_und_freizeitwirtschaft_tourism_and_leisure_management
IMC FH-Krems
Study Course "Tourism and Leisure Management" (Bach. & Mas.), "The rising importance of leisure and recreation as well as open minded attitudes provide for a promising and thrilling future for tourism, whilst the fast changing world economy and the global political situation create new markets. Tourism will, therefore, add new jobs and secure employment. Today´s tourists seek the highest quality. Thus, quality and sustainable tourism needs professionals who proactively capitalize on global business challenges." (Study course description)
Sustainable Tourism Development (2 ECTS)

Study Course "Medical and Pharmaceutical Biotechnology" (Bach. & Mas.)
"Deepened knowledge of biomedicine and skills and competences needed for the development and production of biotechnological products. Work areas of graduates stretch from the planning and conducting of biotechnological processes (fermentation) to biomedical and analytical testing, to coordinative activities in production, quality control, registration of pharmaceutical products and also to subject-specific marketing and distribution." (Study Course description)

9. http://www.mci.edu/en/study-program/bachelor/engineering-environmental-biotechnology
MCI Innsbruck,
Study Course "Engineering, Environmental & Biotechnology" (Bach. & Mas.), "Graduates who have majored in environmental technologies typically become involved in the interdisciplinary relationships between natural science, engineering and the impacts of pollutants on man and the environment. They make use of a wide range of environmental engineering processes, from water and air pollution control to residual waste treatment and alternative and renewable energy. Graduates are involved in analyzing pollutants and utilizing the results for the technical solutions needed to reduce impacts on the soil, water and air. They are also responsible for monitoring processing plants and for due observation of the relevant codes and laws. This high-level interdisciplinary program equips graduates to work in a wide range of fields in which environmental protection plays a critical role." (Study Course description)
Focal Subject s of Environmental Engineering (37 ECTS)
Focal Subject s of Biotechnology (37 ECTS)

10. http://www.fh-ooe.at/
http://www.fh-ooe.at/campus-wels/
http://research.fh-ooe.at/de/sciencefield/field/5368
FH-Oberösterreich
Study Course "Bio- and Environmental Engineering" (Bach. & Mas.), biotechnology is important in the chemical, pharmaceutical and food industries. Environmental technology covers important areas such as cleaning of water, air and earth as well as prevention of pollution in all fields.
Career profiles include (1) the development and operation of components and plants in Bio-and Environmental Process Engineering, (2) planning and operation of biotechnological production in the pharmaceutical, farming and food industries, (3) planning and implementation of energy-efficient and ecological energy systems The study course offers the opportunity of specialization in either Biotechnology or Environmental Engineering. Core subjects are Environmental Process Engineering and Environmental Biotechnology, Plant Planning and Plant Engineering, Bio-Analytics, Food Production Technology and Quality Management.

Study Course "Innovation and Product Management (Bach. & Mas.)
The ability to innovate is essential for international companies in a world of intensifying global competition. The development of new products can only be guaranteed by integration of marketing, design and technology with strategic thinking.

Eco- Energy Engineering (Bach. &Mas.)

Energy consumption is rising, reserves dwindling worldwide. It is vital that we cover our energy needs as economically and efficiently as possible and minimize primary energy use. This must be achieved as far as possible by using the sun, wind, water and geothermal energy, for these are our future. This programme is about efficient and environmentally-friendly production and use of energy.
Elective module Solar Technology (23 ECTS) or Sustainable Building Management (23 ECTS)

Research centre "Energy and Environment"
Focus on Eco-Energy and Environmental Technology
Solar energy/hydrogen production, Building optimization/Solar mobility, Biogas, Bioethanol (1st and 2nd generation), Energy from Biomass, Clean-up of waste gas, waste air and waste water.
Primary objective is the ethical use of the world resources.

List 3 Austrian universities in Life Science and SD

University of Graz, http://www.kfunigraz.ac.at/

- Already in the year 2004 a task force for the "sustainable university", which has been developing strategies for environmental friendly and social balanced university, was founded.
- As first Austrian university the University of Graz presented in the year 2006 a sustainability report. 4
- Additionally, in the year 2007 a RCE– Regional Centre of Expertise as part of the international RCE-networks „Global Learning Space for Sustainable Development" (GLS) of United Nations University (UNU) was founded at the University of Graz.5.
- Furthermore, there is an Institute of System Sciences, Innovation and Sustainability Research6.
- There education and vocational learning, research and knowledge transfer is carried out by local and global actors.

University of Natural Resources and Applied Life Sciences in Vienna (short BOKU), http://www.boku.ac.at/

- Referring to the mission statement, BOKU is a "teaching and research facility" for renewable resources.
- BOKU has in mind an expanded BOKU Sustainability Report for the year 2011.
- Accordingly, the platform sustainability and the doctoral school SD were established.
- Furthermore, a master program for sustainable commodities was created together with the Technical University of Munich and the University of Applied Science Weihenstephan.
- The Austrian Institute for Sustainable Development (ÖIN)7 was founded in 1995 as non-commercial scientific association registered with the University of Natural Resources and Applied Life Sciences. Back then, a group of dedicated scientists from various Austrian universities and research institutions got together with the aim, in cooperation with practical protagonists, to lay the foundations for the implementation of a sustainability development concept. Correspondingly, the institute still has a strong practical, transdisciplinary and international approach to its activities.
- The Centre for Global Change and Sustainability8 networks between institutes, departments, platforms and initiatives at the University of Natural Resources and Life Sciences (short BOKU), in their research and teaching in the areas of global change and sustainability (e.g. climate change and climate protection, sustainable concepts for ensuring global food security, transportation, waste management, water supply and use). This work involves networking, cooperation, knowledge exchange and synthesis in research but also in teaching, policy advice and public relations. Furthermore, these cooperative and networking activities of the center extend to national and

4 http://www.uni-graz.at/en/geo2www/geo2www_nachaltigkeitsberichte.htm
5 http://www.ias.unu.edu/sub_page.aspx?catID=108&ddlID=183 and http://www.rce-graz.at/
6 https://online.uni-graz.at/kfu_online/webnav.navigate_to?corg=14202
7 http://oin.boku.ac.at/oin/english/index.php
8 http://www.boku.ac.at/zgwn.html?&L=1

international research institutes and organizations. Currently the centre employs seven researchers and one member of staff dealing with administrative duties.

- In the meantime a Department of Sustainable Agricultural Systems, whose goal is to contribute to the development of a network of sustainable and ecological agricultural systems, which provide food, renewable resources and energy, has been established.
- Included in the Department of Sustainable Agricultural Systems is an Institute for Sustainable Economic Development which develops solutions that contribute to SD having an integrative view on problems in the fields of AGRICULTURE | ENERGY | ENVIRONMENT | REGIONS | RESOURCES. A team of economists, social and natural scientists integrate disciplinary and problem based approaches to inter-disciplinary solutions in research and teaching. Our research efforts focus spatially on Austria and Europe but also integrate global and development perspectives.

University of Klagenfurt, http://www.uni-klu.ac.at/

- One of eleven main teaching and research topics is SD (environment, engineering, economy).
- An Institute of Intervention Research and Cultural Sustainability[9] and a university course "Education for SD – innovations in teacher education has been established.
- Additionally, the interdisciplinary sustainability research was extended by a professorship for environmental history.

University of Vienna, http://www.univie.ac.at/

- At the Research Institute for Managing Sustainability (RIMAS)[10] a total of ten institutes and departments of the Vienna University of Economics and Business Administration deal with economic, environmental and social aspects of SD.
- New masters were created which include partial aspects of SD for instance Environmental Science; moreover the Faculty of LS has a special research focus on Natural Heritage and Global Change.

Vienna University of Economics and Business

- The topic sustainability is addressed from a variety of angles including Corporate Sustainability, Corporate Social Responsibility, Good Governance, innovation research, and sustainable consumption.
- A total of ten institutes and departments of this university deals with economic, environmental and social aspects of sustainable development. In the late 1990s, these activities were consolidated and reinforced in interdisciplinary projects with the establishment of a Research Centre for Managing Sustainability, which in 2005 became the Research Institute for Managing Sustainability(RIMAS).

Vienna University of Technology

- The Centre for Sustainable Technology contributes to a sustainable development of society by specific research and education, http://info.tuwien.ac.at/cst/index.htm

The Johannes-Kepler University Linz

- For example the Institute for Comprehensive Analysis of Economy was established at the university in autumn 2009 – almost exactly one year after the crash of commercial finance. It is a research institute financed by external funds. One focus of the research is on the causes and background of the economic crisis. The institute seeks to go beyond prevalent economy monitoring and a purely empirical study of the economy. It prefers interdisciplinary research approaches, embedding the economy as a whole into the complex of the social areas of academics, politics and the media. Socio-economic theories in the tradition of Max Weber, Joseph A. Schumpeter or Otto Neurath serves as an inspiration for this, as does the vast area of heterodox economics. The Institute sees economics as a social science which is aware of its macroeconomic and sociological foundations and which axiomatically opposes the idea that market processes represent "natural" orders and can be understood via "laws of nature".

[9] https://campus.uni-klu.ac.at/org/oe?orgkey=85 or https://campus.uni-klu.ac.at/org/oe?orgkey=85

[10] http://www.sustainability.at/?k=&s=home&u=&lang=en

University Innsbruck

- The research centre for Globaler Wandel - regionale Nachhaltigkeit (global changes – regional sustainability) is situated at the university in Innsbruck. It deals with global processes and its effects on regional and local level and looks for solutions for a sustainable space.for living.

List 4 Programs for SD in Austria

1.D.2.1 Austrian Climate Research Programme

The Austrian Climate Research Programme (ACRP) was developed in 2008 by the Klima- und Energiefonds (Austrian Climate and Energy Fund) set up by the Federal Government. The ACRP aims at promoting climate and energy research on a broad basis. Through the ACRP, the Austrian Climate and Energy Fund, supports a broad range of research issues aiming at exploring climate change impacts in Austria and at contributing to building up competence in climate research which is both reputable and relevant to policies. http://www.klimafonds.gv.at

1.D.2.2 PFEIL 10

PFEIL 10 (2006-2010) is the programme for research and development of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. It forms a framework for research and development for the federal offices and research institutions under the responsibility of this Ministry, and for research funding in this area. The programme aims at contributing to a high quality of life in Austria with regard to the preservation and responsible use of natural resources, soil, water, air, energy and biodiversity. Further research topics covered by the programme are the preservation of urban environments, sustainable production of secure and high quality food, and renewable resources. http://www.lebensministerium.at

1.D.2.3 proVISION

proVISION is a programme introduced by the Austrian Federal Ministry of Science and Research (BMWF). It is aimed at implementing Austria's FORNE strategy (research for sustainable development) and – together with complementary research programmes – creating the scientific basis for the country's sustainability strategy. proVISION investigates the impact of climate change on ecosystems, regional development and quality of life. Focusing on sustainability, it is aimed at making knowledge available for solving the most urgent problems in provision for nature and society: adaptation to climate change and its consequences, suitable life and work models, responsible use of natural and industrial resources, and environmental protection. Transdisciplinarity is the guiding research principle. Scientific work is carried out with non-scientific partners also involved in generating knowledge by contributing their way of approaching problems, expertise and experience to research, thus maximising efficiency.

1.D.2.4 Austrian Program on Technologies for Sustainable Development

http://www.nachhaltigwirtschaften.at/

This initiative has been developed by the Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT). It initiates and supports trendsetting research and development projects and the implementation of exemplary pilot projects. Objectives of the Program are new opportunities for the economy. Economical use of natural resources, Consolidation of Austria's position in the field of technology and Positive effects on the economy and on employment achieved through Strengthening of R&D competence, Interdisciplinarity and networking, Diffusion and application of R&D Results.

1.D.2.5 New Energies 2020

http://www.ffg.at/neue-energien-2020

The research and technology programme New Energies 2020, which has been commissioned by the Climate and Energy Fund, has three fundamental objectives: Efficient energy use Renewable energy Intelligent and Intelligent energy systems.

1.D.2.6 Programs of the Austrian Academy of Sciences – Österreichische Akademie der Wissenschaften

http://www.oeaw.ac.at/
The research programs are financed by the Federal Ministry for Science and Research and administered by national committees established at the Austrian Academy of Sciences. The national committees, consisting of renowned scientists and representatives of several Ministries and federal organizations have, among other things, the following tasks:

- co-ordination of the research activities in their respective research sector;
- formulating programme based research strategies;
- quality assurance of the funded research projects;
- development of new research focuses ;
- stimulation of new research projects and scientific co-operation.

The research proposals submitted after specific projects calls are granted by the national committee after an external peer review. Furthermore, the scientific quality of both the results and project reports are also reviewed by the national committee. All ÖAW research programs are either part of international scientific programs (UNESCO, UNO, ICSU, EU) or linked to international research programs through contracts and scientific co-operations.

1.D.2.7 Man and Biosphere Program (MaB) - UNESCO-Program
The UNESCO research program "Man and Biosphere (MAB)" established in the year 1971, develops the basis, within the natural and the social sciences, for the sustainable use and conservation of biological diversity, and for the improvement of the relationship between people and their environment globally. The MAB Program encourages interdisciplinary research, demonstration and training in natural resource management. The concept of the biosphere reserve network represents the key component of the MAB Program. Biosphere Reserves are internationally recognized areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with its sustainable use. Biosphere reserves serve in some ways as 'living laboratories' for testing out and demonstrating integrated management of land, water and biodiversity. The Austrian MAB-Committee has focused its future research activities predominantly on the needs of the Austrian biosphere reserves.

1.D.2.8 Global Change Program
Established in 1990 this research program covers three international research networks:
International Geosphere-Biosphere Programme (IGBP);
World Climate Research Programme (WCRP);
International Human Dimension Programme (IHDP).
The Global Change program is supporting projects dedicated to the study of causes and effects of global environmental change (e.g. climate, biodiversity).

List 5 Specific university studies in Life Sciences

At the **University of Graz** there are a bachelor and a master program for Environmental System Science. The specific trainings about SD which are also available for other studies are:

Environmental System Sciences, business administration, bachelor	Environmental System Sciences, master program[11]
• Corporate Social Responsibility, interactive seminar, 4 ECTS • Sustainability und CSR - Corporate Social Responsibility, pro-seminar, 4 ECTS • Reportage of Sustainability, Lecture Discussion in groups Case-examples, 4 ECTS • Reportage of Sustainability, interactive seminar, 4 ECTS • Management of Sustainable Development 2	• Target group focused communication about Sustainability, tutorial, 10 ECTS • Interdisciplinary Practical Training – sustainable players, lecture, 6 ECTS • Interdisciplinary Practical Training - Sustainability in developing countries, interactive seminar, 10 ECTS • Interdisciplinary Practical Training for sustainable projects, seminar, 10 ECTS

[11] http://www.uni-graz.at/en/usw1www_master_environmental_systems_sciences_graz1.pdf

Environmental Management, 4 ECTS	• Interdisciplinary Practical Training for sustainable cooperation at the regional level, seminar, 6 ECTS • Integrative SD Processes in Regions, practical, 4 ECTS • Methods for Sustainable Change Processes in Region and Business, practical, 4 ECTS

At the **BOKU** there are degree programs[12], considering SD as follows:

- In the course of Organic farming (Msc program) students learn about Organic Farming and other orientations of sustainable cultivation of land.
- MSc program "Management of Environment and Bio Resources" the field of activities are defined in a way that in their work environmental and resource managers are focused on sustainable cultivation and development of renewable and sustainable environmental resources. Graduates have to take economic, ecologic, social and cultural aspects into consideration when working. Furthermore, sustainable environmental and resource management requires a high level of interdisciplinary and integrative abilities as well as distinct competences in the fields of leading and management, social behaviour, economy, law, natural sciences and technical knowledge.
- In the ERASMUS MUNDUS Msc program a course is offered with the Subject area „Sustainable viticulture, vegetable and ornamental plant management" for students in Horticultural Sciences
- The integrated European Master of Science Course in Animal Breeding and Genetics (EM-ABG)[13] is on the development of sustainable breeding programs for farm animals, fish and companion.
- A joint MSc program in environmental science entitled "Soil, Water and Biodiversity: the European Approach (ENVEURO)". The program focus on the relationships between natural resource uses in Europe and the effects it has on environment and health, and aims at providing analytical and management tools as well as environmental technologies for sustainable production systems in areas with high pressures on natural resources.

University of Klagenfurt

- A University course „Education for SD"[14] (IFF/University Klagenfurt and FORUM Umweltbildung) is an extra-occupational course over 4 terms with 14 hours or 36 ECTS. The course is held in three modules at different places in Austria. The modules are Module 1: Concepts for SD, Issues for education for SD, research methods, and conception of final thesis (7,5 ECTS), Module 2: Methods and didactic in education for SD; reflection and analysis of projects and research activities until now (10,5 ECTS) and Module 3: Methods and didactic of research studies; presentation techniques; team training– workshops, presentation of course results to the general public (7,5 ECTS) and final thesis (10,5 ETCS).

At the **University of Vienna** two master degrees which specific focus on SD are available, duration 4 terms, namely

- MA Program „Environmental Sciences: in the Module Human Ecology and Social Ecology the students reproduce basic theoretical concepts of human ecology with focus on SD and are able to illustrate their significance with socio-ecologically relevant examples. They recognize current methods of human ecology and assess their correct application. Students of this module acquire the competence to realize complex ecological, social and economical processes in terms of their genesis and mutual interactions. They are qualified for adequate analysis of environmental problems.
- MA Program „Nature Protection and Biodiversity Management" does not include SD explicitly

List 6 in Life Science as a specific subject

University of Graz

- Concepts of sustainability, seminar, 2 hours per week, 4 ECTS, winter term
- Consumption and products: Sustainable Lifestyles, seminar, 2 hours per week, 4 ECTS, summer term

12 http://www.boku.ac.at/11633.html

13 http://www.emabg.eu

14 https://campus.uni-klu.ac.at/ulgng/ctl/details/show?stpkey=694

BOKU[15]**, [2]**

- Sustainable Development I, Lecture, 2 hours per week, 3ECTS, winter term
- Sustainable Development II, Lecture, 2 hours per week, 3ECTS, winter term
- Sustainable Rural Development, lecture and practical exercises, 2 hours per week, 3ECTS winter term
- LA 21 – Processes and Sustainable Urban and Regional Development, seminar, 3 hours per week, 4,5 ECTS, summer term
- Peasant Economy for Sustained Economic Growth, lecture, 2 hours per week, 2 ECTS, winter term
- Peasant Economy for Sustained Economic Growth, seminar, 2 hours per week, 3 ECTS, winter term
- Innovations for Sustainable Forest Management, lecture, 2 hours per week, 3ECTS, winter term
- Sustainability, Protection of Resources and Natural Hazards, Lecture and practice, 2 hours per week, 3ECTS, winter term
- Peasant Economies and sustainable Development, lecture, 2 hours per week, 2ECTS, summer term
- Sustainable Fruit Production and house gardening, lecture, 2 hours per week, 3ECTS, winter term
- Evaluation of sustainable development, lecture, 2 hours per week, 3ECTS, winter term
- Organic Farming and Sustainable Land Use, lecture, 4 hours per week, 6ECTS, winter term
- Strategies in sustainable natural resource management
- Sustainable forest management and forest certification - international distance course

University of Vienna

- Growth and sustainability – Outlines of the right for development, seminar
- Education for SD, lecture and practical exercises
- Environment and development – challenges for SD using the example of hunger, climate change and biodiversity, lecture and practical exercises
- Human ecology and social ecology – basics for SD, lecture

University of Klagenfurt

- Consumption and products: Sustainable Lifestyles, seminar, 2 hours per week, 4 ECTS, summer term
- Sustainability research as transdisciplinary approach, lecture, 2 hours per week, summer term
- Sustainability, lecture, 2 hours per week, summer term

15 http://www.boku.ac.at/11633.html

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN BULGARIA

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[2] University of Forestry – Sofia
[3] International University College – Dobrich
[4] Medical University – Plovdiv
[5] Agricultural Academy Sofia

Recently the European Environment State and Outlook Report 2010 was published underlining that Bulgaria ranks among the first in Europe regarding biodiversity. Between 1991 and 2007, protected areas doubled and now cover 5.14 % of the national land area.

A lot of problems related to sustainable development are still pending on a national and on a European level; however the tendencies in our country show a gradual and steady progress in Bulgaria.

1. Sustainable Development (SD) policies in Bulgaria:

There is no single specific national institution in charge of sustainable development in Bulgaria. The sustainable development is a transversal policy which is being implemented throughout the activities of a number of national institutions in Bulgaria. An Inter-institutional Advisory Council for Sustainable Development was established in August 2006 by Decision on the Council of Ministers. It is chaired by the Minister of Economy and Energy and consists of Deputy Ministers from the Ministries of Economy and Energy, Health, Agriculture and Food, Transport, Social Policy, Regional Development, Foreign Affairs, Environment and Water, Education and Public Administration. One of the main objectives of the Council is to elaborate a National Sustainable Development Strategy (NDSD) and set of indicators which are going to be used to monitor Bulgarian NDSD. It has to be elaborated corresponding to the Renewed EU Sustainable Development Strategy that was adopted in July 2006. The objectives of the Inter-institutional Advisory Council for Sustainable Development includes also the coordination and preparation of draft positions of Bulgaria on topics related to sustainable development in the framework of Bulgaria's membership in international organizations involved in sustainable development, outlining the strategic priorities and vision for sustainable development of Bulgaria, legislative initiatives, alignment of the different strategies and programmes adopted in Bulgaria with the vision and priorities of the sustainable development policies.

In 2007 the draft of NDSD was elaborated. It is based on the Renewed European Union Sustainable Development Strategy and the Lisbon Strategy. On a national level the strategy covers strategies, programmes, action plans and measures

related to the sustainable development in Bulgaria and in this regard the strategy combines activities and areas of responsibilities of different state institutions and authorities. The leading institution responsible for the overall achievement of the goals set up in the strategy and responsible for the monitoring of the progress is the Ministry of Economy, Energy and Tourism in Bulgaria. In addition the following state institutions are involved in the process of realization of the strategy objectives: Ministry of Environment and Water, Ministry of Labour and Social Policy, Ministry of Agriculture and Food, Ministry of Transport, Information Technologies and Communications, Ministry of Health.

- The Ministry of Environment and Waters of Bulgaria
- Ministry of Health
- Ministry of Education and Science
- National center of Environment and Sustainable development under the Ministry of Environment and Water
- Society Center of Environment and Sustainable development under the Ministry of Environment and Water
- Various national and international NGOs, agencies, associations.

As mentioned above, the sustainable development policies on a national level reflect the tendencies and developments on the European and international level. The NSDS outlines measures to be taken and activities to be completed which will lead to improvement of the quality of life not only of the current generation, but also that of the future generations. It presents an analysis of the country's opportunities and the challenges it is confronted with. The main areas concerned are:

- environmental issues related to the preservation of the ecological balance and environmental protection;
- economic issues related to environmentally friendly production;
- social issues related to social life conditions of the population, employability, education and training, health, access to healthy environment, responsible management.

Along with NSDS the following sustainable development strategies concerning different specific areas of human's life and activities with direct influence on the environment have been approved and are being currently implemented in Bulgaria:

- Sustainable Development National Strategy (2007)
- National Environmental Strategy 2009 – 2018
- Strategy for Development of the Transport System of Bulgaria until 2020
- National Strategy for Sustainable Development of the Forestry Sector 2006 – 2015
- National Programme for Sustainable Land Management and Combat of Desertification until 2013
- National Rural Development Strategy 2007 – 2013
- National Strategy for Sustainable Development of Tourism 2009 – 2013

- National Programme for Support of Fishery Resources Sustainable Development 2008 – 2013
- National Strategy for Maintaining Biodiversity
- Municipality development programme 2007-2011
- "Sustainable Development of Bulgaria 2008" – publication of the National Statistical Institute, published 28 June 2010, available in Bulgarian and in English
- Project BG051PO001-6.2.03 "Accreditation of hospitals and continuing training of health personnel", supported by the Operational Programme "Human Resources Development 2007-2013"
- National Programme for Action on Environment and Health 2008 - 2013 г.
- Law on Vocational Education and Training
- National Strategy for Continuing Vocational Training

Another document outlining the main areas where sustainable development policies should be implemented is the National Strategic Reference Framework (NSRF). Its chief objectives are in full compliance with the Community Strategic Guidelines, the Lisbon Strategy and the principles for sustainability as formulated in the conclusions of the Gothenburg Council and it covers the programming period of 2007 – 2013. It reflects the priorities for national and regional development of Bulgaria which on the other hand correspond to the objectives of the operational programmes which are being implemented in Bulgaria during the specified period.

- **Environmental Protection Act**, Promulgated, State Gazette No. 91/25.09.2002, amended, SG No. 98/18.10.2002, last amended and supplemented, SG No. 52/6.06.2008, available in English: http://www.sokolovskisenvironment.com/img/promo_files_promo_infoitem_27_16.pdf
- **Biological Diversity Act,** 2002, last amendments in 2010 http://www.internationalwildlifelaw.org/BiodiversityActBulgaria.pdf
- National Environment Strategy 2009-2018, and an Action Plan to it (approved by Decision of the Council of Ministers № 353 of 15 May 2009)
- National Strategy for Management and Development of water sector in Bulgaria 2015
- National Programme for Management of Waste Operations for the Period 2009 – 2013
- National Action Programme for Sustainable Land Management and Combating Desertification in Bulgaria 2007 – 2013 onwards
- National Action Programme on Environment and Health 2008-2013

The following OP are dedicated to sustainable development of the environment and different areas of social and economic life in Bulgaria and provide European funding for achievement of objectives related to sustainable development:

- Operational Programme Regional Development
- Operational Programme Environment

- Operational Programme Development of the Competitiveness of the Bulgarian Economy
- Operational Programme for Human Resources Development
- Operational Programme Transport
- Operational Programme Rural Development

In 2011 the Ministry of Social Affairs and the Ministry of Environment and Waters are planning subsidies to the employers for the 'green' professions, as the first measure in compliance with the EC Strategy "Europe 2020". The program in included in the National Employability Plan for Bulgaria.

- Existence of SD criteria in the accreditation systems of the university degrees:

The sustainable development concept included in studies related to ecology, environmental protection, management of natural resources, renewable energy sources, etc., is a very important criteria in the accreditation process conducted by the National Evaluation and Accreditation Agency (http://www.neaa.government.bg/en). Those universities, which include SD in their educational curricula and study programmes receive higher assessment grades.

- No specific subventions about education in SD

- Specific university policies about SD exist in the majority of the universities:

- Commission of Education under the Academic council of the University of Forestry, Sofia;
- University Commission (headed by a newly appointed Manager of Quality) and Faculty Commissions of Quality Assurance at the Agricultural University – Plovdiv;
- Medical University – Plovdiv is certified for meeting the requirements of ISO 9001:2008 (2009 - 2012) and accredited by the National accreditation agency with institutional and program accreditation for education and research.

- Existence of specific units or departments about SD

Agricultural University – Plovdiv:

* Faculty of Plant Protection and Agroecology offering training in 4 majors for BSc degree and over 10 MSc cources, related to environmental ecology, integrated plant protection, organic farming, etc.;
* Department of Agroecology and Protection of Agroecosystems and Population within the Faculty of Plant Protection and Agroecology
* Agroecological Centre. It was founded in 1989 with the aim of coordinating the efforts of researchers, students, farmers and consumers to carry out research and provide education for the development of organic agriculture in Bulgaria.
* *Sunny Garden* Organic Farm for children was established on the Agroecological Centre in 2010. The aim is to contribute to ecological education of children and to give

knowledge to students for sustainable production, especially organic farming, for sustainable way of life and preservation of the environment.

University of Forestry – Sofia:
* Faculty of Business Management including a Department of Management of Natural Resources, which organizes every year an International symposium of SD. The faculty organize Center for Entrepreneurship had been established during 2006.
* Faculty of Ecology and Landscape Architecture. In 1973 this Faculty was established under title ”Preservation and enhancement of natural environment”. With 34 disciplines covered wide specter related with sustainable development and preservation of the natural resources, ecology monitoring, preservation of biodiversity, water management and etc. The scientific researches in this faculty include a lot of projects.

Medical University – Plovdiv: Several different structures of MU are responsible for the SD in the medical education, research and public health as Scientific Department, Educational Department, International Relations Department, Integrative Research Center, Career Center etc. The department of Hygiene and Ecology works in close relation with the National Centre of Hygiene, Medical Ecology and Feeding (MH).
The international activities of the University follow the programs financed by the European Union: LLP (Comenius, Erasmus, Leonardo da Vinci, Grundtvig, Jean Monnet), 7FP, Lion Austrian program (Medical students beyond frontiers), EEA etc.

International University College: The Bulgarian – Romanian Research Center for Sustainable Tourism at IUC established in the framework of a PHARE – CBC Romania – Bulgaria programme acts as a think-tank in the area of sustainable development of Dobrudja. Its members are involved in research activities and policy development in the area of sustainable tourism. The research center publishes the European Journal of Tourism Research (EJTR).

Other Bulgarian Universities: “St. Kliment Ohridski” University of Sofia; “Angel Kanchev” University of Ruse; University of National and World Economy – Sofia; University of Chemical Technologies and Metallurgy – Sofia; New Bulgarian University, etc.

Existence of specific programs about SD
Agricultural University – Plovdiv: University research projects on maintaining the biodiversity and preserving the valuable botanical species in the gardens on the University campus;

SD University Studies in Bulgaria: In some Bulgarian universities
Agricultural University – Plovdiv:
1. Bachelor Degree Programmes – 4-year course of studies in the following majors:
   - Ecology and Environmental Protection
   - Organic Farming
   - Plant Protection

2. Master Degree Courses – 3 to 4 semesters:
   - Sustainable land management
   - Management of genetic resources
   - Agricultural Pharmacy
   - Ecology of Urban Systems
   - Organic Farming
   - Preservation and management of biological diversity
   - Population and environmental protection and prevention against natural disasters and catastrophes
   - Sustainable Agricultural Development

University of Forestry:
1. Bachelor Degree Programmes – 4-year course of studies:
   - Business management and sustainable development.
   - Ecology and Environment Protection
   - Sustainable development and natural resources
   - Biological agriculture.
2. Master Degree Courses – 3 to 4 semesters:
   - Agro forestry
   - Ecology and Environment Protection
   - Business management and sustainable development

Medical University – Plovdiv:
The department of Hygiene and Ecology provides 1-year-course in Hygiene and Ecology for medical students as a part of the whole curriculum for the medical students. The same department teaches postgraduates medical doctors in the same field.
The section of General Practice offers postgraduate education for doctors, acquiring masters degree in General Practice/Family medicine and part of it includes health promotion, healthy life style and environment and health.

- Existence of specific subjects about SD in the degrees:

- Agricultural University – Plovdiv: Land and Soil Restoration, organic Agriculture, Renewable Energy Sources, Problematic Soils, Biological Control of Plants, Air Pollution and Impact on the Ecosystems, Biodiversity and Bioresources, Water Contamination and the Impact on the Ecosystems, Urban Ecology, Conservation Ecology, Bioecology, Environmental Economics, Social Psychology and Tourist Behaviour.
  Sustainable development as a concept is included in all the subjects taught both at BSc and MSc degrees, referring to agricultural technologies for crop production and animal breeding, integrated plant protection, ecology, rural and regional development, tourism, land management, safety food production, etc.
- University of Forestry – Sofia: Not exactly specific subjects but there are a lot of ecological and environmental subjects with teaching units devoted to the sustainable development like General ecology, Ecological physiology, Water

pollution and effects on ecosystems, Air pollution and effects on ecosystems, Soil pollution, Management of Protected Areas, Ecological tourism etc.

- Medical University – Plovdiv: A lot of subjects taught in Medical University Plovdiv refer education in Life Sciences as Microbiology, Non-organic and Organic chemistry, Sanitary chemistry, Physics and Bio-physics, Medical Radiation Physics, Medical Psychology, Health Management, Health economy, Herbal Medicine etc.
- International University College: Sustainable tourism is an elective subject taught in 4th semester in tourism related programmes at IUC. In addition topics related to sustainable development are included in all business and management programmes delivered at the institution.
  Along with the business ethics and entrepreneurship SD is taught throughout all the modules in the programmes in order to build up a strong attitude and consciousness towards these transversal policies.

- Specific subjects about SD are offered in the majority of the degrees at the other Bulgarian Universities having courses in Life Sciences;
- In some degrees in the other Bulgarian universities.

- Existence of specific practical activities about SD in the degrees
  - Agricultural University – Plovdiv:

1) Student mobility: AU was awarded the University Erasmus Charter in 1999. In 2007 AU obtained the Extended Erasmus Charter.
2) The pre-diploma internship of students in a real work environment is a result of the reported necessity for bridging the gap between education, research and business. A project under *Priority Axis* 3: Improving the Quality of Education and Training in Correspondence with the Labour Market Needs for Building a Knowledge-based Economy was implemented, financed by the European Social Fund in Bulgaria.

- University of Forestry – Sofia: Yes, there are specific practical activities for all subjects mentioned above in the experimental fields, ecological sites, enterprises, executive agencies, research institutions, waste water treatment plants, recycling plants etc. In the majority of the degrees: bachelor, master, doctoral theses.
- Medical University – Plovdiv: There are specific practical activities for all subjects described above and for all the degrees obtained in Medical University – Plovdiv (bachelor, master, doctoral theses) for which the university is accredited. Some of our projects are financed by the European Social Fund and E Content Plus program. MU Plovdiv was awarded the Extended Erasmus Charter.
- In the majority of the degrees at the Universities offering courses in Life Sciences;
- In few degrees in the other Bulgarian universities.

All life sciences contribute to sustainable development of ecosystems because it is their main objective – how to manage the environment in order to keep the sustainable development of all natural resources and all the fields of life.

No barriers and problems for the integration of the SD in teaching procedures and upbringing children starting with 3-4 years old children and continuing lifelong.

There is an improvement of all teaching programmmes concerning the SD at all the educational degrees.

3. Relevant Institutions related to SD in Bulgaria:

- **Permanent Delegation of the Republic of Bulgaria to UNESCO**

whc.unesco.org/en/statesparties/bg

- **Students Club of Environmental protection** - University of Forestry

4. International cooperation in ESD (Education in SD) for Bulgaria:

Agricultural University – Plovdiv

1) International Educational Projects

The projects within the *Lifelong Learning Programme* contribute to quality enhancement and expanding the diversity of educational services providing professional teaching both to AU students and external customers; to the improvement of the links between secondary professional schools, colleges and AU aiming at ensuring the smooth transition between educational levels and at improving the professional skills and competences for faster adaptation to the dynamics of the labor market, leading to sustainable development.

Since 2009 the AU has successfully been involved in the *TEMPUS IV* programme with three projects in three different areas – plant protection, food technologies and agrobusiness. The EU representatives are going to develop joint curricula for acquiring a Master Degree with partner countries in different European regions – Macedonia, Serbia, Croatia, Albania, Ukraine. The EU universities involved in the project will exchange experience in curriculum enhancement, in facilitating student mobility and in achieving transparency and recognition of the Master degree knowledge and competences. These will be the first Joint Master Degree courses with a European accreditation for AU.

2) International Research Project

1. Classification of European Biomass Potential for Bioenergy Using Terrestrial and Earth Observations

The project is within the 7th Framework Programme, specific programme *Cooperation.* The objective is to classify the potential for bioenergy production by utilizing biomass from various sources in different European regions via applying terrestrial and satellite observations.

2. Raising Awareness of Renewable Energy Developing Agroenergetic Chain Models RADAR

- The project is financed by the *Intelligent Europe Programme* and is aimed at popularizing the renewable energy and energy efficiency measures, utilizing the existing renewable energy sources and knowledge and experience transfer among the partner institutions with the goal of creating a joint strategy, guaranteeing the sustainable development of rural regions.

3. Bringing the Benefits of Research to AgroFood SMEs from the Regions of Central Macedonia, Puglia and Pazardzhik /RAF Regions/

RAF-REGIONS is a project financed by the 7th Framework Programme for Research and Technological Development, the *Regions of Knowledge Initiative,* whose

activities are directed toward capacity enhancement in the regions of Pazardzhik (Bulgaria), Central Macedonia (Greece) and Puglia (Italy); increasing the integration of AgroFood SMEs in regional survey clusters and raising their knowledge of the potential benefit of research work in this sector of industry.

4. Integrated European Network for Biomass and Waste Reutilization for Bio-products /AquaTerrE/

The project is under the 7th Framework Programme and is aimed at setting up an integrated European biomass network and waste utilization for bioproducts. AU was assigned to create database on the existing biomass and bioprodusts producing units. A committee of representatives of all project partners will process the information and workout the good practice selection criteria.

5. Global Solution for Slaughterhouses, Meat Processing Plants and Phytosanitary Sector: Treatment of Category 3 Animal Wastes and Production of High Value Products with Biopesticides /APTAR/

The project is under the 7th Framework Programme. Research is done to the benefit of the associations of SMEs, aiming at reutilisation of animal waste products for the production of biopesticides of high value applying micribiological hydrolysis.

6. Best Management Practices for Sustainable Crop Nutrition in Bulgaria

Main goals: to summarize literature references to the conducted fertilizer experiments in Bulgaria in the major field, vegetable, fruit crops and vineyards; to carry out fertilizer experiments in different ecological regions of the country for identification of crop response to NPK.

7. The Biology and Taxonomy of the Family Scelionidae /Hymenoptera/ and Their Practical Importance for the IPM and Biological Control of Pests in Agriculture, Forestry and Horticulture - Collaborative Linkage Grant

The project is developed within the NATO programme *Security Through Science* and is aimed at studying the biology and taxonomy of the *Scelionidae /Hymenoptera/* family in order to use it in the integrated plant protection in agriculture and forestry.

8. Bilateral Agreement Investigation into the Biology and Plant Host Range of Natural Enemies of Invasive Teasels (*Dipsacus spp*.) in Bulgaria

The project is commissioned by the Biotechnology and Biological Control Agency in Rome, Italy. Field surveys will be undertaken for the identification of insects found in Bulgaria which could be used as biological agents for the control of invasive weed species in America.

9. Bilateral Agreement Investigations on Biological Control of Selected Rangeland Weeds in Bulgaria

The project is commissioned by the European Biological Control Laboratory in Montpellier, France. The aim is to study the population of the invasive *Dipsacus species* in Bulgaria and to identify its natural pests in order to use them for biological control of its spread.

University of Forestry

- LLL “NESSIE” project “Agroressoursies valorisation”. Responsible for the Teaching unite “Water quality management and Environment”- 2006-2009.
- ICP “Modeling and Mapping”. International Cooperative Programme for Modeling and Mapping critical loads for acidity and heavy metals on European

scale using the Steady State Mass Balance method for Sustainable Development of the Ecosystems. 29 countries included in the project. Bulgarian scientific team has been involved in this project since 1994. There are 23 teachers and 9 students working on this project.

- Project 754 “Calculation of Critical Loads of Lead and Cadmium for aqutic ecosistems and their exceedances by real depositions” 2006-2008 funded by the Ministry of Education and science of Bulgaria.
- Project 783 “Calculation of Critical Loads of acidifying pollutants and Heavy Metals for forest soils” 2007-2008 funded by the Bulgarian Ministry of Environment and Water.
- Project “Optimisation of National Ecological Network Natura 2000 and scientific base of its development” 2007-2008; Funded by the Bulgarian Ministry of Environment and water.
- Project: LTER- European Network for Longterm Ecological Researches for Sustainable development of the ecosystems, Bulgaria, funded by the EC.
- *Project CC-1507/2005,* “The combined effect of O3 and acidifying S and N deposition on vegetation in Sofia” 2006- 2008, *funded by the Ministry of Education and Science of Bulgaria,* in collaboration with a French team.
- Project ENVEurope “Environmental quality and pressures assessment across Europe” 2010 until now.
- ERASMUS Intensive programme (ENVIRONHORT-Environmental Horticulture for 2007-2009 with Reference number 230/24/07).
- Best Management Practices for Sustainable Crop Nutrition in Bulgaria. Main goals: to summarize literature references to the conducted fertilizer experiments in Bulgaria in the major field, vegetable, fruit crops and vineyards; to carry out fertilizer experiments in different ecological regions of the country for identification of crop response to NPK.
- Bio-energy potential of non-traditional plant species. - Project funded by MEYS MES contract № 1613/2006, started 2006, completed in 2010.
- Project with India - International, funded by NSF-MEYS E 02-133/27.07.2009g contract. (BIN-1209) - "System for preparation of solutions to assess the impact on food production of low quality water used for irrigation. Launched 2009.
- Bilateral, international - with Ukraine, funded by MEYS - DO02-42/05.12.2008g contract. "Impact on food production and environmental impacts of irrigation with water of low quality." Began 2008., Current in 2010.
- Project HS-BP 202/2006 - MEYS "Expert system for the use of irrigation water according to its quality. - Started 2006. Current 2010. Ending 2011., Head of project Prof. Dr. S. Kalcheva.
- Project funded by the UF, № 34, "Energy and water saving technologies for producing competitive agricultural production, current - 2010.
- BUL/SGP/OP4/CORE/07/04 - Alternative options for land use to reduce soil degradation in health risk assessment in the area of KCM - Plovdiv, ending 2011., Current 2010.

- Harmful and beneficial insects in medicinal plants in Bulgaria and Romania. Project funded by MEYS-№ D01-1217/17.12.07g. - Bilateral cooperation between Bulgaria and Romania. Successfully completed in 2010.
- Evaluation of energy potential of sites and forest land fund in the region of northeastern Bulgaria. The project is funded by UF.
- Role of underground fitomasa the annual fixation of CO2 from forest ecosystems lesoobrazuvatelni major species in Bulgaria.
- BUL/SGP/OP4/CORE/07/04 - Alternative options for land use to reduce soil degradation in health risk assessment in the area of KCM - Plovdiv, ending 2011.
- Theme № 849 / 2010. - Reclamation of waste dumps of Elatsite and planting of appropriate grass mixtures on different substrates - for one year, ending 2011.
- Project № 842 - Reclamation and seeding of 3 acres pasture and create new arrays with walnuts and hazelnuts - Yakimovo municipality.

Medical University – Plovdiv

The academic staff of Medical University Plovdiv is involved in many international projects in very specialized fields of medicine, but closely related to ISLE project topic are:

- Tempus project in Medical radiation physics with King's college, London UK
- INTERREG III project between Bulgaria and Greece, focused on public health.

International University College

Students and staff of IUC have been involved in a number of sustainable development related projects through IUC partnership and cooperation with a number of non-profit organizations:

1. PHARE CBC Romania – Bulgaria: Establishing a research center for sustainable tourism;
2. CBC Romania – Bulgaria: TRANS-TOUR-NET: Creation and Marketing of Pilot Cross Border Tourist Products in Dobrudzha;
3. Youth in Action: Sustainable development through the eyes of youth;
4. Raising awareness on Common Agriculture Policy: Sustainable development of Dobrudja through CAP of EU;
5. Operational Programme Administrative capacity: Improving the administrative capacity of municipalities in protected areas in North-Eastern region in Bulgaria.

5. Good practices and relevant experiences in the Higher Education Institutions in Bulgaria:

- National Programme for supporting the education of sustainable development in Bulgaria

In 2010 the Agricultural University – Plovdiv developed a project on establishing 'Sunny Garden' educational and training farm on organic agriculture for children at primary schools. The farm is located on the Agroecological Centre of the Agricultural

University. It is visited by children from different primary schools from Sofia and Plovdiv who grow vegetables, milk sheep and cows, following the rules of organic farming and process the milk and vegetables producing organic food.

In 2010 the Medical University – Plovdiv organized 2 seminars and one conference under ESF project for student practice ("Student Practice in Palliative Medicine"), focused on the SD in the education and research in this field.

6. Possible future actions in Bulgaria:

The future actions in Bulgaria will be based on the accumulated experience in this field from other EU universities, implementation of the results from ISLE.

The results of the questionnaires with students and teachers will be analyzed and the conclusions made will be stepping stone for designing indicators for evaluating sustainable development of teaching Life Sciences.

7. References

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN CYPRUS

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1. Sustainable Development (SD) policies in Cyprus:

i) The planning and Management Strategies concerning the Sustainable Development of Cyprus are coordinated by the Planning Bureau and the Ministry of Agriculture, Natural Resources and Environment of the Country.

- The Planning Bureau

The Planning Bureau has a separate General management, equivalent with those of Ministries. The Permanent Secretary of the Planning Bureau is equivalent and interchangeable with all the Permanent Secretaries of Ministries and he is accountable, as the other Permanent Secretaries, to the Council of Ministers. The Planning Bureau is a Governmental Office in charge with the promotion and co-ordination of the economic and social growth of Cyprus.

- The Ministry of Agriculture, Natural Resources and Environment

The Ministry of Agriculture, Natural Resources and Environment is the operator of the governmental policy in the fields of Agriculture, Natural Resources and the Environment and it processes and applies specific plans and programmes aiming at the development of the latter fields or the solution of specific problems appeared in those fields. The departments and services of the Ministry are categorized in three sectors, the sector of Agriculture, the sector of Natural Resources and the sector of the Environment.

ii) The targets of the specific national policies of Cyprus about SD can be summarized as follows:

- Development of new Power Stations that will be able to operate with Natural Gas
- Deactivation of old steam-turbine units used by the Electricity Authority of Cyprus (EAC)
- Establishment of Renewable Energy Sources
- Utilization of wastes towards energy production
- Establishment of Environmental Education Centers
- Use of Natural Gas by selected industrial units
- Encouragement of the use of Mass Transportation by the public
- Significant improvement of the Energy Performance of Buildings
- Improvement and extension of the Urban, Interurban and Rural Transportation Network of the Country
- Prevention and treatment of possible threats to human health
- Significant reduction of the number of deaths by road accidents

- Significant improvement of Public Health Services
- Reduction of *poverty danger* to 12% by 2011
- Abrogation of unproductive practices in the public/governmental sector
- Promotion of Research in Education and the various fields of Sustainable Development
- Promotion and support of the cooperation between Academic, Research and Governmental Institutions.

iii) Cyprus Republic as a full member of the European Union has adopted the relative European legislation concerning Sustainable Development. Moreover, Cyprus has committed to follow the UNECE (United Nations Economic Commission for Europe) strategy that practically concerns all the fields related to Sustainable Development.

iv) During the last decade, the Cyprus government has adopted and put in force a series of programmes and specific subventions about Sustainable Development. The following are provided as an example:

- **Research Promotion Foundation of Cyprus:** Specific research programmes and subventions covering all the fields of Sustainable Development.
- **Ministry of Economics:** Specific subventions concerning sustainable economic growth
- **Ministry of Agriculture, Natural Resources and Environment:** Specific programmes and subventions concerning sustainable agriculture, sustainable use of Natural Resources and Environmental protection.
- **Ministry of Labour:** Specific programmes and subventions concerning the prevention of labour accidents.
- **Ministry of Transportation and Works:** Specific subventions concerning the use of Environmental Friendly transportation vehicles and the encouragement of mass transportation
- **Ministry of Interior:** Specific subventions against poverty.

Therefore, the values of the indicators "1.A" of the guidelines for Cyprus are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

There are currently three (3) governmental (Cyprus university of Technology, University of Cyprus and the Open University of Cyprus) and three (3) private Universities in Cyprus. Moreover, there are some other educational institutions (colleges) that provide specific educational programmes in Cyprus. Currently, there are no specific universities or colleges about SD. The only institutions operating in Cyprus and are focused on SD activities are the "Environmental Education Centers". However, all the six (6) Universities of Cyprus (public and private) provide specific educational programmes that are related either directly or indirectly to Sustainable Development. In particular, the Cyprus University of Technology provides a significant number of educational programmes in the fields of Environmental Protection, Sustainable Agriculture, Sustainable Use of Energy Resources, Sustainable Waste Disposal,

Sustainable Energy Production and Utilization, Sustainable Urban Development and Sustainable Tourism.

The Ministry of Education and Culture of the Cyprus Republic has adopted specific educational policies concerning SD. These policies aim to the promotion of SD in education. These policies include the following (among others):

- Promotion of Environmental Education in all the levels of the National Educational System (elementary, secondary and Higher).
- Promotion of Life-Long Learning (LLL)
- Promotion of SD activities in public schools

Cyprus Republic has adopted the relative European legislation concerning Sustainable Development. Moreover, Cyprus has committed to follow the UNECE (United Nations Economic Commission for Europe) strategy that practically concerns all the fields related to Sustainable Development (including SD in Education).

Currently, the accreditation system of university degrees does not include any criteria related to Sustainable Development. However, the whole educational system of Cyprus is currently being revised and is expected to be significantly updated in the next couple of years. There is a high possibility that the new educational system will also include certain SD criteria in the accreditation of university degrees.

The Research Promotion Foundation of Cyprus and the Ministry of Education have adopted a series of programmes and subventions about education in SD. These programmes (research projects for pupils) aim to the promotion of Sustainable Development and Research in primary and secondary education. However, it should be noted that no such programmes exist in the sectors of higher and highest education.

Therefore, the values of the indicators "1.B" of the guidelines for Cyprus are:

- ✓ No existence of specific educational national institutions about SD
- ✓ Existence of specific educational regional and national policies about SD
- ✓ Existence of specific educational regional (not national) legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ Existence of specific subventions about education in SD

The majority of the universities in Cyprus have adopted some policies concerning SD. However, none of the universities has incorporated a complete Sustainable Scheme so far. The two of the three public Universities (Cyprus University of Technology and University of Cyprus) have committed to adopt the Bologna Process. A significant progress has been made towards this direction during the last five years but still there are a lot that have to be done to fully comply with the Bologna process. The specific policies that have been adopted so far by the latter two universities include processes for the supply of materials and services, energy performance of university buildings, sustainable use of materials and energy resources and sustainable transportation within and towards the university buildings.

None of the universities in Cyprus includes specific academic departments that exclusively deal with SD. However, the majority of the universities (especially the two large public universities) include several departments that are related to Sustainable Development. In particular, the three (3) private universities include departments that are related to Environmental Education, Sustainable Use of Energy Resources and Energy Performance of Buildings. In addition, the two of the three public universities include departments that are related to Environmental Protection, Sustainable Agriculture, Sustainable Use of Energy Resources, Renewable Energy, Energy Performance of Buildings and Sustainable Tourism. The following departments/degrees that are related to SD are provided as an example:

- Department of Environmental Management, Cyprus University of Technology
- Department of Agricultural Sciences, Cyprus University of Technology
- Department of Tourism, Cyprus University of Technology
- Department of Civil Engineering and Geomatics, Cyprus University of Technology
- Department of Chemistry, University of Cyprus
- Department of Civil and Environmental Engineering, University of Cyprus
- Department of Education, University of Cyprus
- Department of Education, University of Nicosia
- Department of Health Sciences, European University Cyprus
- Department of Architecture, Frederick university
- Department of Education, Frederick University
- Department of Tourism, Frederick University

Therefore, the values of the indicators "1.C" of the guidelines for Cyprus are:

- ✓ Existence of specific university policies about SD: In the majority of the universities
- ✓ No existence of specific units or departments about SD
- ✓ Existence of units or departments related to SD: In the majority of the universities

The Research Promotion Foundation of Cyprus is the responsible institution for the coordination of the majority of the research projects available in Cyprus. The programmes available include grants and funding practically for all the fields of research related to Sustainable Development. The programmes can be categorized in two large sectors, those targeting the private entrepreneurial sector and those targeting academic and research institutions.
However, it should be noted that the available funding is rather inadequate in some cases while in addition, the whole funding mechanism is quite slow and inelastic.

Therefore, the value of the indicator "1.D" of the guidelines for Cyprus is:

- ✓ Existence of specific programs (regional and national) about SD

2. SD University Studies in Cyprus:

The majority of the universities in Cyprus include some, limited studies in Life Sciences. Some but not all of these studies are directly related and adopt the basic principles of Sustainable Development.

The following studies in Life Sciences are currently available in Cyprus:
- Department of Agriculture Sciences, Biotechnology and Food Science (BSc in Plant Science, BSc in Animal Science, BSc in Food Science), Cyprus University of Technology, 4-year studies, *programme based on SD principles*.
- The Harvard School of Public Health, Cyprus University of Technology, 4-year studies, *programme based on SD principles*.
- Department of Biology, University of Cyprus, 4-year studies.
- Department of Life and Health Sciences, University of Nicosia, 4-year studies, *programme based on SD principles*.
- Department of Health Sciences (BSc in Nursing and BSc in Physiotherapy), European University Cyprus University of Technology, 4-year studies.

Life Long Learning is adopted, in principle, by all of the universities in Cyprus. All the universities provide specific programmes within the framework of LLL. However, none of these programmes are directly related to either Life Sciences or SD.

Therefore, the value of the indicator "2.A" of the guidelines for Cyprus is:
✓ Existence of specific studies in Life Sciences about SD: In few universities

The abovementioned university studies in Life Sciences include some subjects that are directly related to SD. These subjects are limited to the following:
- Sustainable Animal Production
- Sustainable Plant Production
- Sustainable Biotechnology

Therefore, the value of the indicator "2.B" of the guidelines for Cyprus is:
✓ Existence of specific subjects about SD in the degrees: In very few degrees

All the abovementioned university departments that are related to SD require the successful performance of a Diploma Work (final year project). A part of these projects is directly related to SD. In addition, some departments require at least a 3-months practical exercise of their students in private enterprises or in other private or public institutions. Moreover, some departments require the implementation of specific assignments by the students directly or indirectly related to SD.

Therefore, the value of the indicator "2.C" of the guidelines for Cyprus is:
✓ Existence of specific practical activities about SD in the degrees: In few degrees

The full understanding of life is a prerequisite for Sustainable Development. The education in LS in Cyprus has significantly helped the country towards the adoption of modern, sustainable methods in the fields of animal production, plant production and natural resource management.

The barriers that prevent the full integration of SD in Cyprus are summarized in Table1.

Table 1: *Barriers of sustainability integration and possible solutions*

Barriers	*Solutions*
Tasks of different institutions are overlapping or conflicting	Separate jurisdiction and coordinate the tasks of each competent authority/institution
Inadequate funding	Invest on R&D and develop adequate funding schemes for SD
Complexity and inflexibility of current funding schemes	Modernization and simplification of processes
Public not aware of the meaning and benefits of SD	Stimulate public awareness
Lack of specific policies and motivation for education in SD	Finance and provide motivation to promote education in SD
Skepticism of the private sector	Provide motivation to promote participation of the private sector in the research for SD and the adaptation of SD principles
Lack of prioritization criteria	Partition between areas of knowledge
Inadequate cooperation between industry and academia	Provide simple and adequate cooperation and funding schemes. Set academic and industrial links
Excessive bureaucracy	Simplify processes. Set simple mechanisms for coordination between officers, educators and researchers

3. Relevant Institutions related to SD in Cyprus:

There are a lot of research centers, governmental institutions, enterprises, associations and NGOs that are related to SD. The governmental institutions, research centers and NGOs are usually willing to cooperate with the universities and to participate in various SD educational activities. The same is not true in the case of the private enterprises and institutions.
The governmental institutions and a few of the NGOs have a significant influence in governmental decisions and policies related to SD.

The following are some of the institutions in Cyprus that are related to SD:

- Agricultural Research Institute (ARI), governmental
- Energy Service, governmental
- Center of Environmental Studies, Private
- Cyprus Energy Agency, NGO

- Department of Environment, governmental
- The Cyprus Institute, governmental
- Cyprus Productivity Center, governmental
- AKTI Research Center, Private
- Art and Wild Nature Foundation, NGO
- BirdLife Cyprus, NGO
- Environmental Protection Foundation, NGO
- Cyprus Association for the Protection and Care of Animals, NGO
- Cyprus Association of Professional Foresters, NGO,
- Cyprus Conservation Foundation, NGO
- Cyprus Marine Environment Protection Association, NGO
- Ecognosia: Centre for Environmental Research and Information, Private

4. International cooperation in ESD (Education in SD) in Cyprus:

The objective of Cyprus international policy is to "have an active involvement in processes that aim to promote international cooperation, peace, stability and sustainable development". Its geographical position enables it to play "a role both in the region, and within the European family. Its accession to the European Union will initiate a new era in its relations with other countries as a formal member of a group of states with which it shares common values, principles and ideals". The Ministry of Education is in close cooperation with the governmental universities and SD related institutions in Cyprus towards the implementation of this policy.

The Cyprus Universities, governmental and research institutions are very well engaged with several research projects concerning Education in Sustainable Development. The public as well as the private universities have specific policies for the invitation and participation of foreign professors in their both their undergraduate and post-graduate courses. Moreover, the universities are strongly involved in several student exchange programmes with other Countries (particularly from the EU).

5. Good practices and relevant experiences in Cyprus:

The activities carried out by the Cyprus Government to implement and/or promote the SD can be summarized as follows:

- Existence of specific subventions (funding schemes) for the implementation and utilization of Renewable Energy Sources.
- Existence of specific subventions (funding schemes) for buildings with High Energy Performance.
- Existence of several specific competitions such as "The Green Entrepreneurial Award" for private enterprises.
- Funding Schemes for several activities related to SD (development/conservation of "green areas", improvement and renovation of historic and archeological sites, promotion of agro-tourism, etc) performed by the municipalities of Cyprus.

- Existence of specific SD related research programmes for children (elementary and secondary education level).
- Existence of several specific competitions (related to SD) for children.
- Existence of several school-clubs for the protection of the environment and wildlife.

In addition, some activities have been carried out by the Cypriot universities to implement or promote the SD. These activities include seminars, conferences, workshops and the publication of leaflets/manuals in the following fields:

- Recycling in general
- Water saving
- Water treatment and reuse in the domestic sector
- Waste management and pollution control
- Energy saving and efficiency in the domestic sector
- Environmental Education
- The "Green Procurement" criteria

6. Possible future actions in Cyprus:

Although a lot of research programmes and other educational schemes are available in Cyprus, the funding provided is in most of the cases inadequate. Most importantly, there is a significant need for a more flexible mechanism and a more organized institution/body to coordinate all the activities related to ESD.

The concept and principles of SD could be integrated in the Life Sciences studies by the following actions that have not been considered or not implemented so far:

- Emphasize the significance of SD in Life Sciences within the elementary and secondary educational programmes.
- Development of specific educational programmes concerning SD in the Life Sciences at a University Level.
- Motivate practitioners of Life Sciences to adopt the concepts of SD.

Moreover, based on the barriers of sustainability criteria integration in the university which have been summarized above (section 2), the following possible future actions that will alter these barriers can be summarized as follows:

- Increase funding for SD activities
- Develop specific grants and funding mechanisms for SD
- Set academic and industrial links
- Modernization and simplification of processes
- Provide motivation to promote participation of the private sector in the research for SD and the adaptation of SD principles
- Stimulate public awareness
- Develop training programs for professors (specially for novice professors)
- Simplify processes. Set simple mechanisms for coordination between officers, educators and researchers

- Use of sustainable criteria in purchase decisions

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[3] “Global Education in Cyprus - National Report on Cyprus”, North-South Centre of the Council of Europe, European Commission 2004.

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN CZECH REPUBLIC

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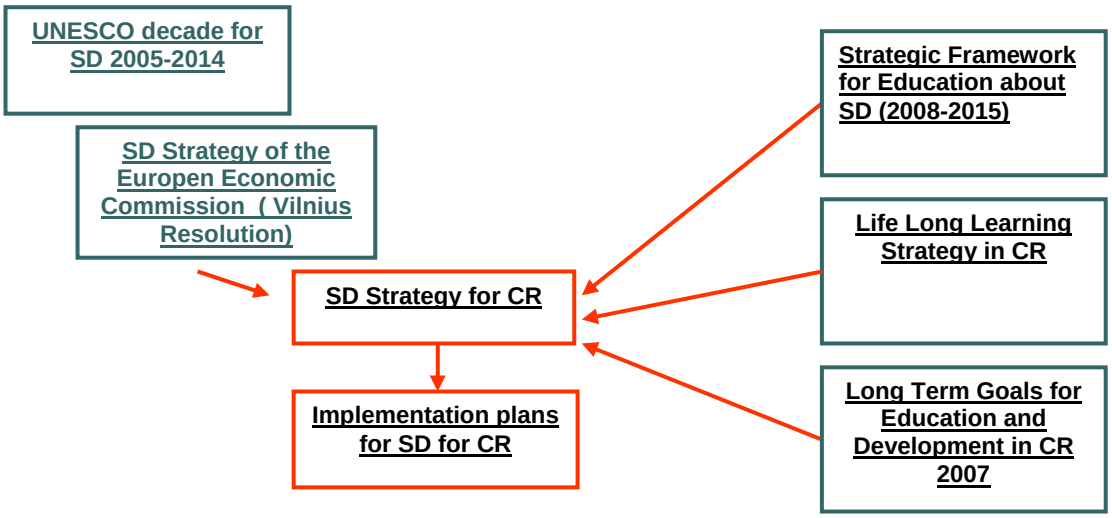
1. Sustainable Development (SD) policies in the Czech Republic:

The Czech Government Council for SD was established in 2004. Representatives of all ministries and of main stakeholders participate in the different bodies of the Council-committees (2) and working groups (7). Generally, the Council has developed several managerial communication tools (i.e. communication strategy, communication action plan, etc). In cooperation with the Committee on the SD Strategy, the Council facilitates public discussion by organising public hearings, thematic workshops, national stakeholder forums, email-based discussions, information campaigns, etc. The Council also annually prepares the 'Sustainable Development Forum' which aims to facilitate broad public discussion and access of the public to information on SD topics. In 2006, the Council started a more intensive dialogue with leaders of the business community. In 2007, the Council communication activities towards the general public were conducted under the common theme 'Sustainable and Safe Transport', in 2008-2009 it is the theme of 'Sustainable Energy'. Planned themes for the future are 'Public Health`(2010) and 'Sustainable Consumption and Production' (2011).In its session on 11 January 2010 the Czech Government adopted by its Resolution No. 37 the updated Strategy for Sustainable Development of the Czech Republic under the title **"Strategic Framework for Sustainable Development in the Czech Republic" (1).** An implementation plan for the Strategy is under preparation and has been submitted to the Government in May 2010. The document aims to identify key themes and issues related to the Czech Republic's sustainable development and to find appropriate measures for addressing them – these measures may be included in already existing and approved policy documents. In connection with the new "Strategic Framework for Sustainable Development of the Czech Republic" the Ministry for Regional Development has established the "Working Group for SD in Regions, Villages and Territory" (²). The situation in the various fields of Czech sustainable development is monitored using a set of indicators, with the results being regularly published as Progress Reports on the Czech Republic Sustainable Development Strategy. The latest Progress Report (2009), i.e. the third in succession, clearly indicates that *while there has been improvement in some monitored areas (e.g. the coverage of the Czech Republic by municipalities' land-use planning documentation) many indicators (economic structure, biodiversity, corruption, etc.) have shown a consistent adverse trend.* The SDS shall operate until 2030. In accordance with the directives of the SDS, Progress Reports are made under the auspices of the Government Council for Sustainable Development with the objective to map the fulfilment of the SDS goals and inform both politicians and the public about the state and development of the Czech

Republic in respect of sustainable development. For the year 2011, the Fourth Progress Report on the CR SDS is being prepared.



Therefore, the values of the indicators "1.A" of the guidelines for Czech Republic are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

In the Czech Republic the Ministry for Regional Development "Working Group for SD in Regions, Villages and Territory" (2) and the Ministry of Education, Youth and Sport **"**Action Group for implementation of" Strategy for education about SD for years 2008/2018" are specific institutions/programmes implementing the agenda of SD. **The Strategic Framework for SD Education in the Czech Republic 2008/2018 (3)) focuses on:**

- the understanding of interconnection and mutual coherency of economic, social and environmental dimensions of the development, at local, national, and global level respectively.
- the perception of the SD as a holistic and systemic attitude that tends to economically prosperous society and respects both social and environmental connections and limits.
- the development of competences (knowledge, skills, and competence) for democratic and free decision making processes, in accordance with Czech legislation concerning SD.

Therefore, the values of the indicators "1.B" of the guidelines for Czech Republic are:

- ✓ Existence of specific educational national institutions about SD
- ✓ Existence of specific educational regional (not national) policies about SD
- ✓ Existence of specific educational regional (not national) legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ No existence of specific subventions about education in SD

Rectors of 5 Prague HEI signed in January 2006 a Memorandum of Understanding on the systematic introduction of studies focusing on SD and Environmental Studies (ES). This Memorandum enables interlinking study programmes and research in SD. Creating a common platform of studies in SD and ES is important, due to existing interdisciplinary links found throughout study areas taught at various HEI in Prague. The MoU does not focus on establishing a common study programme in SD. However students can study subjects related to SD at various universities and in various study programmes. The MoU was signed by the Rectors of Charles University Prague, University of Economics Prague, Institute of Chemical Technology Prague, the Czech Technical University and the Czech University of Life Sciences Prague. In 2003 the Charles University Prague has organised an international conference with the title "Education for a Sustainable Future".

Therefore, the values of the indicators "1.C" of the guidelines for Czech Republic are:

- ✓ Existence of specific university policies about SD: In the majority of the universities
- ✓ Existence of specific units or departments about SD: In some universities

The following is a list of several relevant scientific papers (i.e. publications) found on the portal *Research and Development and Innovation System of the Czech Republic (http://www.isvav.cz/)*. The list includes the code numbers of each project. Most scientific papers were published by the Charles University Prague Environmental Centre, together with the Ministry of Environment of the Czech Republic and the Czech Academy of Science.

- RIV/00216208:11690/02:00005008 - Sustainable Development Strategy for the Czech Republic: How to recognize sustainability? (2002)
- RIV/00216208:11690/05:00011023 - Czech Experience with Education for Sustainability (Reflection of Hidden Paradigms) (2005)
- RIV/00216208:11690/01:00100300 - Towards Sustainable Development of the Czech Republic (2001)
- RIV/00216208:11690/05:00011024 - Sustainability at universities in the Czech Republic: What are the possibilities (2005)
- RIV/00216208:11690/05:00011023 Czech Experience with Education for Sustainability (Reflection of Hidden Paradigms) (2005)
- RIV/00216208:11690/05:00011018 - Options of University Activities for Sustainable Development (2005). *The article makes an overview of the role of education in the sustainable development strategy with a special focus to the higher education sphere. Important options of the universities' support to the sustainable development are analyzed. Some of those activities are based on the unique character of universities as institutions - particularly an interdisciplinary research or, more precisely sustainability science. Furthermore, attention is paid to the environmental performance of universities and their strategic planning. The article also describes current international networks which intend to support sustainable universities. Two case studies are presented as well.*
- RIV/00216208:11690/05:00011060 - Universities and Sustainable Development in Europe (2005). *The paper shortly reviews responsibilities of the tertiary educational*

sector in the contemporary world and attempts to define its position within the mainstream EU policy and relevant documents. Theoretical analysis of the paradigm shifts in science and research is presented; most important opportunities and risks of the routinely used interdisciplinary approaches are discussed in this context. Institutional reactions to the globalization challenges are described as the role of international associations in the process of sustainability.

- RIV/00216208:11690/02:00005001 - A set of sustainable development indicators for the Czech Republic (2002).*The indicators were chosen so that it could be possible to compile them from the existing datasets and databases. They comprise the headline indicators as well as the aggregated indicators.*

Therefore, the value of the indicator "1.D" of the guidelines for the Czech Republic is:

✓ Existence of specific programs about SD

2. University studies in the Czech Republic

Charles University Prague – E-Learning: **European Virtual Seminar on Sustainable Development**. **European Virtual Seminar on Sustainable Development**

Problems of sustainable development are typically complex and perspectives on the nature and solution of these problems are likely to vary with national, cultural and disciplinary background. Transboundary competence, the ability to communicate and collaborate across the boundaries of nation, culture and discipline, is therefore an essential competence for sustainable development. In the European Virtual Seminar on Sustainable Development (EVS) students with different national and disciplinary backgrounds work together on case studies in sustainable development, using modern ICT to overcome the constraints of place and time. The heterogeneous student groups are an excellent learning environment to develop transboundary abilities, as the students experience differences in perspective in a very direct way and have to come to a joint solution of the problem. Learning objectives:

At the end of the EVS the student will be able to:

1. describe and operationalise the concept of sustainable development
2. analyse sustainable development issues from a European perspective
3. link local, national and European policy-related issues to a societal shift towards sustainable development
4. collaborate with students of different nationalities and from different cultural and disciplinary backgrounds
5. use the computer-conferencing system effectively for collaborative learning

Corporate Sustainability and Natural Resources

- The course provides a general introduction to the field of Environmental Economics and Management with emphasis in the relationship between Sustainable Development and Economics and examines the ways in which companies engage in environmental management, the role of stakeholders in the development of the corporate environmental strategy, and the links developed between financially drawn managerial decisions and the measurement and evaluation of the impact of these decisions on the environment.

Masaryk University Brno **- COST C27: European research programme Sustainable development for small deprived peripheral communities**

Czech University of Life Sciences Prague - COST C27: European research programme Sustainable development for small deprived peripheral communities

Sustainable Use Of Natural Resources (BSc Programme, 3 years)

- The programme is taught in English and delivers theoretical and applied knowledge about sustainable use and management of natural resources.

Sustainable Rural Development In Tropics and Subtropics (BSc, MSc & PhD programmes)

- Includes general subjects on theoretical principles and specialized subjects relating to sustainable tropical and subtropical agriculture. The range of the specialized subjects refers mainly to engineering, economics and environment. The graduate becomes a specialist in the field of sustainable tropical and subtropical agriculture.

Sustainable Biosphere Development (MSc Programme, 2 years)

- Graduates have a broad and deep theoretical knowledge in the fields associated with air quality, waste water treatments, ecotoxicology and environmental contamination. These subjects are supplemented with specialized subjects of landscape environmental application, biomonitoring, advanced soil science, hydropedology, and remediation of contaminated environment. They also have broad ideas concerning individual renewable energy resources and contemporary situation in this fast growing segment of our economy. Graduates are also equipped with a vast knowledge of environmental economics and law extending their education scope. Graduates are aware of the quality of their knowledge, and possibilities for further study in related PhD study programmes.

Development Economics Seminar: Sustainable development in developing countries (BSc and MSc level, Faculty of Economics and Management)

- Building sustainable agroforestry systems in Peru in contrast to the production of biofuels in Brasil. The concept of sustainable development must be considered for reaching economic prosperity.

Mendel University of Agriculture and Forestry Brno

- The Sustainable Utilisation and Management of Grasslands by Ruminants in Less Favourable Areas (LFA) within The European Model of a Multifunctional Agriculture

Masaryk University Brno Geoinformatics and Sustainable Development (BSc field of studies, 3 years)

- In the study field Geoinformatics and Sustainable Development, two complementary sciences are connected with respect to increasing requests of information society, which cannot develop without solving of sustainable development questions. A graduate of this field is oriented mainly on geographic information systems and their practical use. Simultaneously he has a practical ability to solve topics of sustainable development on local and regional levels with a perspective of praxis compatibility in the European Union frame. It concerns mainly knowledge and skills of prudent implementation and evaluation of connected cultural, economic, social, environmental and political changes according to internationally accepted requirements (preliminary cautious, generation responsibility etc.).

South Bohemian University
Sustainable landscape management systems (BSc subject, 3 years)

Therefore, the value of the indicator "2.A" of the guidelines for Czech Republic is:

✓ Existence of specific studies about SD: In few universities

Therefore, the value of the indicator "2.B" of the guidelines for Czech Republic is:

✓ Existence of specific subjects about SD in the degrees: In the majority of the degrees

Therefore, the value of the indicator "2.C" of the guidelines for Czech Republic is:

✓ Existence of specific practical activities about SD in the degrees: In the majority of the degrees

The Czech life-sciences sector benefits from an extensive pool of educated and skilled labour supplied by a network of universities. The total number of university students in the Czech Republic was 323 765 in 2008. Approximately 56 777 students were enrolled in life-sciences universities with the corresponding annual output of approximately 7 400 graduates *(Life Sciences in the Czech Republic)*. Though mentioned data come from official (governmental) sources, it is necessary to regard them as approximate. Many fields of study in the Czech Republic´s universities are not unambiguously classifiable into life sciences (LS), and, further, all the faculties of medicine (and their numerous fields of study) could be also included in LS. Table 1 shows the overview of the LS institutions at the faculty level.

Table 1. Universities and faculties with Life Sciences fields of study in the Czech republic.

	University	**Faculty**
1	Czech Technical University in Prague	Faculty of Biomedical Engineering
2	Czech University of Life Sciences Prague	Faculty of Agrobiology, Food and Natural Resources
3	University of South Bohemia	Faculty of Science
4	University of South Bohemia	Faculty of Health and Social Studies

5	University of South Bohemia	Faculty of Agriculture
6	Mendel University of Agriculture and Forestry	Faculty of Agronomy
7	Mendel University of Agriculture and Forestry	Faculty of Horticulture
8	Masaryk University Brno	Faculty of Science
9	University of Ostrava	Faculty of Science
10	University of Pardubice	Faculty of Chemical Technology
11	Charles University in Prague	Faculty of Pharmacy in Hradec Králové
12	Charles University in Prague	Faculty of Science
13	Charles University in Prague	2nd Faculty of Medicine
14	Charles University in Prague	3rd Faculty of Medicine
15	Palacky University	Faculty of Science
16	University of Veterinary and Pharmaceutical Sciences Brno	Faculty of Pharmacy
17	VŠB - Technical University Ostrava	Faculty of Mining and Geology
18	Institute of Chemical Technology, Prague	Faculty of Food and Biochemical Technology
19	Institute of Chemical Technology, Prague	Faculty of Environmental Technology
20	Brno University of Technology	Faculty of Chemistry

2.D. ***How do you think education in LS contribute to SD in your country.***

Education in SD must start at pre-school and primary level and must be intensified at secondary level education. Higher education in Life Sciences (LS) can only yield tangible results in the area of SD, if primary and secondary education in SD creates a solid basis. Currently, students of LS are aware of the problematic of SD, but not to the extent that they would systematically take actions for SD and accept the restraints and limitations, which are corollaries of SD.

2.E. ***Barriers for the integration of the SD and problems in the teaching methods***

Integration of SD at the higher education level is problematic due to the complexity of accrediting specialized (interdisciplinary, interfaculty) study programmes aimed at education in SD. A high rate of transmissivity and mobility of students among faculties´ field of studies is thus needed. Similarly, lifelong education in LS does not necessarily include courses in SD (except in universities listed above). However, education in SD is also aimed at the cooperation between universities (or generally higher education institutions) and practical professions in “expert centres” or in the form of so called “clinical education”.

The main barrier for integrating SD in our teaching (and mainly in our life style) is the ultraliberal laissez-faire mentality propagated by multinationals and their think tanks. Sustainability is systematically played down by the “global players” in the economic sector – in the media and particularly in advertising campaigns. We are literally mesmerised to think, that we are living in the best possible world. How can the educational sector integrate SD in the curricula, when trends in the “real world” seem to be quite opposite (e.g. unsustainable multinational meat industry, unsustainable multinational GMO production, unsustainable fossil fuels industry and unsustainable motorcar manufacturing)? One of the biggest problems is, as stated above,

propaganda and consumer manipulation by means of advertisement. Just one example to illustrate this point: Recently a French car manufacturer ran an advertisement which shows an "up-to-date hip" consumer choosing a particular model of a car. All the while the salesman tries to convince the potential buyer about the qualities of the car, but the "up-to-date hip" consumer does not seem to be interested. Finally the exasperated salesman says: "Sir, do you really need a car like this?" The "enlightened", "rational" consumer answers with a "blasé" smile: "I do not need it. But I want it!" So if currently, in 2011, in times when SD should be on top of the agenda, we see advertisements like this, we may wonder, if the mentality of "laissez faire" does not simply imply "after us cometh the flood". SD is not sexy. SUV's (sports utility vans) are sexy!

3. Relevant Institutions related to SD in the Czech Republic:

Governmental institutions:
Ministry for Regional Development "Working Group for SD in Regions, Villages and Territory" (2).
Ministry of Education, Youth and Sport "Action Group for implementation of " Strategy for education about SD for years 2008-2018"
Ministry of Labour and Social Affairs
Ministry of Industry and Trade

NGOs:
Bioinstitut http://www.bioinstitut.cz/english/index.html is an NGO focusing on organic farming initiatives and sustainable agriculture policies in the Czech Republic
The **Society for Sustainable Life** http://www.stuz.cz/rs/ (web only in Czech) is a NGO founded in 1992 by the former Minister of Environment of the Czech Republic with the aim to support the dissemination of information on SD and as a platform for discussions in all spheres of SD: agriculture, social, economic etc.
The **Green Circle** http://www.zelenykruh.cz/en/ is an association of 28 environmental NGOs working in the Czech Republic. It was founded in 1989. Green circle promotes concerns of its members mainly by information and legislative activity.
The **Children of Earth** (Deti zeme) http://www.detizeme.cz/dokument.shtml?x=152827 is an NGO focusing on working in regions on local problems; nevertheless, two activities of ours surpass regional and even national borders - protecting birds of prey, and supporting environmentally-sustainable means of transport.
Pražské Matky (Prague Mothers) http://pmatky.ecn.cz/about-us/about-us.html are a not-for-profit civic association (NGO) striving to improve the condition of our living environment and traffic safety, particularly for the most vulnerable citizens. We support sustainable mobility and try to increase interest and a more responsible approach of citizens and public administrations to these issues.
Czech Union for Nature Conservation
http://www.csop.cz/index.php?cis_menu=3&m1_id=1257 is a civic association of people (NGO) who share an active interest in nature conservation and the environment. Our mission is to protect and restore nature, the landscape and the environment, to promote environmental education and support sustainable living.
Permakultura (CS) http://permakultura.cz/ (web only in Czech) is an NGO active in the Czech Republic and the Slovak Republic which focuses on the conceptions and

realizations of sustainable human habitats (following the works of Bill Mollison) (4)

a. **International cooperation in ESD in the Czech Republic (Education in SD):**

Charles University Prague – E-Learning: **European Virtual Seminar on Sustainable Development**. **European Virtual Seminar on Sustainable Development**

b. **Good practices and relevant experiences in the Czech Republic:**

In the Czech Republic a policy of waste separation is pretty well implemented, including in schools, universities and public offices.

The most advanced tool that is presently being used to study the sustainability of development from a scientific viewpoint is the material and energy flow accounting (MEFA). This methodology is being evolved at the Institute of Social Ecology in Vienna, Austria in particular. The last international conference, dedicated to Ester Boserup´s legacy, took place in November 2010 in Vienna. The Danish scientist Ester Boserup (e.g. Boserup, 1983) is considered as the founder of interdisciplinary sustainability studies. The MEFA links socioeconomic processes and ecosystems in a way that is meaningful for social as well as for natural sciences (Haberl et al., 2004). Kušková et al. (2008) applied the MEFA in the Czech Republic. The Czech Republic experienced fundamental changes of political system during last hundred years. The MEFA shows long term changes in social metabolism and land use in the Czech Republic during this period as well as the influence of several political regimes on the sustainability of the development in general. The main disadvantage of the MEFA framework is the use of quantitative official statistical data (social and economic indicators) from statistical yearbooks in calculations. Mentioned data are characterized by a low validity, they have low predicative value of social phenomena and, in the case of some political regimes, they may be manipulated for political reasons.

6. Possible future actions in the Czech Republic:

- Increase the coordination between institutions and departments
- Coordination between students, academic and non-academic staff
- Increase funding
- Increase promotion
- Develop specific grants
- Introduce sustainability criteria in the selection of professors
- Develop training programs for professors (specially for novice professors)
- Act in the previews education levels
- Use of sustainable criteria in purchase decisions

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Ministry of Regional Development (http://psur.mmr.cz/)
(3) “Strategy for education about SD for 2008 – 2015” (http://www.msmt.cz/dokumenty/strategie-vzdelavani-pro-udrzitelny-rozvoj-ceske-republiky?lang=1) /only in Czech/
(*) Further information found on http://www.isvav.cz/
(4) Interesting resources on Permaculture can be seen on http://www.permaculturecairns.com/
A description of the SD Strategy in the Czech Republic (as well as other EU countries) can be accessed at http://www.sd-network.eu

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN DENMARK

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1. Sustainable development policies in Denmark

1.A. Planning, investment and management strategies of the state and local governments to promote (SD) (organization, structure, responsibilities, policies, legislation, subventions…)

Existence of specific national institutions about SD

SD in Denmark, on a governmental level, is primarily handled by the Danish Ministry of the Environment, the Environmental Protection Agency (Environmental Protection agency 2011). At a more local level, the five Danish regions handle SD issues, primarily through their Local Agenda21 secretariat, which also exist on municipal level (Danish ministry of the Environment 2009).

National policies about SD

The overall strategy for SD in Denmark is expressed in the report "A Shared Future – Balanced Development" from 2002. The Danish strategy for sustainable development is founded on eight objectives and principles: 1: The welfare society must be developed and economic growth decoupled from environmental impacts. 2. There must be a safe and healthy environment for
everyone, and we must maintain a high level of protection. 3. Denmark must secure a high degree of bio-diversity and protect ecosystems. 4. Resources must be used more efficiently. 5. We must take action at an international level. 6. Environmental concerns must be taken into account
in all sectors. 7. The market must support sustainable development. 8. Sustainable development is a shared responsibility, and Denmark must measure progress Sustainable development presents national (Environmental Protection agency 2002)

National legislation about SD

A great number of Danish legislative efforts involve a focus on SD. Legislation on social, environmental, economic and educational and other fields draw heavily on SD issues. Also the Danish legislation is in a great number of ways influenced by EU directives concerning SD (OECD: 2007)

1.B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…)

Existence of specific educational national institutions about SD

In late 2009 the Danish Regional Centre of Expertise (RCE) under the UN University was launched as part of an effort to link research on SD, teaching on SD and SD in practice. This network serves as the only official institution that, on a national level, focus (among other fields) on SD in higher Education (RCE Denmark 2011).

Sustainable development as an independent term is not used in the Danish higher level national educational policies, legislation or accreditation system. This, however, does not imply that the ideas behind SD are not present. Issues such as

democracy, participation and environmental concerns are very much a part of the Danish laws governing higher education, but the term SD is not used.

1.C. University policies and experiences (obligation and possibilities of include SD competences or contents in Life Science higher education studies, organization, policies, specific departments, influence of the Bologna Process)

Existence of specific university policies about SD

All the eight Danish Universities (Aalborg University, Aarhus University, University of Southern Denmark, Roskilde University, University of Copenhagen, Technical University of Denmark, Copenhagen Business School, IT University of Copenhagen) focus on sustainability as part of the universities organization. All consider SD in relation to the physical environment of the universities, buildings, energy consumption etc.

Existence of specific units or departments about SD

A majority of the Danish universities have departments, units or secretariats working with issues closely related to SD. At the University of Copenhagen a steering group for climate and sustainability instigates initiatives like sustainability lectures at the LIFE-science department and climate conferences (KU 2011). Aarhus University has created a Sustainability network for students and teachers, in order to emphasize SD especially as a link between students and business life (ASB 2011). At Aalborg University a special research program for sustainability, innovation and politics is focusing on SD in an interdisciplinary setting (AAU 2011). At the University of Southern Denmark, they do not have an independent unit or department for SD, but strive to create a forum for knowledge exchange on SD between life sciences, natural and social sciences (SDU 2011).

1.D. Research policies related to SD (specific programs, grants)

A majority of the Danish universities has research policies related to SD. These come in many forms, but generally link with the units or departments mentioned above. For example the research program for sustainability, innovation and politics at Aalborg University, emphasize what they call sustainability management which they argue is a special research program related to all three pillars of sustainable development - economic social and environmental aspects, thus trying to focus on the socalled triple bottom line that is of increasing importance among business actors: profit, people and planet (AAU 2011).

2. SD University studies in Denmark

2.A. Specific University Studies in Life Sciences and others

Little direct use of SD could be identified in university studies related to “life” sciences as understood as the study of the biology of organisms, but as the list of fields attached to this questionnaire are somewhat vague and very broad, other university studies that that could be interesting are described here.

At the Life-science department at the University of Copenhagen there is a three year MSc in Agriculture: Plant Science, Production and Environment. This involves a focus on sustainable production systems and techniques (KU 2011-2).

At the Danish Technical University a two year master course are taught on Sustainable Energy. This MSc focuses on new energy systems, energy system modeling and evaluation of impacts on ecosystems and society (DTU 2011).
At the Aarhus School of Business a three year bachelor course on Sustainability focus on the interaction between economical factors and a sustainable development (ASB 2011-2)

At the Faculty of agricultural sciences at Aarhus University there is a MSc in Agro-Environmental Management, focusing on "holistic understanding of the processes in the open land, the interaction between the different production forms in agriculture and environmental management and nature conservation", and thus dealing with a range of issues closely related to Sustainable development issues.

At the same faculty the MSc in biosystems engineering also stress SD perspectives when dealing with food technology, automation and environmental technology. (AU 2011)

2.B. SD specific subjects in Life Sciences University studies.
As mentioned above very few, if any "Life" science higher education institutions work directly with SD, but it still has an important status in many subjects taught in neighboring fields. At the Life-science department of Copenhagen University several special sustainability lectures will be held during 2011, focusing on different aspects of SD and often climate change (KU 2011-3).
At the Danish Technical University a semester long course on life-cycle management is taught. This course work very directly with the idea, possibilities and limitations of SD (DTU 2011-2). A corresponding course, Input-Output analysis is taught at The University of Copenhagen.

2.C. SD practical activities (practice in enterprise or in institutions, course, work etc)
As mentioned earlier a majority of the Danish universities tries hard to incorporate SD ideas into the everyday running of the universities. The buildings, transport and energy consumption are fields where all Danish universities strive to work on a sustainable basis.

2.D. How do you think education in LS contribute to SD in your country
Regarding the public discussion of SD, LS does not contribute greatly. Where the natural and social sciences work very directly with SD issues, "Life" sciences often works in neighboring fields, for example researching algae that could potentially be interesting as a natural resource.

2.E. Barriers for the integration of SD and problems in teaching methods.

The barriers involved when discussing the integration of SD into higher education are many and of very different types.

Several structural barriers are very important. The overall focus on SD issues should make it a cornerstone of every course taught, but the fact is that teaching on all levels are hard pressed to find time and resources to deal with the many different perspectives that a student today must be acquainted with means that SD, can be viewed as something that has to be taught alongside other more "important" issues. This coupled with the tendency in the Danish educational system that changes to curriculum are hard to make and takes a long time, due to a comprehensive national accreditation procedure, means that a quick fix to a lack of SD related issues in higher education is hard to come by.

Also since the dismal failure of the COP15 in held in Copenhagen December 2009, the country has witnessed a considerable low in interest surrounding issues of SD and related climate and environmental topics. Coupled with a center-right wing government that is more focused on economical growth than SD, and the field has witnessed a downturn in interest from many actors, among them the mass media.

Regarding "Life" science, which most of this questionnaire focus on, SD could be viewed as a somewhat normative and hermeneutical issue that is hard to incorporate into the more "hard" science identity that is central at most Life-science departments.

Many other factors act as barriers, or as something resembling barriers acting as catalysts in the beginning of the process of integrating SD issues, but later slowing the process, e.g. the media's role in Denmark, where SD and climate issues have had a strong impact on the everyday media landscape, boosting interest and the possibility of a greater focus on SD. The media, however, is a fickle mistress and after some time often moves on to new stories of catastrophes, crisis and missing babies. Alas, during the last year there has been considerable less focus on SD issues, and thus less possibility for integration into the Danes normal life and their educational institutions.

3. Relevant Institutions related to SD in your country

3.A. Research centers, governmental institutions, enterprises, associations and NGOs

We are unsure of whether this question only stresses relevant institutions related to higher education or a more overall approach. Choosing the latter as the former would be very narrow. Also an evaluation of their "influence on SD" is very hard to present in a short way, especially when dealing with such a large and varied field.

A large number of different institutions and organizations are involved in SD in Denmark. The major players on a governmental level have been discussed, but a long list of interesting actors can be drawn up.

- The Danish Public Health organization works with SD issues (SST 2011)
- LO, the Danish federation of trade unions is involved in SD, and has published several articles on the field (LO 2011)
- Corresponding to this the Confederation of the Danish Industry is also involved in SD work (DI 2011).

- The Danish Economic council works with SD, hosting discussions and publishing on the field (DORS 2011).
- The Danish Adult Education Association spans a wide field of issues and topics related to SD, and has a great impact on the everyday life of the normal Dane (DAEA 2011).
- A host of NGOs work within the field among these The Danish 92 Group, which is a coalition of 22 Danish NGO's working on issues related to environment and development (92group 2011). Some of the individual NGOs also have a very important position in the Danish society when discussing SD. Among these could be mentioned: The Danish Society of Nature Conservation (DN 2011), Friends of the Earth Denmark NOAH (NOAH 2011), Climate Movement of Denmark (KB 2011) etc.

4. International Cooperation in ESD

4.A. Policies (state and local governments, university)

Denmark has been involved in the Decade for Education for sustainable development (2005-2014). Early in the process Denmark took part in the planning of the decade, but somehow managed to present its own strategy for the decade almost halfway through it. This does not mean that nothing has happened, but rather that especially the government has lost its momentum on the matter after a promising start (UVM 2009). From 2010 the activity level has increased again, among other things with a number of conferences on the issue. There has been several initiatives and as mentioned earlier support to strengthen ESD on across the education scene, from non-formal to formal of all levels.

4.B. Experience in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs…)

As already mentioned very little has been done from the life science departments to incorporate SD or ESD into the curriculum, this does also mean that there is even less focus in international cooperation related to SD.

5. Good practices and relevant experiences in the higher education institutions in Denmark

5.A. Activities to implement or promote SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD)

There are plenty of activities that fall within this field. Conferences are annularly held at all the major universities focusing on the perspectives mentioned. As an example Roskilde University 2010 hosted a conference called Sunrise – Triple C presented an interdisciplinary effort to bring politicians, researchers and teachers together and discuss SD and climate change (RUC 2010). At the Danish School of Education Aarhus University a conference focusing on Education and Climate change took place in 2009, with governmental representatives and individuals from education present (DPU

2009). The RCE-Denmark, mentioned earlier, is also an effort to bridge the gap between the different actors involved with SD issues, striving to convert the theoretical insights of academia into more tangible results in society and the educational sector.

6. Possible future actions in Denmark

Much is possible, but as the interest in SD is often representing a rollercoaster ride, with intense high´s and depressing low's it is not easy to see what the future holds for SD in Denmark. A not entirely unlikely change in government to a centre-left majority would most likely bring a renewed focus on SD and a strong impetus to insist on a more widespread integration of the issues into higher education. Also SD has for some time been present in primary and high school curriculum and it is not unthinkable that this would continue to the higher education sector.

6.A. How could education and research in ESD in Denmark be improved?

More resources as always, but overall a distinct focus on the barriers mentioned earlier would be a great help when developing the ESD field in Denmark. There is progress in both education and research, but it is not by any means unproblematic to introduce ESD to new fields and sectors. ESD is often considered a highly normative subject, and interpreted in many different ways according to the different venues it permeates. It would thus be wrong to talk about a unified approach and idea of ESD in Denmark, but to a much greater degree a living and dynamic field that is changing and developing to meet the many challenges on its road. A combination of a governmental action plan for the promotion of ESD, including a foundation to support innovations in this field, with bottom-up initiatives is probably necessary, if the process should be intensified.

6.B. How could the concept of ESD be integrated into Life Science studies?

ESD is often linked with either more "natural" science fields such as energy-research, wind-power, life-cycle analysis or social sciences like sociology, philosophy, education etc. As such it meets many challenges in some areas of LIFE-sciences that often focus more on changes on cells, organisms etc. There are however several interesting approaches, such as research dealing with Public health that is working with many aspects of SD.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN FRANCE

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1. Sustainable Development Policies in France

1. A. Specific existence of national institutions and policies

In both the National Assembly and the Senate, the Delegation for Regional Planning and Sustainable Development is in charge of assessing regional planning and development policies and of informing the parliamentary bodies on the carrying-out of the regional planning policy.

The historical practice of spatial planning in France is very close to the current concept of sustainable development. In France, the notion of "territory " was defined since the establishment of a policy of State for planning in 1950. Regional planning in France is a set of actions led by the French government to encourage the development of the regions forming the national territory. Acting on a scale larger than the urban policy, it concerns the spatial organization of people and activities. It therefore combines economic development, housing, transportation, communications and environmental protection. These various aspects of development of territories can obviously come into opposition and political authorities must make decisions thinking about long-term development of an area. From this point of view the historical practice of regional planning in France is very close to the current concept of sustainable development.

In the french culture of spatial planning, the state plays a leading role much more than in most European countries. However, today, the territorial planning implementation involves contractual arrangements with local authorities. This is especially true for project contract-state region. It is, in France, a document by which the state and region are committed to programming and multi-year funding of major projects such as building infrastructures. Contracts for state-region project are a new form of the “plans contracts” created by the Act of July 29, 1982. Nowadays, the European Union occurs more in developing regions through its regional policy. This double movement of decentralization and European integration leads to involve all levels of the policy structures in the territorial planning.

Today in France the ministry in charge of sustainable development is the Ministry of Ecology, Energy, Sustainable Development and Spatial Planning (MEEDDAT). The Ministry of Ecology and Sustainable Development is the successor of the Secretariat of State in charge of sustainable development which was established in May 2002. The

horizontal nature of the actions associated to sustainable development are obvious. The policy implementation follows the following rule : Under the leadership of the State, all departments and devolved services, local authorities and civil society contribute to the sustainable development strategy. The action plans are set in the context of the NSSD (National Strategy of Sustainable Development), set by an inter-ministerial committee for sustainable development. The Inter-ministerial Committee for Sustainable Development (ICSD) was set up in 2003 and is chaired by the Prime Minister. The first NSSD was made for the period 2003-2008. Main 11 indicators defined in the framework of the European Sustainable Development Strategy (EUSDS). For the new NSSD 2010- 2013 called “Towards a fair and green economy”, the list of indicators has been completed and improved in order to inform the public about the society's evolutions but also in order to convince and encourage people to change their behavior.

The state created an interdepartmental network in which the Ministry of Sustainable Development plays a key role in network animation. This network involves many other ministries and a senior official responsible for sustainable development has been appointed in each ministry involved in order to stimulate the mobilization of services. Moreover, many actions for sustainable development are achieved by the various departments. The case of the Ministry of Higher Education and Research will be discussed later.

Accordance with international recommendations and because it is essential to involve civil society, it was established the National Council for Sustainable Development, whose role is to be a force for proposals. As for local authorities, they are in the Local Agenda 21 tool allowing them to apply a policy of sustainable development. At the city level, the Charter of Aalborg, Charter of European cities for sustainable development, was signed by over 200 local authorities in France.

The central government has local administrative structures in the French regions and departments. At this level the local structures responsible for environmental protection, water resources, agriculture, monitoring of potentially hazardous industrial facilities to the environment, roads and communications have come together today in a Departmental Directorate Territories, called the Departmental Directorate of Territory and the Sea in the coastal departments. It is a decentralized service of the French state created on 1 January 2010 under the authority of the prefect of the department. This overall structure aims to integrate the particular concept of sustainable development into its activities as formerly the Regional Departments of Agriculture and Forestry had supported the application of local planning policy in the territories. What has fundamentally changed is the importance taken by the local political authorities (Regional Councils in particular) in the choices made in particular as co-financing of actions performed.

Tax Assistance	Welfare	Financial	**Specific** (general or sectoral or according to company size**)**
Reduction of tax	Exemption or reduction in charges	Subsidies and investment allowances	Many professional sectors of the economy provide specific support
Deduction of specific expenses or investments	Contract Premiums	Interest subsidies repayable at 0%	Water agencies
Exemption or partial tax on profits	Social work exempt from common law	Private equity (venture capital, development capital, leveraged buy-out, fund for investment in environment and energy control.	ADEME (waste, energy, and transport agency)
Tax exemption or partial tax relief	Training costs support	Credit leasing ; Energy ; Environment (eg. Sofergie).	Development Agencies
Simplification of administrative procedures		Fund guarantees (eg. investments of energy control guarantee fund.	Chambers of commerce; local authorities *etc.*

Table 1 : Specific subsidies for SD actions

But the overall policy of the French state in terms of sustainable development goes further. Recently, an important reflection took place during the so-called "Grenelle of the environment". It was a national consultation aimed at reshaping the policy in ecology and economic growth in order to make it compatible with the limits of a finite world. The goal of the collective discussion that took place in 2007 and 2008 was to lead an action plan whose lines were drawn during the discussions in several working groups on climate change, biodiversity and natural resources, the health, the environment, production and consumption, democracy and governance, the competitiveness and employment. Following this work, the National Assembly began to consider bill program in July 2008 on the implementation of the Grenelle Environment Forum. This legislative package has been called "Grenelle 1 ". According to Law of finances from march 9th 2010, 5 milliards of euros of national loan “investments for future” are for the development of SD in France. Then, a bill on national commitment to environmental "Grenelle 2", presented as "legal toolbox of the Grenelle Environment", listed practical measures for effective implementation of the law program on the implementation of the so-called Grenelle Environment 1. Bill Grenelle 2 was voted in June 2010 and came into force.

Mission of some institutions is to distribute funds for the benefit of actions in the field of Sustainable Development. We can cite for example the National Spatial Planning and Development Fund, which has an endowment of some 300 million euros. Table 1 presents some specific subsidies dedicated to increase SD in France.

Therefore, the values of the indicators “1.A” of the guidelines for France are :

- ✓ **Existence of specific national and regional institutions about SD**
- ✓ **Existence of specific national and regional policies about SD**
- ✓ **Existence of specific national and regional legislation about SD**
- ✓ **Existence of specific subventions about SD**

1.B. Higher Education policies related to SD

The Ministry of Higher Education and Research conducts a policy of sustainable development that is part of the National Strategy for Sustainable Development. NSSD 2010-2013 was entitled "Towards a Green Economy and fair" and aims to develop a low-resource and carbon-free while pursuing an objective of social justice and equity. The three pillars of sustainable development are concerned : economic, environmental and social. The NSSD is built around nine challenges consistent with international and European commitments of France, especially in the case of the Ministry of Higher Education and Research :

- Challenge 2 on the knowledge society (education, training, research and development),
- Challenge 4 on climate change and energy : the reduction of emissions of greenhouse gases must be sought, public actors must be good examples in this field,
- Challenge 8 on demography, immigration and social inclusion (continued fight against all exclusions, including those related to disability).

According to challenge 2, in France the education of SD was integrated into the studies particularly in history-geography, and in Life sciences.

The implementation of the NSSD in action plan also includes a section on the exemplary nature of the state in the operation of its services and an educational component by education to SD. The Ministry of Higher Education and Research is committed in the implementation of the circular of the Prime Minister (circular of the 3 December 2008) on the exemplary nature of the State regarding sustainable development in the operation of its services. A copy of Exemplary Plan for the Administration (EPA) for central and decentralized services of the ministry was established in March 2009 to contribute to sustainable development of french economy. This plan is a guidance document. It specifies the actions to be undertaken or continued in the field of sustainable development and of eco-responsibility in our administration in relation to building energy management, introduction of products from organic farming in catering, waste management, buying SD furnitures in public procurement, integration of disabled people. This EPA was also declined in each region. The local public institutions involved in higher education and research have to develop their own plan. The evaluation of the implementation of departmental EPA is based on annual performance indicators.

Regarding the educational component of the NSSD in sustainable development, the Ministry of Education set up a Virtual University dedicated to the issue of sustainable development. Founded in June 2005, the Virtual University Environment and Sustainable Development (UVED) is one of seven Thematic Digital Universities supported by the Ministry of Higher Education and Research. The UVED mission is to produce, develop and diffuse digital learning resources scientifically validated in all fields linked to sustainable development.

While relying on the universities, the UVED affirms the need for a strong link between research and teaching. Thus, the UVED aims to contribute to diffuse the research results in order to increase transfer of expertise toward companies. The UVED aims to respond business needs or professional needs in the field of SD. This thematic digital university is based on interdisciplinarity. The courses offered are the result of cooperation of experts from different disciplines that aim to tackle issues in an integrated approach. The UVED decided to develop its training around the following areas :

- global changes, ecosystems and biodiversity,
- dynamics of natural environments, natural resource management,
- waste management, assessment and risk management,
- management and land management,
- eco-design and eco-technology,
- institutions, stakeholders and society.

The concept of sustainable development is treated as a major theme, transverse and not as a particular area [1].

Therefore, the values of the indicators “1.B” of the guidelines for France are :

✓**Existence of one specific educational national institutions about SD (a virtual University)**
✓**Existence of specific educational national and regional policies about SD**
✓**Existence of specific national legislation about SD (part of EPA)**
✓**No existence of SD criteria in the accreditation systems of the university degrees**
✓**No existence of specific subventions about education in SD (SD is not the only criteria to obtain subventions or subventions are coming from other partners than the State)**

1.C. Existence of specific universities policies or departments about sustainable development

In France, universities are autonomous structures. They are responsible for their guidance in teaching and research. Therefore they are free to adopt a specific policy on sustainable development or not. Also they are free to structure itself by creating units specifically related to sustainable development. The case of the University of Southern

Brittany is an example among others. The university has created a "mission for sustainable development " led by an adviser. The role of the special adviser "sustainable development" is to monitor and to federate all the actions are within the context of sustainable development and to engage effectively in establishing a policy of long-term development. The realization of these actions will help to develop the skills of the university in teaching and in research. The University of South Brittany has also established a charter given to all users of the university and it is possible to sign the charter online. In 2008, a competition dedicated to sustainable development was organized by the university and helped to bring out new ideas and projects that are now achieved as the implementation of the collection of used batteries, waste sorting, etc...

Other universities are organized differently. The University of Burgundy has created a steering committee "sustainable campus". Indeed, for several years, the University of Burgundy set up actions for sustainable development. Some actions are implemented at the initiative of some of its services or of its staff. Others come from a comprehensive policy. There was therefore a need to coordinate actions such as social action aimed at staff and students or the hazardous waste management. The creation in October 2008 of the steering committee "sustainable campus" responded to this need. This committee is under the direct responsibility of the university president, marking the establishment of a strategy for the University of Burgundy in environmental protection and sustainable development.

Anyway, the implementation of sustainable development strategies in these establishments is very similar to what concerns the establishment of monitoring the quality of teaching within universities. Sustainable development is the result of horizontal actions and therefore requires the establishment of a cross-animation structure like for quality management in companies or in administrative services.

Higher education does not only means universities in France. There are also engineering schools and groups of institutions who are called polytechnics. Depending on their area of work, these institutions can implement specific policies or create departments dedicated to sustainable development. As such, it is essential to cite the Polytechnic Institute of Grenoble, which is a reference in France for multidisciplinary research and environmental protection. The description of its graduate school refers specifically to the concept of sustainable development.

Finally some of the curriculum of higher education in France takes place in high schools : These are bac + 2 degrees called "Brevet de Technicien Supérieur". High schools do not have autonomous status. These high schools are subject to the obligation to respect the EPA from their ministry. For example, the agricultural college of Nevers-Challuy established a monitoring and reduction of waste generated within the facility. This action is subject to regular communication with students. Similarly various investments were studied to increase the use of rainwater collected or to reduce the energy cost of the boiler. However, funding for such facilities needs the help of local structures (General Council at the department level or Regional Council of Burgundy).

Ther are no national funding for these projects. For example, the project which aimed to develop a device for video conferencing to avoid the travel of many teachers from Dijon (and thus reducing energy expenditure) was rejected. These actions are consistent with the themes of the NSSD in which the Ministry of Education is involved (see above) including that of education to sustainable development.

Of course other actions are successfull. For example in the picardy region different actions for education in environment and awareness campaign in direction to all types of public such as the regional weeks of environment are led. Since 2007 the Region and ADEME have supported 7 public agricultural establishments which are engaged in the realization of Agenda 21 of educational establishments.

Therefore, the values of the indicators "1.C" of the guidelines for France are :

- ✓ **Existence of specific university policies about SD: In the majority of the universities or of higher education institution**
- ✓ **Existence of specific units or departments about SD: In some universities or higher education institution**

1.D. Specific research related to Sustainable Development Policies

Research organizations in France are highly specialized and not multidisciplinary oriented. These research facilities typically manage research topics related to environmental protection or the proper use of natural resources. These structures thus contribute to the establishment of a sustainable mode of development, but few studies directly sustainable development as a multidisciplinary topic. France has the particularity of having non-academic research organizations (CNRS, INRA, CEMAGREF...). These high-level research organizations are directly controlled by the Ministry of Research and their centers are highly specialized. This hyper-specialized organization goes against the operation of research structures of universities. Indeed, each university is general in its teaching and has researchers in life sciences able to work in the field of environment and sustainable development. Currently the organization of research and higher education centers (PRES) attempts to overcome the contradictions that exist between the existence of general educational universities and the government requirement for local specialization of research teams. The centers of research and higher education (PRES) allow universities, engineering schools and research organizations to pool their resources. These offer a research and training better suited to the needs of the territories. Early 2011, there was 19 PRES in France. For instance, within the ParisTech PRES began research and training support actions in the field of éco-conception of buildings and infrastructures, drinking water management in emerging and developing countries, prospective modeling in service to SD.

The governance structures in France have long maintained links with research in the field of public policy and rural development, for example with the teams of what is today AgroSup Dijon. In this context what is called sustainable development today is

one of those concerns. One can cite for instance the work of Luc Thiébaut [2] [3] within the CAESER (Center for Applied Economics and Sociology in Agricultural and Rural Areas) of AgroSup Dijon. For a decade already multidisciplinary studies relative to sustainable development are regularly launched by the Ministry of Research for instance on the topic of eco-conception of equipments.

Nowadays, the Ministry of Higher Education and Research drives the policy in the matter of SD which enrolls in the National Sustainable Development Strategy. The inter-ministerial committee for SD adapted the last revision of this strategy July 27th, 2010. National partnerships are established through the National Research Agency (ANR). ANR project are organised in programs and sub-programs. For instance ther is an ANR program called "Ecosystem and Sustainable Development" which is subdivided into several sub-programs.

Therefore, the value of the indicator "1.D" of the guidelines for France is :

- ✓ **Existence of specific research programs about SD**

2.- SD University Studies in France

In France, the diplomas of higher education are structured as follows. There are degrees to bac + 2 vocationally oriented. The title and content of these degrees are precisely defined by the Ministry of Higher Education. These courses are organized in high schools for the higher technician certificate (BTS) and are organized in University Institutes of Technology (IUT) attached to a university for academic qualifications of technology (DUT).

The bachelor diplomas are under the responsibility of universities. However the title of these bachelors is set by the Ministry of Higher Education and their content is framed in a flexible way and validated by the ministry. Training in 1 Year, the L3-called "professional bachelor" may be co-accredited with engineering schools (eg License "Protection of the Environment, statement water and wastes treatment" is a co-accredited training between University of Burgundy and AgroSup). In the case of professional bachelors, the existence of a "statement" that specifies the title of the diploma allows each institution to show the specificity of the local diploma.

Master degrees are validated by the Ministry of Higher Education but their title, their structure and their contents are freely built by universities. In France only universities can create classical Master degrees. So engineering schools can create "International Master degrees". These engineering schools can also award degrees of "specialized Master" (one year study). Finally, the engineering degrees are awarded by engineering schools under the control of the "Commission des Titres d'Ingénieur" (CTI).

At the level of PhD theses, there are structures called "graduate schools" in France. Some of them clearly include sustainable development in their areas of research.

To summarize, the existence of training in sustainable development at bachelor level depends on the willing of educational institutions. The Department's role is to validate or not to validate the proposed training. In any way, the existence of qualifications aimed specifically at the sustainable development sector will be very dependent on the availability of career opportunities in this sector.

Name	Study level	Status of the establishment	Specific modules	Examples
University Diploma		University		DU Pollutions and nuisances, water and waste. Lyon 1 University
BTS	L1 + L2	Agricultural college or High school	Internship, thematic modules	BTS Water management. Agricultural college of Nevers-Challuy. BTS Water Business. College of Cosne sur loire. BTS Management and protection of nature. Agricultural college of Montmorot.
DUT	L1 + L2	University	Internship	DUT Biological Engineering. University of Burgundy.
Vocational (Professional) Bachelor	L3	University + possibility of cohabilitation (Engineering school	Tutored project Intership	Environmental protection, statement : water and wastes treatment. AGROSUP/University of Burgundy Management of environment, statement : waste business. IUT of Tours. Agronomy, statement : Agriculture and Sustainable Development Jules Verne University of Picardie.
Bachelor	L1 + L2 + L3	University		
Master	M1 + M2	University + possibility of cohabilitation (Engineering school)	Internship	<u>Vocational oriented Master</u> Rural space and environment. AgroSup/University of Burgundy. Master Environment and natural, industrial or urban hazards. Lyon 1University. <u>Research oriented Master</u> Agriculture, Food and Sustainable Development. University of Montpellier / Supagro Montpellier.
International Master	M1 + M2	Engineering school	Internship, study project	Master Management and treatment of water, soils and wastes. AgroParisTech. Master The agrofood chain : Innovations for a sustainable agriculture and better products. Paul Sabatier University of

				Toulouse.
Engineer Diploma	L3 + M1 + M2	Engineering school	Internship, project study, specific modules on environment protection and management, scenarios, specializations graduation.	AGROSUP Engineer, Specialty : Agronomy. Possibility of specialization of completion "Agriculture & Environment" AgroSup.
Specialized Master	M3 ?	Engineering school	Internship, micro-projects, project study.	Specialized Master : Public action for the sustainable development of territories and agriculture. AGROSUP.

Table 2 : Integration of sustainable development training in the French university system

Therefore, the value of the indicator "2.A" of the guidelines for France is :

- ✓ **Existence of specific studies about SD : In some universities or higher education institutions**

The teaching of sustainable development requires a degree of interdisciplinary integration. Indeed fundamentally a sustainable development education should be based on the integration of three pillars that define sustainable development. Yet higher education in France is organized according to certain characteristics. The result is that the bachelor diplomas that have a direct link with sustainable development are vocationally oriented diplomas (L2 or L3 level). Therefore the skills taught belong to technical areas that rely primarily on one of the three pillars of sustainable development. Regarding the field of life sciences, this is particularly the pillar on the protection of the environment (and professional activities related to the exploitation of natural resources).

However, the need to professionalize the training involves training the students to economic, regulatory and social sciences to prepare them to deal with all dimensions of the problems they will have to solve in the target business sector. Although universities are autonomous in establishing their programs, titles of licenses are regulated by the state (like those of university-level L2), which simplifies the analysis of the situation. The case of Master level training is more variable. The training at this level are generally characterized by the existence of more multidisciplinary modules consistent with the greater complexity of the problems at this study level. However, as in the case of bachelor levels, training related to sustainable development, if they respond well to the goal "to produce while preserving resources for future generations" remain attached to a main scientific discipline, particularly where these degrees are the field of life sciences.

Table 2 shows the organization of studies in relation to sustainable development in France. All courses are not cited but at least one example is described by title or diploma degree category. This table also presents specific teaching modules that are specific to education for sustainable development. A more detailed analysis of curriculum needs to be done. However, work done on this subject by AGROSUP [(4)] shows the difficulty of conducting a survey on the subject scientifically reliable. Therefore, work done in Dijon (particularly the questionnaire developed) is not presented here, but can serve as a methodological basis to carry out an exhaustive study of all degrees in relation with SD in France.

Therefore, the value of the indicator "2.B" of the guidelines for France is :

- ✓ **Existence of specific subjects about SD in the degrees : In the majority of the degrees (in all of the vocational degrees)**

Therefore, the value of the indicator "2.C" of the guidelines for France is:

- ✓ **Existence of specific practical activities about SD in the degrees : In the majority of the degrees (in all of the vocational degrees)**

3.- Relevant Institutions related to SD in France

The holistic and comprehensive vision required in the SD approach, its consistency and its follow-up will be supported in particular by the Standing Committee of the High-Ranking Civil Servants for Sustainable Development run by the Inter ministerial Delegate for Sustainable Development. Specific research demand of government departments and public authorities is met by mission-oriented public research institutes. The most important French actor in research is the CNRS, (National Center for Scientific Research). Research centers of the INRA (French National Institute for Agricultural Research) perform applied research in the fields of agriculture, food, nutrition and food safety, environment and land management. INRA is the second largest public research institute in the French research landscape. ADEME (Environnent and Energy Management Agency) has the status of public agency. Its mission is encouraging, supervising, coordinating, facilitating and undertaking operations with the aim of protecting the environment and managing energy. Created in 1990, INERIS (National Institute for Industrial Environment and Risks) is a public industrial and commercial institute under the authotity of the Ministry of Ecology, Sustainable Development, Transportation and Housing.

4.- International cooperation in ESD France

There are a lot of international cooperation in the field of ESD in France. Participation of AgroSup dijon to the ISLE program is an example of international cooperation in the field of education for sustainable development. In 2005, SEFI, in cooperation with CESAER (Center for Applied Economics and Sociology in Agricultural and Rural Areas),

organized in Florence (Italy) the First European Convention of Deans of Engineering and Technology Schools on the theme of "Present and Future Challenges for Engineering Education and Research in Europe".

The french Ministry of Foreign Affairs has launched the DURAS Project (Promoting Sustainable Development in Southern Farming Research Systems). DURAS consists of supporting (giving consideration to the priorities set out by Southern countries), through calls for tenders all research and development players in the field of agriculture, from researchers to growers.

There are also bilateral cooperations in ESD. For instance :

- France-Brazil : this year was the point of departure with Brazil on renew collaborations in mixed work groups.
- France- Germany : the French-German Council favours consolidation of SD in the perspective of a large scale european cooperation.

5.- Good practices and relevant experiences in the Higher Education Institutions in France

There are a lot of conferences and seminars about SD in France. Here are some examples :

- Seminar, Balancing Health, Environment and Sustainable Development : Utopia or Reality? Return of experience and foresight across the territory and the company, March 31 2011 at MINES ParisTech, Paris ;
- Festival Films, Research and Sustainable Development 6-9 April 2011, Toulouse ;
- Pedagogical program « Les Ecol'ogiques » (part of the Agenda 21 educational program), by the regional natural Parc of Avesnois (In partnership with National Education).

It may be mentioned as another good practices in this area : the EPA and the existence of missions for sustainable development in Universities.

6.- Possible future actions in France

The implementation of EPA in the structures under the Ministry of Education authority and the establishment of official representatives on sustainable development in universities has shown that sustainable development is achieved by all services but requires a transversal animation. This mission must be identified within schools and universities in a transverse structure. In business and in administrative services there are transverse structures which are already responsible for "health and safety" or "quality management". Similarly one can imagine the establishment of a mission for "sustainable development" in educational institutions.

However, the creation of training is dependent on the availability of jobs in the area of sustainable development or the implication of sustainable development into existing jobs. So, the creation of an observatory of job related to sustainable development could be a way forward in the future.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN GREECE

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1 Sustainable Development (SD) policies in Greece:

In Greece, the Ministry of Environment, Energy and Climate Change is the main responsible for the policy covering sustainable development. A special agency for the Management of the Operational Programme "Environment and Sustainable Development" has been operating and responsible for many aspects of SD in Greece. An additional, more agricultural-focused part of SD is being handled by the Ministry of Rural Development and Food, while additional SD actions are taken by other Ministries, such as Ministry of Development, Ministry of Merchant Marine, Ministry of Economy and Finance and other ministries. The Ministry of Environment, Energy and Climate Change has published a number of official documents describing and setting laws for various issues in the context of SD, such as ozone layer protection, waste management, environmental education, industry and environment, as well as environmental reports covering a wide range of topics. In addition, it is responsible for the national legislation covering SD topics and it coordinates a number of programmes and actions related to sustainable topics.

The national strategy for sustainable development in Greece is currently based on the version published in 2002 [1] by the Ministry for the Environment, Physical Planning and Public Works (now Ministry of Environment, Energy and Climate Change) and was lastly revised in 2006 by the EU [2]. The initial version was prepared taking into consideration the discussions and proposals made by the European Council in Göteborg (2001), when the first EU Sustainable Development Strategy (SDS) was adopted. In addition, it was revised after the discussions made during the World Summit on Sustainable Development in Johannesburg (2002).

The national strategy for sustainable development in Greece was published in order to "provide clear directions for achieving environmental sustainable policies in Greece and to guide the future work in the field of environment for the next decade". It describes the status of SD aspects in 2002, actions and measures for the SD in various sectors, such as energy, transport, agriculture & fisheries, industry, tourism and employment [1].

The revision made in 2006 took into consideration "unsustainable trends in relation to climate change and energy use, threats to public health, poverty and social exclusion, demographic pressure and ageing, management of natural resources, biodiversity loss, land use and transport still persist and new challenges" that arise. It includes objectives and principles covering environmental protection, social equity and cohesion, economic prosperity among others [2].

In June 2010, a law for the further development of renewable energy resources and for facing the climate change was voted by the Greek government, supporting the previously published national strategy.

Greece has made steps towards the implementation of the Agenda 21 in various cases, such as municipalities around Greece [6]. Agenda 21 is an action plan of the United Nations (UN) related to sustainable development and was an outcome of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992 [7].

As regards the existence of SD-specific subventions, there is a number of funding options, mostly from EU-funded actions and programmes supporting SD.

Therefore, the values of the indicators for the planning, investment and management strategies in Greece are the following:

- Existence of specific national and regional institutions about SD
- Existence of specific national and regional policies about SD
- Existence of specific national and regional legislation about SD
- Existence of specific subventions about SD

In Greece, it seems that Higher Education Instituted (HEIs) are not involved in policies concerning the SD. Even though there are several HEIs in Greece actively involved in the teaching of SD in various sectors, there in limited or no connection between the academic studies and the development of policies related to SD. However, in some cases there is the opportunity for getting a subvention for educational programmes in SD.

Therefore, the values of the indicators that describe the higher education policies for the SD in Greece are:

- No existence of specific educational national institutions about SD
- No existence of specific educational regional (not national) policies about SD
- No existence of specific educational regional (not national) legislation about SD
- No existence of SD criteria in the accreditation systems of the university degrees
- Existence of specific subventions about education in SD

Several universities in Greece have been involved in initiatives and programmes that promote SD, as well as policies on SD. More and more universities exhibit sustainable practices in the form of e.g. specialized offices (e.g. Office for environmental management in the Agricultural University of Athens). However, only a number of these universities have departments for teaching topics of SD.

Below, the current situation and policy concerning the most important Greek environmental sectors, as taught in various Greek Universities is analyzed [8]:

1 *Greenhouse Gases Emission and Climate Change Prevention Policies*
The fundamental keystones of action of the current National Strategy on Climate Change Prevention Policies include the restructuring and diversification of energy supply, the rational use and conservation of energy, as well as

measures for the restriction of more greenhouse gases. Greece has adopted the targets set by the Kyoto Protocol and has a National Plan that allocates emission permits to the industry.

2 *Air Pollution Emissions*
The fundamental keystones of action of the National Strategy on Air Pollution include the restructuring and diversification of energy supply, rational use and conservation of energy in the sector of building construction, measures for the sector of transport, measures for industry, as well as institutional and organizational measures that enforce effective energy management.

3 *Solid Waste*
The fundamental keystones of action of the National Strategy on Solid Waste emphasize on the safe disposal and utilization of domestic waste, using modern technology, the industrial and hazardous solid waste management, as well as the measures on reductionof solid waste production.

4 *Water Resources Quality and Use*
The fundamental keystones of the National Strategy on Water Resources emphasizes on a complete approach of water management, via a strategic plan on decentralization, infrastructure improvement and expansion, taking into account socio-economical approaches on water resources management, as well as protection from hazardous substances and risks.

5 *Land Use and Desertification Prevention Policies*
The fundamental keystones of the current action of the National Strategy on desertification include measures for the protection of forests, water resources, rural lands and grasslands from the intense exploitation, as well as the enforcement of research, information and education exchange actions and effective use of control mechanisms.

6 *Nature and Biodiversity*
The fundamental keystones of action of the National Strategy on Bio-diversity include measures for the preservation and restoration of ecosystems, for effective water and land resources management, as well as the promotion of horizontal environmental policies and incorporation of the component of bio-diversity at Greek sectoral policies.

7 *Production and Use of Energy Resources*
The specific goal emphasizes on the decrease of energy consumption intensity of the Greek economy, the opening and liberalization of the energy market and the diversification of energy mixture to the direction of environment friendly energy resources. This goal is accomplished with actions that include rational energy use and conservation, co-production plants development, the fast penetration of Natural Gas, the drastic increase of the RES contribution, as well as the improvement and interlock of electric system networks.

Therefore, the values of the indicators of the Universities policies and experiences in Greece are:

- Existence of specific university policies about SD: In some universities

- Existence of specific units or departments about SD: In few universities

2. SD University Studies in Greece:

Greece now has a fairly well-developed higher education system in life sciences which, in common with Western Europe, has experienced significant expansion in the past few years. According to Greek legislation, higher education consists of two parallel sectors [3]:

- The University Sector, which includes various Universities and Polytechnics. Within this sector, degree-level courses relating to life sciences are offered by Universities such as the Agricultural University of Athens, University of Thessaly, University of the Aegean and Harokopion University
- The Technical Sector, which includes the Higher Technological Educational Institutions (TEIs). It needs to be emphasized that TEIs are very similar to the former British polytechnics [4] and were fully integrated into the higher education system in 2001.

A number of Greek universities provide SD studies, covering various sectors of SD. An indicative list is as follows:

a) **Agricultural University of Athens (AUA)**: Provides a number of courses in Organic and Sustainable agriculture in bachelor and post-graduate level, as well as MSc programs in topics closely related to SD, such as "Integrated Rural Development".

b) **University of Thessaly**: The School of Agricultural Sciences hosts the Laboratory of Ecosystems Management and Biodiversity with courses relevant to SD as well as a Master in "Spatial Analysis and Environmental Management"

c) **University of the Aegean**: The department of Environment hosts a significant number of Laboratories that focus on subjects related to SD and environmental issues, such as Waste Management, Biodiversity Management, Energy Management and Laboratory for Environmental Policy & Strategic Environmental Management. These Laboratories offer course in both bachelor and post-graduate (MSc) level.

d) **Harokopio University of Athens**: Department of Home Economics and Ecology offers a post-graduate course in "Sustainable Development", which focuses on three major areas: regional development, environmental management and consumer education.

Additional courses may be available in other Greek universities, but as the course program is often updated there is no constant information about all available courses on SD.

Therefore, the value of the indicator about the SD studies is described as the existence of specific studies in SD in some Greek universities.

Greek Universities in the area of Life Sciences offer SD specific subjects in various cases. These subjects include topics on Agriculture, Atmosphere, Biodiversity, Desertification and Drought, Energy, Forests, Freshwater, Land Management,

Mountains, Oceans and Coastal Areas, Toxic Chemicals, Waste and Hazardous Materials [5].

In addition, actions taken in the SD education of the Greek Universities cover the following fields of the life sciences:

- Climate Change abatement
- Reduction of air pollutants
- Reduction and rational management of solid waste
- Water resources management
- Desertification abatement
- Protection of biodiversity and natural ecosystems
- Sustainable management of forests

As a result, the value of the indicator "2.B" of the guidelines for Greece is:

- Existence of specific studies about SD in the degrees: In some degrees

In various Greek Universities, the theoretical approach of the courses offered is combined with practical activities, exercises and experiments, therefore, the value of the indicator "2.C" of the guidelines for Greece is:

- Existence of specific practical activities about SD in the degrees: In some degrees.

Since a significant number of courses related to SD are provided by the Greek Universities, one could claim that SD is greatly benefited from the existing course programmes in Greece. However, since in most cases the connection of the courses with the SD is not clearly defined, some arguments might arise.

Teaching SD courses in Greece is not facilitated by the current status, since SD education is not properly organized or promoted. In fact, there seems to be a lack of connection between the theory of SD framework and the applications in practice. Possible solutions could be the development of a concrete curriculum on SD topics, which could be modified according to the needs of each specific institute or the introduction of unique forms of teaching topics of SD, such as the learning scenarios. These could be developed by a centralized specialized educational institute and then provided to the tutors in order to be revised and modified according to the specific needs of each tutor/institute.

3. Relevant Institutions related to SD in Greece:

As regards the institutions that are related to SD in Greece, a significant number can be found, covering a wide range of scopes. An indicative list is as follows:

- **National Center of Environment and Sustainable Development (NCESD)**

NCESD is a non-for-profit organization with private status, even though it is supervised by the Ministry of Environment. It focuses on four basic sectors: Biodiversity, Climate Change, Water & Waste Management, Environment and Human Health. It provides information on environmental indicators.

- **Centre for Renewable Energy Sources and Saving (CRES)**
  The CRES is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation. CRES is dynamically active, in the frame of the national and Community policy and legislation, for the protection of the environment and sustainable development.
- **Greek Institute of Entrepreneurship and Sustainable Development**
  It is a non-governmental organization activated in the fields of entrepreneurship and sustainable development, focusing on the activation and rise of the awareness of citizens through volunteering for a better environment.
- **Greek Company for the Environment & Culture**
  It is a non-governmental organization which supports sustainability in Greece through various programs, such as "Sustainable Aegean".
- **MAICh (Mediterranean Agronomic Institute of Chania)**
  MAICh is an institute dedicated to postgraduate and specialised education, applied research and the development of Mediterranean agriculture. It offers a postgraduate program in Sustainable Agriculture.
- **American Farm School**
  The American farm School (Thessalonica Agricultural and Industrial Institute) is an independent, nonprofit educational institution located in Thessaloniki, Greece, that includes a number of topics on sustainable agriculture.

4. International cooperation in ESD (Education in SD) in Greece:

Greece is an active partner in various international initiatives that relate to sustainable development. In addition, Greek organizations and institutions participate in international (mostly European) research programs/projects in the area of Education in Sustainable Development.

Greek Universities have developed an organized network of students' career offices, through which students are informed for applicable exchange programs and they may apply for a grant. In this way, many students of life sciences related to SD are given the chance to visit European HEIs and get additional knowledge and skills on SD-related topics. Similar exchange programs are available for academic staff, facilitating the transfer of knowledge between European Universities.

On the other hand, NGOs that are active in Greece exhibit a significant amount of international cooperation. Examples of such NGOs are WWF Hellas & Greenpeace Greece which are actively supporting SD actions.

5. Good practices and relevant experiences in the Higher Education Institutions in Greece

Greek universities have developed a set of good practices in terms of SD, that are followed in almost all cases. An indicative list is as follows:

- Rational consumption of natural and human resources
- Water, waste and pollution management
- Energy saving, energy efficiency, use of renewable energy resources when applicable
- Sustainable mobility, mostly through the extensive use of public means of transportation and cycling
- Education, information and training in SD topics, when applicable
- Promotion of sustainable consumer attributes

6. Possible future actions in Greece:

In Greece, the sector of education and research in SD topics is constantly developing. New university departments/laboratories in the context of SD are being developed and the existing ones are populated with academic staff and students. This is endorsed by the policy covering the environmental and SD issues, which is constantly updated and revised in order to meet the rising challenges. However, there is further space for improvement in these areas.

As regards the education and research in SD topics, the development of a generic curriculum would provide a solid base for the majority of HEIs that are active in the area of SD. In addition, the use of sustainability indicators would help towards the assessment of the status in various cases. Both academic staff and students should be properly educated, through national and regional seminars, on SD topics and they should be motivated for using sustainable ways of thinking and living (e.g. transportation, use of energy, use of resources).

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN HUNGARY I

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Sustainable Development (SD) policies in Hungary:
The assessment of the current situation in Hungary reveals relevant global trends, and those that are most contrary to long term sustainability and characteristic of the Hungarian situation which, accordingly, need to be addressed as priority areas.

Processes and trends threatening sustainability

- Climate change
- Declining environmental carrying capacity
- Acceleration of the diminishing and ageing of the population
- Low (registered) employment rate
- Declining average standard of public education by international comparison, failing to adequately support employment later in life and leading to amplified social inequalities
- Poor health status and a health care system with serious problems
- Growing social inequalities along the lines of income, health status, qualifications, and access to public services, appearance of social groups falling behind
- Unsustainable (material and energy intensive) consumer habits
- Shrinking and fragmentation of biologically active areas
- Expanding land use
- Endangered water reserves
- Weak SME sector
- Energy system that is highly dependent on external sources and is based on fossil fuels
- Pricing not reflecting scarcity of natural resources
- Public finances with tensions
- Slow and not sufficiently efficient official procedures and services in the public administration system

Setting priorities

Based on processes and trends threatening sustainability, we can identify priorities that affect more than one problem area and facilitate sustainability by positively affecting key processes. These priorities not only set directions and tasks for state bodies and local governments; their implementation takes close cooperation on the part of state, economic, and civil partners to reach the desired goals.
The fourth priority is **to protect natural values**. Preserving the operability of national ecosystems is a fundamental prerequisite for the sustainability of both the economy and of social life. This priority has a positive impact on the following trends threatening sustainability and the underlying causes:

- Climate change
- Declining environmental carrying capacity
- Unsustainable consumer habits
- Shrinking and fragmentation of biologically active areas
- Endangered water reserves
- Expanding land use

The fifth priority is **combating climate change**. Reducing greenhouse gas emissions and adaptation to changing weather and climatic impacts has a positive impact on the following trends threatening sustainability and the underlying causes:

- Growing social inequalities and poverty
- Poor health status
- Climate change
- Declining environmental carrying capacity
- Unsustainable consumer habits
- Shrinking and fragmentation of biologically active areas
- Endangered water reserves
- Pricing not reflecting the scarcity of natural resources

The priority is **to strengthen competitiveness in a sustainable manner**. The competitiveness of the economy may be enhanced in the long run if, and only if, it integrates the concept, basic principles, and objectives of sustainable development. This priority has a positive impact on the following trends threatening sustainability and the underlying causes:

- Pricing not reflecting the scarcity of natural resources
- Low employment rate
- Energy system that is highly dependent on external sources and is based on fossil fuels
- Inadequate efficiency of public administration
- Weak SME sector
- Declining average standard of public education by international comparison, failing to adequately support employment later in life and leading to amplified social inequalities
- The state of public finances

Climate change: **emissions and impacts**

In the wake of the earlier economic setbacks and the subsequent major economic restructuring and modernisation, the emission of greenhouse gases - primarily that of carbon-dioxide - has declined substantially and the level of emissions has not increased even despite the recent trends of economic growth (apart for emissions from transports.)

According to expert estimates - even along with improving energy efficiency - ***demand for energy is expected to increase slowly*** in the forthcoming period ***which will entail an increase in emissions as well*** if the mix of energy sources utilised by the national economy remains unchanged.

In accordance with global trends, the ***annual surface mean temperature is on the increase*** in Hungary. There is a similarly clear trend of increasing daily minimum

temperatures and in the number of warm nights. Certain meteorological and related environmental events have become more frequent; for instance Hungary has had to fight record high floods on the rivers Tisza and Danube in recent years. Precipitation is declining - and its fluctuations are growing more extreme - which is particularly evident in the diminishing of winter precipitation and the decrease of the number of days with more than 5 mm of precipitation. However the length of periods without any precipitation at all has not increased.

The state of the environment

Apart from large towns and the main transport junctions, ***air pollution*** has diminished, but motorisation has increasing impacts.

Actions have been taken ***in land use*** towards revitalising brown field areas, but these have not been able to balance the spread of green field projects and the rapid sprawl of built-up areas (residential and industrial buildings, roads). The proportion of the areas withdrawn from agricultural use and built up - as a consequence of the expansion of the residential and commercial zones of municipalities, construction of new motorways, mining, green field investment projects - has increased substantially as a consequence of developments during recent years (Agricultural land shrank by 300,000 hectares between 1994 and 2004.)

The ***state of the soil*** has improved partly through spontaneous processes and to a smaller extent through state assistance. The biggest problems are caused by soil and wind erosion as well as by compact impermeable layers in the cultivated soil layer. Water erosion is one of the most severe among soil degradation processes in Hungary, damaging more than a third of agricultural land, besides large areas exposed to wind erosion. Almost 50 % of arable lands in Hungary are endangered by improper land use (no crop rotation, no use of farmyard manure, eradication of patches of woods protecting fields from wind, exposure of soil surface, use of heavy machinery, tillage carried out at the wrong time). Soil improving interventions increased in the first half of this decade and the area treated with chemical fertilisers has decreased. Other unfavourable circumstances and processes concerning agriculture include soil acidification, damage caused by water logging, and salination.

The pollution of agricultural and forestry lands with heavy metals, pesticide residues, and other harmful substances is below the relevant limit values. The nitrate and nitrite content of soils was, on average, higher than the 50 mg/kg limit value only in some 1.7-7.2 % of the samples. Acidification originating primarily from atmospheric deposition affects particularly certain areas of Central and West Transdanubia and North Hungary. Sites of pollution caused decades ago, in different sizes and of varying degrees of severity, resulting from inappropriate storage of blast cinder, waste heaps, red mud, fly-ash, and slag as well as from the mining of uranium are to be found across the territory of Hungary. There is an ongoing process of taking account of these areas, assessing their condition and carrying out the necessary remedial and rehabilitation actions in the framework of the National Environmental Remediation Programme.

Among Hungary's ***surface waters,*** the water quality of rivers is acceptable, that of our large lakes has been improving; however, the state of smaller water flows is less

favourable, because sometimes their loads far exceed their self-purification capacities. The quantity of water is another important characteristic of Hungary's rivers and lakes. Maintaining the rivers' water carrying capacity is an important task, the importance of which is further increased by the threats entailed by the growth in the frequency and intensity of floods. In the near future we will have to carry out major investment projects to alleviate the risk of floods, to even out the flows of water, and to mitigate the impacts of draughts.

The quality of subsurface waters continues to be endangered by inherited agricultural and industrial pollution. A total of 4.4 million hectares of land is particularly susceptible to nitrate pollution in Hungary, of which 2.7 million hectares is agricultural land. The average quality of waters has been improved during the past decade and a half. At the same time, the quality of water in Hungary does not only depend on us, as much of the water comes from abroad. The decline in industrial cooling water consumption has had a favourable impact, as has regulations protecting living waters, the expansion of the sewerage networks, and increasing of water treatment and in certain areas the reduction of agricultural production (Lake Balaton area). Hungary's water reservoirs are still endangered, however, particularly in view of the expected increase in the frequency of droughts and the declining average precipitation as a consequence of climate change.

Hungary has adopted Government Decree No. 201/2001. (X. 25.) on the requirements concerning the quality of ***drinking water*** and its controlling system, as part of the process of legal harmonisation with EU legislation. The Drinking Water Improvement Programme integrated the aim of compliance in terms of the parameters laid out in the Accession Treaty (nitrite, boron, fluoride, arsenic) as well as, based on public health considerations, a goal of reducing the ammonium content to below the limit value as well. The Programme covers 908 municipalities and part municipalities in Hungary, with a total population of more than 2.5 million.

Substantial development projects have been launched during the past 10 years in communal ***wastewater*** treatment. A large number of municipal governments have started to construct sewerage and waste water treatment systems using earmarked and targeted state subsidy in recent years. In regard to these actual aspects of economic effectiveness (concerning the construction, maintenance and operation of the systems) and comprehensive environmental impacts should be consistently taken into account at least from this point on, assessing at the same time and in certain cases the economic effectiveness and comprehensive environmental impacts of other possible solutions. The expansion of the sewerage network - without construction of waste water treatment capacities - was, in some cases, accompanied by no change or even by a temporary expansion of the gap between the drinking water network and the sewerage network penetration.

Natural values, biodiversity

Because of its natural conditions and resources (geological conditions, riches of surface waters, soil types, the climate) Hungary has very ***favourable and diverse natural and ecological conditions and resources, natural values, and natural areas*** even by international standards. Preserving and conserving our natural heritage, however, is a

major challenge. In 2004 the Ministry of Environment Protection and Water Management adopted the Fundamentals of the National Strategy and Action Plan on the Conservation of Biodiversity.

Hungary has managed to maintain a higher than 20 % proportion of continuous natural and near-natural habitats and habitat systems in comparison to the country's total area. However, in comparison to 1999 the number of endangered plant species and the number of endangered animal species under protection has increased by 35 % and by 12 %, respectively. The reason for this increase has been - in addition to the environmental load and pollution - a substantial fragmentation of previously unbroken habitats. The most endangered places are wetlands and grasslands, whose fragmentation and elimination has continued even recently. As a consequence of Hungary's EU accession, species and habitats of importance for the community (Natura 2000) are now under special protection.

Much of Hungary's natural values are linked to woodlands, wetlands. and to extensive farming and its locations, i.e. to agricultural habitats. Varied land use adjusted to different environmental conditions and resources - particularly forests managed in a quasi-natural way, comprising indigenous tree species - plays an important role in the riches of biodiversity in Hungary.

Fortunately, the total area of woodlands consisting of indigenous tree species increased by 115,820 hectares between 1999 and 2004, by more than 1.5 times the total increase of forest areas, i.e. tree populations have been replaced on considerable pieces of woodlands.

Since 2002 Hungary has been assisting a number of different environment preserving farming techniques in the field of what is known as ***Agri -Environment Management***. From the aspect of agricultural land use with a focus on environment protection and nature conservation, there are horizontal and zonal measures and programmers. Environmentally aware farming techniques aligned to site conditions include - among others - what is known as ecological farming, the preservation and conservation of wetlands, and extensive grassland management. In the framework of the Agri-Environment Management scheme it is also possible to launch regional (zonal) programmers, aiming specifically at accomplishing the goals of soil and water protection in areas designated for this purpose. The ***Natura 2000 network*** and the related land use practices also contribute to preserving natural resources on almost 2 million hectares in Hungary.

Agriculture

The ***Hungarian agriculture sector has changed immensely*** during the past decades, as a result of the transformation of the ownership and production structure, fundamental changes in the conditions of livestock production, changes in the structure of food consumption and new trends in foreign trade as well as a host of other factors. Consequently, a substantial part of land that had been farmed before the change in political system has been taken out of agricultural production.

Internal market and subsidy conditions have also changed substantially and the current resources and conditions are among the most fundamental consequences of Hungary's EU membership.

Eco-farming has become an important area in regard to the environmental aspects of agricultural production. Organic and eco-farming practices were introduced in Hungary in about 1993-1994, but its organized and controlled regime was launched only in 1996. The proportion of land under controlled organic farming - areas converted into organic farming and the ecologically managed lands together - is still small, but it is growing rapidly: it increased by more than ten times between 1996 and 2004, from 11,400 hectares to 133,000 hectares, equaling about 2.3 % of agricultural lands, less than half of the EU average. In 2004 some 45.6 % of the ecologically managed area was made up of grasslands, meadows, and grazing lands for organic livestock production, 47.6 % was arable land. Most of the Hungarian organic farms sell their produce abroad, some 95-97 % of the qualified and brand-marked organic products end up in West European markets. The EU subsidies may further encourage those working in agriculture and family undertakings to turn increasingly towards ecological farming.

In the late 1990's ***economic growth*** started anew but ***was not accompanied by an increase in traditional forms of pollution as had been witnessed before.*** This process of separation was a result of economic and technological modernisation and the application of new types of environmental regulations. In the way of voluntary undertakings, the application of the ISO 14001 environmental management system of the International Standardisation Organisation (ISO) became a dominant element in corporate management. Today there are more than a thousand certified companies registered in Hungary. Up to the date of Hungary's EU accession we had adopted the European Union's EMAS (Eco-Management and Audit Scheme) and built up its institution. To date a total of eight enterprises with 10 premises in all have been entered in the EMAS register.

In this way in the wake of the change in political system the general goal of segregating economic growth from increasing environmental loads was apparently accomplished in Hungary. The reason for this, however, was not a conscious environmental or economic policy, rather, it came about as a by-product of spontaneous processes following the change in political system. This is why some of the above trends are expected to slow down or turn around in the future (primarily as a consequence of increasing consumption).

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The areas receiving agri-environment management and rural development support have been expanding steadily since 2002. The total area of Sensitive Natural Areas has increased from the 22,000 hectares in 2002 to 39,000 hectares by 2003 and to 117,000 hectares by 2004.

The Natura 2000 areas of importance for the European Community make up a total of about 1,96 million hectares, almost 21 % of the total area of Hungary. Some 38.5 % of the Natura 2000 areas in Hungary also enjoy a national level protection pursuant to other legislation.

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Energy

The structure of the use of ***sources of energy*** has altered in Hungary since the change in political system, natural gas consumption is on the increase. Hungary's total annual energy consumption has been around 1090 PJ for years.

Some businesses have already introduced ***energy efficient technologies,*** but the public sector and households have not made as much progress in this respect as a consequence of the high costs of conversion and lack of motivation. The per-capita energy consumption is significantly below that of developed countries but energy

intensity (per unit of GDP) is still almost three times as high (or 1.5 times as high, in terms of purchasing power parity) as the average of developed countries (In 1991 Hungary required energy which is the equivalent of 802.5 kg oil for generating an output of 1000 Euros, which decreased to 582 kg by 2003: by contrast, the energy efficiency of the EU15 countries is 190.8 kg/1000 Euros). The low energy intensity is, however, not only a matter of energy technology, but is also linked to the country's economic structure and level of development.

The predominant proportion of energy imports and the low level of use of renewable energy sources result in risks and strong external dependence in the energy system. Hungary's growing energy dependence also results in a security exposure: at present we are importing 72 % of our energy consumption and this may increase to 90 % by 2015.

The utilisation of ***renewable energy sources*** is low though it is on the increase: the proportion of the energy consumption originating from renewable energy sources increased from 3.6 % in 2003 to 5.2 % in 2005, while in some developed European countries - not independently of natural conditions - this proportion may be as high as 10-15 %. This relatively rapid growth was caused by an increase in the use of biomass for energy generation, which, besides its favourable features, entails a number of sustainability related risks (e.g. damaging the natural environment). We still have additional potentials in the use of renewable energy sources. The introduction of a guaranteed price for power generated from renewable energy sources is an important step towards a more sustainable energy system.

A total of HUF 202 billion was spent on ***environmental investment projects*** in the national economy in 2005, equalling some 4.6 % of all investments. A large proportion - 82 % - of environmental projects was implemented in the way of direct environment protection projects. The state has been providing funding support from the Earmarked Appropriation for Environment Protection (Hungarian abbreviation: KAC) to public environmental projects, reimbursing of the costs of actions aiming at averting environmental damage requiring prompt intervention, and threats of such damage as well as to operations aiming at preventing, identifying, and eliminating environmental and natural damage.

INSTITUTIONAL SYSTEM AND SUSTAINABLE DEVELOPMENT

State and government institutions have outstanding responsibility in performing tasks of coordination and integration concerning sustainable development. Enforcing and applying the principles of sustainable development requires a number of changes and development in this area as well. Though some progress has been achieved in the recent period, for instance in the areas of legislation and public participation, lack of coordination and consultation between different sectoral policies - taking account of their relationships as well as conflicting interests - continues to raise a multitude of problems. The concept of sustainable development still hardly appears in strategies published by the various ministries.

Forming and operating ***micro-regional associations*** is an important process from the aspect of sustainability. Although civil society organisations are not very strong in rural

Hungary, quite a number of local governmental spatial development associations have achieved significant results. One advantage of micro-regional organisations is that they can manage local sustainability problems at the lowest possible level and in an integrated way, from water and sewerage services through social problems to economic development.

Environmental and nature conservation organisations were the first ones among Hungary's ***civil society organisations*** to take on issues of sustainable development. A number of civil society organisations initiated programmes with the aim of implementing sustainable development in practice. These programmes were implemented in the widest variety of geographical settings, most of them focusing on particular small municipalities or groups of municipalities. These programmes are based on local resources, drawing on local labour and expertise, experience, local materials, and traditional technologies. Furthermore, the conditions of public participation in elaborating various nationwide and regional sectoral and development programmes, and in the inter-sectoral and sectoral bodies dealing with those programmes has greatly improved.

The most important fields of action – natural values (TE)

(*Active protection of natural values*. Hungary has forests, grasslands, and wetland habitats that are highly valuable by European standards, along with major geological values and rich agro-biodiversity (e.g. indigenous Hungarian livestock varieties, traditional crop varieties, related wild species). Preserving these - and in the case of the natural flora, creating seed banks - is an important and urgent task, which is assisted by providing legal protection, encouraging economic partners and the owners of areas of natural value as well as the development of sustainable land use. It is possible to identify the ways for the various types of habitats in which the above goals can be attained. The application of environmentally aware farming methods are assisted by horizontal and zonal programmes, including the system of Sensitive Natural Areas (SNA). In the wake of Hungary's EU accession, the sustainable land use of the Natura 2000 areas also helps this process. In such areas voluntary restrictions may have a more substantial positive impact on environmental factors than those ordered on a mandatory basis. To this end, vertical and zonal programmes should build on one another.

***Integration*.** The viability of biocenosis - ecological communities - and biodiversity may be preserved and natural resources may be sustainably used only through an active effort on the part of all players of the economy and all members of society. So-called 'institutional nature conservation' alone is not capable of attaining sustainability. Observing the aspects and requirements of conserving nature must be achieved in all sectors of the economy, particularly in those placing the greatest loads on the natural environment. Techniques aligned to the natural conditions should be applied in a large proportion of land used in agriculture and forestry. Agriculture must turn out healthy and safe foodstuffs. Agriculture not or not heavily hindering the functioning of natural processes preserves soils, the drinking water reservoirs, surface waters, and life in general, along with land and man, human communities and culture. Near-natural techniques of forest management should be increasingly used in the forestry sector. Areas designated by the Forest Reserve Programme must be given protected status. The required actions and steps in the areas of spatial development, tourism, hunting,

mining, and fisheries must be taken on the basis of the objectives set out in the Strategy and Action Plan for Preserving Biodiversity.
Integration requires close links with institutional protection, since sectors' active participation in working towards the goals of sustainable development can be best ensured by means of regulations.
Institutional protection. To slow down and stop degradation processes in nature, sufficient funding must be provided for institutional nature conservation. Using the law and enforcing the law to regulate the use of nature is just as important.
Change lifestyle and attitude. The success of efforts aimed at preserving the natural environment depends on whether people regard biodiversity valuable and whether people grasp the complex relationships involved and the interdependence of nature, society, and economy, to what extent they are willing and able to choose lifestyles and consumption habits that do not lead to destroying our still viable and functioning natural systems. Strengthening environmental awareness, facilitating the process of understanding and encouraging people to adopt sustainable modes of life are crucial requirements.
Participation. The concept of nature conservation cannot be legitimated without society's acceptance of the required interventions, people's active participation in the implementation of actions, and their contribution of their knowledge. The practice and institutional infrastructure for involving stakeholders need to be created and continuously improved.

Preserving health and developing healthy modes of life

Improving the health status of the Hungarian population is one of the most important goals related to sustainability, given its strong impact on all other economic and social processes. The current trends have to be turned around: **our goal is to enable Hungarians to live as long as possible, in the best possible health**. There are two main areas in which preservation of health and adopting healthy lifestyles can be encouraged: by influencing ways of thinking and attitudes relating to health and in the area of concrete possibilities for preserving good health. In addition to preventive type steps there is a need for efficient health care systems, effective governance and management, and adequate technologies and infrastructure in the area of medical services.
(**Bay National Development Agency** (NDA) – Ministry of Environment and Water (MoEW) Planning group, coordinated by Dr. Ferenc Molnár, Reviewed by: István Vilmos Kovács
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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN HUNGARY II

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1. Sustainable Development (SD) policies in Hungary:

1.A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…).

Hungary had elections in 2010, causing landslide changes in the direction and organisation of most national policies. However, almost all policies and institutions involved in the planning, coordination and determination of the main objectives of sustainable development remained unchanged. The new national development programme (the New Széchenyi Plan) has been introduced in 14th January, 2011. This 10-year long nationwide development programme sets 7 outbreak points which closely correlate with the concept of SD(1). These outbreak points include: Healing Hungary (a program for developing health and health-related industries and businesses), Green Economy Development Programme, Business Development Programme, Science and Innovation Programme, Employment Programme and Development Programme for Traffic and Transportation.

- Existence of specific national institutions about SD

In 2007, the Parliamentary Decision 100/2007(2) determined the planning and coordination tasks of long-term sustainable development of the Republic of Hungary. The National Council for Sustainable Development (Nemzeti Fenntartható Fejlődési Tanács – NFFT) has been established in 2008, with the Parliamentary Decision 57/2008(3). This Decision declares the legal background, mandate, tasks and operation of the Council. The President of institution is the Speaker of the Parliament (currently dr. László Kövér), and the Council has 4 Vice Presidents delegated by the Government, Hungarian Academy of Sciences, opposing parliamentary parties and civil organisations. Tasks and objectives of the Council: facilitating to determine the SD principles and aims in Hungary, seeking international cooperation, reviewing and reworking the SD strategy, coordinating the planning and consultation processes, supporting publicity and social participation.

Since 1985, The Parliament of Hungary also has a special task force concerning SD: the Commission for Sustainable Development(4) currently led by Benedek Jávor MP. The competence of the Commission involves protection against radioactive pollution, energy efficiency and renewable energy resources, chemical safety, environmental health, environmental safety and environmental aspects of traffic and transportation. The primary competence of the Commission is to draft new laws and regulations but is also responsible for monitoring the execution of laws and regulations in force. The Commission has good relations with state and governmental institutions, (particularly with the Ministry of Rural Development and the National Council for Environmental Protection), NGOs, international organisations (OECD, UNEP, IPU), and similar bodies of neighbouring countries.

- Existence of specific national policies about SD

  Hungary adopted a National Sustainable Development Strategy in 2007, with the 1054/2007. (VII. 9.) Gov. Decision(5), (and as it was discussed before, the New Széchenyi Plan also includes several programmes (outbreak points) determining the frames of future activities in this field). The main objective of the National Sustainable Development Strategy is to help shift domestic social, economic, and environmental processes, i.e. Hungary's development onto a path that is sustainable in medium and long-term, taking into account both domestic realities and external and global processes and conditions. The Strategy has been worked out with a view to the guiding principles and key objectives laid out in the EU's renewed Sustainable Development Strategy. Since Hungary's Strategy integrates domestic sectors, it is coherent with the goals of sectoral strategies and programmes. Based on the concept, approach, values, basic principles, objectives, and implementation tools of sustainable development, this Strategy offers a long term comprehensive framework - that is to be regularly reviewed and renewed - for strategies, programmes, and plans focusing on development and other - more concrete - horizontal issues, thereby taking into account at the same time their relationships and interactions and assisting their coherence.

- Existence of specific national legislation about SD

  Several laws refer to the SD in Hungary, but up to now, no single SD legislation exists. Considerable efforts have been made to establish a so-called Climate Law, but the Parliament rejected the draft Law on Climate Protection on 23rd February, 2010. However, the government adopted the *National Renewable Energy Action Plan*(7) on 22nd December 2010 in accordance with the Article 4 of the Renewable Energy Directive (2009/28/EC) of the European Commission.

- Existence of specific subventions about SD

  The New Széchenyi Plan provides a number of different subventions in various fields. The total budget of the New Széchenyi Plan is 4916 million €. Until 2013, 5.15% of this budget (253,1 million €) will be spent on the improvement of the use of renewable energy and 3.14% (154,3 million €) on improving the efficiency of energy use. After 2013, a new tender program will be created for the various projects. Other projects and available supports for the period of 2007-2013 (such as building renewals, energetic reconstruction of flats and houses, new jobs in

green economy etc.) are listed in the Environment and Energy Operative Programme[8] and the Regional Operative Programmes [9]. The National Agricultural-Environmental Program also offers grants for conversion to organic farming [10, 11].

1.B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…). The following indicators must be included in the description:

The National Sustainable Development Strategy determines the objectives and goals for higher education institutions and also the Act CXXXIX on Higher Education[12] relates to the role of higher education institutes in SD.

- Existence of specific educational national institutions about SD

  Currently no special institution of such kind exists in Hungary.

- Existence of specific educational national policies about SD

  The National Sustainable Development Strategy and the Act CXXXIX on Higher Education mentions the role of higher education institutes in SD, but no national educational policy exists. Teaching of Environmental education in nursery, primary and secondary schools is general, due to the National Basic Curricula.

- Existence of specific educational national legislation about SD

  The Act CXXXIX on Higher Education relates to the role of higher education institutes in SD. However, the legislation on higher education is expected to be reviewed and reformed soon. The current Act just mentions the role of higher education institutions, but contains no specific measures on SD.

- Existence of SD criteria in the accreditation systems of the university degrees

  No such system of criteria exists, however the legislation is expected to be reformed soon. Currently little is known about the new Act and its effects on this field.

- Existence of specific subventions about education in SD

  There are no specific subventions from the state, only specific applications and tenders from different sources (EU, UNECE, foundations etc.) are available.

1.C. University policies and experiences (Obligation and possibilities of include SD competences or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process). The following indicators must be included in the description:

- Existence of specific university policies about SD

  Up to now, **some** higher education institutions adopted an SD Strategy, e.g. the Sustainable Development Strategy of the University of West Hungary[13], University of Szeged[14] and the Eötvös Loránd University[15].

- Existence of specific units or departments about SD

  Some universities and colleges have specific departments dedicated to SD: e.g. the Department of Ecological and Sustainable Production Systems[16] at the Corvinus University, Budapest.

1.D. Research policies related to SD (Specific programs, grants…). The following indicator must be included in the description:

- Existence of specific programs about SD

Almost all of the universities and colleges have some kind of PhD or research project which can be connected to the concept of SD. In 2010, the Hungarian Association of Market Research Organisations conducted a survey [17] measuring the knowledge of the population on SD. It has been revealed that the general knowledge of the Hungarian population on SD is still low, but only 3% of the respondents said that they can not do anything in favour of SD. Some university research projects: Sustainable Energy Sources [18] (Budapest University of Technology and Economics), Establishment of agroforestry systems [19] (Corvinus University, Budapest), Survey of environment-tolerant plant protection chemicals[20] (Pannon University, Keszthely). The Szent István University (Gödöllő) also has spin-off firms[21] to manage some of the research projects. Research grants related to the SD, or SD specific subjects as water pollution, water treatment, waste treatment, etc are present. Formerly, detailed grants were in the New Hungary Development Plan, Environment and Energy OP (EEOP). The EEOP programs were as follows:

1.2 Wastewater treatment
1.3 Improvement of drinking water quality
2.1 Formation of good flood protection practices
2.2 Complex river catchment development
2.3 Recultivation of municipal solid waste landfills
2.4 Remediation of polluted areas
2.5 River basin management plans
3.1 Restoration, preservation and development of protected natural assets and areas
3.2 Creation of the infrastructure basis for habitat-conserving agriculture and forestry (investments)
3.3 Development of the forest school network
5. Efficient energy use
6. Sustainable lifestyle and consumption patterns
6.1 Promotion of sustainable consumption- (Hungarian codes: KEOP-2009-6.1.0/A, KEOP-2009-6.1.0/B, KEOP-2009-6.1.0/C)
6.2 Developments targeting e-environmental protection

Other programs and supports were managed by the Ministry of Rural Development

some grant and activity, e.g. "The Green Nursery School 2001" - Pedagogical program of the nursery must contain the environmental education, must introduce the concept of the sustainability.

2. SD University Studies in Hungary:

2.A. Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…). The following indicator must be included in the description:

- Existence of specific studies about SD:

  In **some** universities specific studies about SD are available and there are some post-degree studies as well.[22, 23, 24]

2.B. SD specific subjects in Life Sciences university studies (Not mentioned before, difference levels). The following indicator must be included in the description:

- Existence of specific subjects about SD in the degrees:

  In the **majority of the degrees** there are specific subjects about SD, e.g: Organic farming, Soil tillage, Conversion planning to organic farming[25] (Horticultural engineer on the Corvinus University, Budapest, 1 semester each); Ecological farming[26] (Horticultural engineer on the Pannon University at Keszthely, 4 semesters), General environment protection, habitat protection, protected areas (Environment engineering on the Pannon University at Keszthely), and Environmental Engineering[27] (Pannon University, Veszprém).

2.C. SD practical activities (practices in enterprises or in institutions, course works, etc). The following indicator must be included in the description:

- Existence of specific practical activities about SD in the degrees

  Special practical activities are included only in **a few** degrees. This is because students are employed during their compulsory practical field works by the university itself (limited capability to effectively work in the field of SD) or businesses which predominantly do not participate in SD. However, there are options to participate in practical courses related to SD, but their utilization is not widespread.

2.D. How do you think education in LS contribute to SD in your country.

Apart from the NGO-s and governmental institutions, LS education has the greatest role in forming the students' awareness of SD and the possible consequences of disregarding the problems arising from neglecting the aspect of SD. And not just LS education must be mentioned, but also the role of primary and secondary education is very significant. Currently the greatest effect of LS education is to raise the awareness in general, but also special, advanced education and research programs are running.

2.E. Barriers for the integration of the SD and problems in the teaching methods

The most important barrier for the integration of SD is the lack of communication between the higher education institutions and the lacking adaptation of harmonized curricula. The teaching methods can also be criticized, since there is a painful need for a more practical approach. Steps have been taken in these directions in the past years and the communication between faculties improved, but still lacks the efficiency needed to overcome the problem and successfully integrate the concept of SD.

3. Relevant Institutions related to SD in Hungary:

3.A. Research centres, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education,…)

There are two main governmental institutions: the *National Council for Sustainable Development*[3], and the Parliament's *Commission for Sustainable Development*[4]. Their influence should be vast, but currently they lack the efficiency. These institutions should at least make recommendations concerning education, but yet there is no sensible effect. Research centres are limited to PhD schools of universities and task forces of the Academy of Sciences. A lot of enterprises, associations and NGO-s are operating; listing them all would be a hard task, we just indicate a number of examples:

- Independent Ecological Centre[28]
- National Society of Conservationists[29]
- The Ormánság Foundation[30]
- Nimfea Nature Conservation Association[31]
- Gyűrűfű Foundation[32]
- Ecological Institute for Sustainable Development[33]
- Göncöl Alapítvány[34]
- Foundation for Nagykörű[35]

4. International cooperation in ESD (Education in SD) Hungary:

4.A. Policies (State and local governments, university...)

Since its inception by the former European Rector's Conference (CRE) in 1993, 328 universities and higher education institutions from 38 countries across Europe have signed the University Charter for Sustainable Development, thereby declaring that they will give sustainable development an important place in their activities. This implies that in curricula, institutional management and services to the local/regional society, a responsible balance between economical, ecological and social/cultural aspects has to be worked out. The problem is that this cooperation (Copernicus[36]) is unheard of by the majority of the students and professors of these higher education institutions.

Hungary does not officially participate in the Decade of Education for Sustainable Development – DESD – initiated for the 2005-2014 period by UNESCO.

4.B. Experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...)

Almost all universities and colleges have experiences in linked programs which are quite often accompanied by exchange of professors and students. The number of linked projects is vast, so let us just mention some of these:

- At the Department of Ecological and Sustainable Production Systems of Corvinus University, Budapest:

EU6 Framework - Channel project[37]

Leonardo projects[38]:

Pilot 2: COMPASS

Further development of post secondary education program in the topic of ecological farming ,emphasizing transnationality.

Pilot 3: ECOLOGICA – "Development of central databank on European level for the education of ecological farming advisers". CerOrganic "Certify-Organic: Quality-Certified Training of Farmers on Organic Agriculture" LdV Transfer of Innovation –Mediterranean Agronomic Institute of Chania (MAICH), Crete, Greece.

eContent Plus project[39]: Organic.Edunet: A Multilingual Federation of Learning Repositories with Quality Content for the Awareness and Education of European Youth about Organic Agriculture and Agroecology

- At the Dpt. of Vegetable and Mushroom Growing of Corvinus University, Budapest:

Lifelong Learning Programme (SECTORIAL programme: GRUNDTVIG (Adult education) – Multilateral Projects[40], a 3-year program with a budget of 300.000 €. (Goal: Urban gardening activities can encourage lifelong learning among people, and especially seniors, unemployed people, migrants, and all disadvantaged categories by stimulating, collaborative learning, creativity, intergenerational exchange and sense of belonging to the community). Also participating: Italy (Agricultural Faculty of the University of Bologna), Germany (Universität Hohenheim - Institute for Social Sciences in Agriculture), Spain (University of Cartagena) and North Carolina State University. Furthermore, NGO-s from all participating countries are also involved in the project.

- At the Eszterházy Károly College, Eger, and the Institute of Viticulture and Oenology of Corvinus University of Budapest:

Student exchange program with the University of Stellenbosch, South Africa in 2008-2010

- At the Dept. of Food Economy of Corvinus University of Budapest:

Tempus Leonardo Lifelong Learning Program: Waste Management systems and Recycling Industry in Adult Education"[41] with Bulgarian and Romanian partner institutions, (total budget: 207,500 € grant + 69,654 € own funding.)

5. Good practices and relevant experiences in the Higher Education Institutions in Hungary:

5.A. Activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD...)

There are a great number of good practices and measures in the Higher Education Institutions, just a few examples:

Conferences:

- Invitation to the Hungarian Higher Education 2010 „Strategic crossroads" conference[42]
- Sustainability Summit, Balatonalmádi[43]
- Ecological problems of our days – from global to local scale – Vulnerability and adaptation[44]

- Conference on Sustainability in Öko-Valley[45]
- III. Hungarian Climate Summit at Szentendre[46]
- 2011 Seminary on Energy Efficiency, Visegrád [47]
- VI. International Energy Conference at Győr, Climate Change, Energy Awareness, Energy Efficiency[48]
- Renexpo – Hungary's Energy Trade Fair[49]

Energy and water efficiency measures

- CEP Clean Energy & Passive House EXPO International exhibition and conference on energy efficient and intelligent buildings[50]
- TFHE Roof, Wall and Facade Exhibition and Conference, Budapest[51]
- ÖKOTECH 10th International Trade Fair for Environmental Protection and Municipal Technology, Budapest[52]
- International Environmental Industry, Energy Efficiency and Renewable Energy Exhibition, Budapest[53]

Green transport

- Hungarian solar cell car wins competition[54]
- Energy producing car at the University of Győr[55]

6. Possible future actions in Hungary:

6.A. How could be improved the education and research in SD in your country?

The main objective is to integrate the already existing programs, since currently the curricula, courses, subjects, supports and government grants are isolated, they do not form organic parts of a larger, coherent system. The general thinking, the paradigm is not integrated, therefore it can not become a main aspect of the society.

6.B. How could be integrated the concept of SD in the Life Science Studies?

First of all, the concept of SD must be rendered widely known and understood (even in the primary and secondary education). Teachers and professors must be trained and motivated, and businesses should also be involved in education, life-long learning and social responsibility.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN ICELAND

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1. Sustainable Development (SD) policies in the country:

1.A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions). The following indicators must be included in the description:

- Existence of specific national institutions about SD

The ministry of Education, Science and Culture (http://eng.menntamalaraduneyti.is/) oversees the planning of educatin in Iceland and does this within their department of Education and department of Science and Higher Education. Within those SD is planned into education on all levels and for research agendas.
The ministry of the environment (http://eng.umhverfisraduneyti.is/) formulates and enforces the Icelandic government policy for environmental affairs and thus also is involved in planning and manageing SD in Iceland.
Since 1998 there has been a **Committe of Environmental Education (Ice. Umhverfisfræðsluráð**). Its goal is to increase education about the environment and sustainable development among the public and on all school and university levels.
Local Agenda 21 – This part of the agenda 21 that was set during the United Nations meeting in Rio in 1992 has become an important tool to implement SD at local authorities level. From 1998 to 2009 the Ministry of the environment and the Association of Local Authorities in Iceland set up a special programme to promote Local Agenda 21 across all municipalities in Iceland. Around half of all municipalities with over 90% of the population in Iceland participated in this programme. Its focus is mainly on waste management, preventing pollution from industries, protecing nature and including SD into schools. Local agenda 21 is still a tool used by local municipalities and it is uncertain how or if it supports the implementation of SD.

- Existence of specific national policies about SD

The ministry of the environment publishes every 4 year a report called **Welfare for the future** (Ministry of Environment, 2010) with goals to be achieved regarding sustainable dev elopment for all sectors in Iceland. This is an ongong report, first put together in 2002 and in that the Icelandic government sets down its policy or rather areas of action for SD across all sectors of society, along with goals to achieve within 4 years. This also includes education across all sectors in Iceland. How exactly it is implemented and what its results are have not been

systematically researched. The two main emphais for the period 2010 to 2014 are sustainable production and consumption and education towards SD.
Part of that report is dedicated to what Iceland will do as part of the The United Nations Decade of Education for Sustainable Development (2005-2014). According to UNESCO this action by the UN: „...seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century." (http://www.unesco.org/en/esd/).
In the above report there is a section on education for SD, the focus is mostly on schools and no specific mention is made about university research or eduction towards SD. There is though focus on issues for research and for all sectors of society but it seems it is left to the Universities to write and implement their own policy.
In the national curriculum, written by the **ministry of Education, Science and Culture**, the concept environmental education (Ice. Umhverfisfræðsla) is used which may or may not include SD, all according to how in this case schools choice to interpret the concept. For this reason it becomes clear that as Environmental education does not necessarily promote SD it is unclear how succesful SD is integrated into education policies.

- Existence of specific national legislation about SD

The Icelandic National Planning Agency (http://www.skipulagsstofnun.is/english) is a state authority responsible for the administration, monitoring and implementation of the Planning and Building Act (in Icelandic), the Enviornmental Impact Assessment Act (EIA) and the Strategic Environmental Assessment Act (SEA) in Icelandic. Through these acts SD is in some way supported by national legislation in regard to these areas. These acts are most likely the only ones that actually integrate SD into their laws. Laws on fisheries do not use that word or concept but do stress protection and wise management and seem to actually lead to SD of fisheries.

- Existence of specific subventions about SD

Not aware of any. There are state support through grants on research in the area of sustainable fisheries, sustainable energy and agriculture but whether they tackle SD is difficult to say.

1.B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…). The following indicators must be included in the description:

- Existence of specific educational national institutions about SD

  The **ministry of Education, Science and Culture** (http://eng.menntamalaraduneyti.is/) oversees the planning of education in Iceland and does this within their department of Education and department of Science and Higher Education. Within those SD is planned into education on all

levels and for research agendas, but it is left to each research institute how the focus on the policy and how they implement SD. So there are the example named here (the Marine Research Institute is most likely the only real example of where a national institute actually does research and educates (their client , the fishers, mostly) and implements SD.
The Marine Research Institute (http://www.hafro.is/undir_eng.php?ID=1&REF=1) oversees research and regulates the amount of fishing to be allowed each fishing year. Their suggestions is based on best-practice research is legally binding for the fishing fleet of Iceland. So this is most likely the best case of research put into sustainability practice in Iceland. This institute is however not formal educational institute but its scientist and research are often part of research done at Universities across Iceland and at smaller **regional nature research institutes** (http://www.sns.is/) of which there is a network across the country and most of them are involved in some kind of life science research such as in fisheries, sea and freshwater research, land erosion and more.
The **Reykjavík Nature School** is an institute supported by the Local Authorities Association, which works across Iceland. Its focus is on education towards SD through educating teachers (mostly at schools not at higher education/Universities), promoting SD at special occasions at schools and through outdoor education for pubils at level 1 to 10 (ages 6 to 16). So far this institute has not promoted SD at higher education level. But it has the potential.

- Existence of specific educational national policies about SD

The ministry of the environment publishes every 4 year a report called **Wellbeing for the future** (Ministry of Environment, 2010). In the report there is a section on education for SD, the focus is mostly on schools and no specific mention is made about university research or eduction towards SD. There is though focus on issues for research and for all sectors of society but it seems it is left to the Universities to write and implement their own policy.

- Existence of specific educational national legislation about SD

The **ministry of Education, Science and Culture** (http://eng.menntamalaraduneyti.is/) oversees the planning of education in Iceland and does this within their department of Education and department of Science and Higher Education. Within those SD is planned into education on all levels and for research agendas. The national curriculum at school level includes issues of SD in that is stresses environmental education. The national legislation about higher education is not specific about SD.

- Existence of SD criteria in the accreditation systems of the university degrees

Not aware of any. If there is any it should be part of the Bologna process, but within that the universities are audited based on Bologna criteria. They seem not to very specific about SD.

- Existence of specific subventions about education in SD

  Not aware of any and rather unlikely that this is the case.

1.C. University policies and experiences (Obligation and possibilities to include SD competences or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process). The following indicators must be included in the description:

- Existence of specific university policies about SD
  - In the majority of the universities
  - In some universities
  - In few universities

  At **Holar University College** the focus is on developing research and teaching in the spirit of SD for use of natural resources, active rural policy and innovation. Thus each department with the University (equine science, aqua-culture and aquatic biology, and tourism studies.) is responsible for managing and implementing SD in its research and teaching.
  The Agricultural University of Iceland (AUI) is an educational and research institution in the field of agriculture and environmental sciences. The main focus is on the conservation and sustainable use of land and animal resources, including traditional agriculture, horticulture and forestry, environmental planning, restoration sciences, rural development and sustainable development (http://landbunadur2.lbhi.is/index.aspx?GroupId=410&TabId=416).
- Existence of specific units or departments about SD
  - In the majority of the universities
  - In some universities – X – In Iceland there are 6 Universities (4 public and 2 private-but receive the same amount of funding as the public Universities, i.e. each university becomes a certain amount per student)
  - In few universities

  University of Iceland Institute for Sustainability Studies (UI-ISS) (http://www.ssf.hi.is/page/FrodiEng_home) is an interdisciplinary research institute that promotes national and international co-operation, research and education in fields relating to sustainable development. The ISS also organizes lectures, seminars and conferences and is actively involved in teaching at graduate and undergraduate levels.
  At the **University of Akureyri** there is a **B.Sc and a M.Sc. degree programme in Natural resource science**, which comprises interdisciplinary applied science studies in three main fields of specialisation: biotechnology, fishery science, environmental and energy science (http://english.unak.is/page/naturalresource).
  At the **University Centre of the Westfjords** in Ísafjörður (http://www.uwestfjords.is/masters_program/), which is linked to the

University of Akureyri, there is a master's program in Coastal and Marine Management, which has the goal of finding ways of using natural resources in a sustainable way.
At the **Agricultural University of Iceland** two out of three faculties, i.e. the **Faculty of Animal and Land Resources** (http://vefur.lbhi.is/Pages/1615) and **Faculty of Environmental Sciences (**http://vefur.lbhi.is/pages/1651**)**, put a focus on SD in their teaching and research. The Faculty of Animal and Land Resources has a common degree in Equine sciences with the Holar University College.

1.D. Research policies related to SD (Specific programs, grants…). The following indicator must be included in the description:

- Existence of specific programs about SD

The **Icelandic Centre for Research** (http://www.rannis.is/english/home/), which is mentioned here in section 3.A. is the main funding body for scientific research in Iceland and thus carries out the governmental policy regarding science research. SD is part of that, however there are no clear guidelines on how that is done. This research centre is though most likely the closest there is in Iceland in regard to research policy related to SD being carried out across different fields of research. At the moment however this programme cannot be said to completely fulfil the purpose of carrying out research policies related to SD.

2. SD University Studies in the country:

2.A. Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…). The following indicator must be included in the description:

- Existence of specific studies about SD:
  - In the majority of the universities
  - In some universities
  - In few universities – X

At the Holar University College the Aquaculture and Fish Biology Department offers a 1 year diploma degree in aquaculture and fish biology which has its chief aims to promote the professional development of aquaculture in the spirit of sustainable development. (http://www2.holar.is/index.php?option=com_content&view=article&id=453&catid=149&Itemid=201) and thus looks at all three aspects of SD in this programme, although the focus on economy is somewhat limited to operating a aquaculture farm and there is little focus on society.
At the **Agricultural University of Iceland** two out of three faculties, i.e. the **Faculty of Animal and Land Resources** (http://vefur.lbhi.is/Pages/1615) and **Faculty of Environmental Sciences (**http://vefur.lbhi.is/pages/1651**)**, put a focus on SD in their teaching and research. The Faculty of Animal and Land Resources has a common degree in Equine sciences with the Holar University College. However it is difficult to take out specific studies within these

departments and claim they are SD studies as they are specific to certain areas or fields, such as agriculture, landscape architecture and such. So whether they actually contain all the important ingredients of SD (environmental, social and economic) is hard to proof.
University of Iceland Institute for Sustainability Studies offers an Interdisciplinary master's program, MA or MSc, in Environment and Natural Resources (http://www.hi.is/files/skjol/verkfraedi_og_raunvisindasvid/deildir/thverfaglegt_framhaldsnam/umhverfis_og_audlindafraedi/ENR.pdf). This study does though not focus specifically on the life sciences, but the students can choose to focus on that in their final thesis and partly in course assignments.

A report on environmental education in Iceland was written in 2009 with the aim to assess the state of environmental education at all school levels, including Universities (http://www.environice.is/Files/Skra_0042865.pdf). In this report written for the **Committe of Environmental Education (Ice. Umhverfisfræðsluráð** the author states that Icelandic Universities do not offer much in terms of SD studies (although the author names the above with the exception of the Holar University College programme) and that what is offered is mostly limited to the physical sciences although not always.

2.B. SD specific subjects in Life Sciences university studies (Not mentioned before, difference levels). The following indicator must be included in the description:

- Existence of specific subjects about SD in the degrees:
  - In the majority of the degrees
  - In some degrees
  - In few degrees - X – as far as I know, but without a more detailed study this remains unknown

It is difficult to find out whether there are truly specific subjects in Life Sciences that focus on SD. Therefore only courses at Holar University College will be mentioned as these are best known to the author.
Environmental Issues is a 1st year course within Diploma tourism studies at Holar University College. A 6 ECTS course where students learn about the SD, certification system of SD in tourism, environmental ethics, nature protection, role of nature rangers in protecting and promoting nature, the governance of nature protection in Iceland and more. In this course the students thus gain an insight into the global and local environmental issues, the Icelandic ecosystem, the laws and regulation regarding nature protection and access for tourist and how to implement environmental management in tourism. Thus all the aspects of SD are covered in this course. Taught in 3 weeks, including a 2 day field trip.
Environmental issues in aquaculture is a 1st year course in Aquaculture and fish biology studies at Holar University College. A 6 ECTS course where students learn about environmental issues regarding aquaculture

and its connection to wild nature. The course teaches issues of pollution and solution for that, impact on the environment from aquaculture, rule and regulation, environmental management, safety issues for personnel and more. Taught in 3 weeks, with 1 week as a field trip.

2.C. SD practical activities (practices in enterprises or in institutions, courseworks, etc). The following indicator must be included in the description:

- Existence of specific practical activities about SD in the degrees
  - In the majority of the degrees:
  - In some degrees
  - In few degrees – X – as far as I know, but without a more detailed study this remains unknown

It is difficult to find out whether there are truly practical activities in enterprises or institutions whose main focus is on SD. At the moment this author only has first-hand knowledge about own courses taught at Holar University College and whether they truly bring in SD is difficult to know without external assessing. However one course has been assessed as part of the Bologna process. That course is an outdoor course regarding trail building and is a part of tourism studies, so whether it is pertinent to this report on SD in Life Sciences is perhaps doubtful. A short description though is included:

A **Trail maintenance course in 1st year diploma in Tourism studies, 2 ECTS. A 3 day outdoor course** where students use forest timber, grass and rocks to build a short trail at Holar. They need to think about how a trail fits into a landscape, how it might affect plants and animals in that area, how the trail needs to be designed so as not to increase water erosion and at the same time be appealing to tourist. The students in effect apply knowledge from other course from their 1st year, where they have learned about the ecosystem and the Icelandic flora and fauna. This course seems thus due to its outdoor character to help students reflect on and apply the previous knowledge.

2.D. How do you think education in LS contribute to SD in your country.

Education in LS is quite often driven by field research in biology, land management, fish farming, forestry etc. and has a strong practical application and connection to people working in fish farming, land management, forestry, nature conservation etc. Often field research is within national parks, protected areas or areas of high biological value and in connection with local researchers or stakeholders. Thus part of the education in LS does bring home to both students and those hosting their research the value of SD. For that reason mainly I think LS does contribute in a very important manner to SD in Iceland.

2.E. Barriers for the integration of the SD and problems in the teaching methods

Barriers can be both lack of funding so that researcher and higher education teachers do not have the time to integrate new research or new approached to teaching so as to really deliver a SD teaching. New teaching methods such as outdoor education (which do not include field research which is a standard and good way of teaching) and experiential learning have been slow in being used as teachers are not aware of do not know how to use them. For this reason and others more often than not SD is only partially taught, e.g. only focuses on the environment or on society or on economy. Quite seldom are all three pillars of SD included in one course, although this may be the case within a e.g. 1 year diploma, 3 year BSc. or BA or 2 year Msc. or MA. So in many cases the actual learning of SD is more up to the student rather than a well-integrated an planned action on behalf of the research programme.

3. Relevant Institutions related to SD in the country:

3.A. Research centers, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education…)

The **Icelandic Centre for Research** (http://www.rannis.is/english/home/) is the main funding body for scientific research in Iceland. It funds both students and researchers in Iceland. Their focus is on supporting excellency in scientific research in Iceland and does not specifically focus on SD although it is a part of how they evaluate applications. This is a governmental organisation. They participate in education through the funding they give out. Their website give a good overview of international cooperation within the scientific community, the English language website does though not give as detailed information as the Icelandic one.

There is a network of **regional nature research institutes** (http://www.sns.is/) across the country, one example (in English) is the North East Iceland Nature Center (http://www.nna.is/page.asp?Id=584), which like the 7 others has a specific function. All though have the same general functions according to Icelandic Legislation no. 60/1992 which are (NE means north east and each institute has a specific region it covers, so only the location is different from each institute to another not its role):

- To do scientific research on NE Iceland nature with focus on NE Iceland natural phenomenon.
- To collect data and references regarding the natural history of NE Iceland.
- To promote acceptable land use, nature conservation and environmental education for schools in NE Iceland.

Landvernd /Icelandic Environment Association (http://www.landvernd.is/yflokkar.asp?flokkur=1002) is an **NGO** with several objectives. One of it is to promote the conservation of nature, the protection of the country's cultural landscape and the responsible use of land and ocean, see more on (http://www.landvernd.is/flokkar.asp?flokkur=1004). An example of

their work that related directly to SD is the Global Action Plan for the Earth (GAP) project, which has it aims to raise awareness and implantation towards sustainability by working with families and business on how they can live in a sustainable manner. Many communities have supported this project as part of their Local Agenda 21 work.

Náttúruverndarsamtök Íslands (Icelandic nature conservation association) http://www.natturuverndarsamtok.is/samtokin/page.asp?ID=2517 is an organisation that focuses on the protection of Icelandic nature, including fighting soil erosion (which is one of Iceland´s main environmental problem), supporting sustainable tourism. This **NGO** also informs the public about issues regarding the nature of Iceland, its ecosystem and the importance of SD.

4. International cooperation in ESD (Education in SD) the country:

4.A. Policies (State and local governments, university...)

Norden is the Official co-operation in the Nordic region and is on the highest level. (http://www.norden.org/en/nordic-council-of-ministers/ministers-for-co-operation-mr-sam/sustainable-development/indicators-for-sustainable-development/) The Nordic governments thus cooperate in setting and implanting polices. This includes policies on SD such as regarding Education and research, public participation and local sustainability strategies, to mention one part of the current Nordic SD indicators for SD. The Norden cooperation is a very important and much used organisation with all the Nordic countries to promote e.g. best practice in wide ranging issues regarding SD.

Iceland supports the **The United Nations Decade of Education for Sustainable Development (2005-2014)** through its educational policies.

The **United Nations University Fisheries Training** Programme is a postgraduate training programme http://www.unuftp.is/forsida/) located **in Iceland** and it emphasises e.g. that conservation is an integral part of sustainable fisheries and the development of the fisheries sector.

The Geothermal Training Programme of the United Nations University (UNU-GTP) in Iceland is a postgraduate training programme, aiming at assisting developing countries in capacity building within geothermal exploration and development (http://www.unugtp.is/)

The United Nations University - Land Restoration Training programme (UNU-LRT) **in Iceland** is a programme on restoration of degraded land and sustainable land management, aiming at assisting developing countries in capacity development within this field. The programme is a cooperation between the United Nations University, the Government of Iceland, the Soil Conservation Service of Iceland, and the Agricultural University of Iceland (http://www.unulrt.is/).

4.B. Experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...)

Most if not every University, research institute and governmental bodies play heavy emphasis of exchange programmes for both students and lectures from abroad. The EU Erasmus Programme is e.g. widely used by students and many foreign students have come to Iceland to study life sciences, such as marine research, fish farming, renewable energy, geology etc.

5. Good practices and relevant experiences in the Higher Education Institutions in your country:

5.A. Activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD...)

At this moment little has been done in Iceland to define good practices and gather them, so existing knowledge is fragmented and it needs a more detailed study, through interviews and survey to get this information.

In section 2.C I have mention on example of how outdoor education can help students reflect on and put in practice the many different aspects of SD through focusing on one aspect (trail management). It is very likely that this way of teaching is used in such fields as aquaculture, land management, soil erosion etc. to the same effect. But as mentioned earlier this has not been systematically gathered or critically reviewed so as to see whether these good practices actually support and promote SD.

6. Possible future actions in your country:

6.A. How could the education and research in SD be improved in your country?

By better integrating research and methods in teaching in that best practice is more efficiently shared across different fields of research and within the research and universities environment. Also by helping existing researchers and educators to share these best practices and to become more aware of their benefits, especially in how SD integrates both nature and man, both the studies on the natural world and on society so as to create a better platform for creating sustainable solutions.

6.B. How could the concept of SD in the Life Science Studies be integrated?

- There is a need for comprehensive cooperation between the public funding bodies, research institutes and Universities in the field of SD to promote SD teaching and research. Only through active sharing of experiences in teaching SD and assessing what student learn can the Life Sciences achieve SD in their course and programmes.

- There is at the same time a need to define in operationalized way what SD actually means in Life Sciences so as not to make the mistake of just focusing on environmental issues instead of the holistic concept of SD.
- Training the teachers that teach SD must therefore also be a priority, both in terms of ongoing further education and within the teacher´s education and for programmes that focus on SD to include methods for education in SD within each programme expertise.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN ITALY

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1. Sustainable Development (SD) policies in ITALY:

1.A Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…).

Sustainable Development (SD) policies in Italy follow the European Union strategies and documents. The *European Sustainable Development strategy 2005-10* integrates the objectives of environmental sustainability (Gothenburg Strategy) and economical and social development (Lisbon Strategy). The *Community strategic guidelines on economic, social and territorial cohesion 2007-2013*, in accordance with the integrated guidelines for growth and jobs of the renewed Lisbon agenda, develop synergies between the economical, social and environmental dimensions.

✓ **Existence of specific national institutions about SD**

The implementation of the EU strategies for SD is managed at the national level. The integration of different political levels is ensured by the "State-Regions Permanent Conference", including representatives of national and regional political bodies.

These are the Ministries involved in the implementation:

Prime Minister's Office – Department of Community Policies (Presidenza del Consiglio dei Ministri – Dipartimento per il coordinamento delle politiche comunitarie). The Permanent Technical Committee of *CIACE (Comitato Interministeriale Affari Comunitari Europei - Inter-ministerial Committee for European Community Affairs)* has the task of developing themes concerning the participation of Italy in EU and coordinating different Ministries on specific topics.

Ministry for Environment, Land and Sea (Ministero dell'ambiente e della tutela del territorio e del mare - MATTM). The Ministry *General Secretariat* has the competence for programming and coordinating European strategies in the environmental sector and European cohesion policies. The *General Direction for SD, climate and energy* has specific competences in SD.

Ministry for Food, Agriculture and Forestry (*Ministero per le Politiche Agricole Alimentari e Forestali - MIPAAF) - General Direction for agro-food development and quality – Sector Organic Agriculture*. It deals with general order of organic and sustainable agriculture and coordination between other Ministries with competences on SD.

Institute for Environmental Protection and Research (Istituto Superiore per la Protezione e la Ricerca Ambientale - ISPRA). The Institute, established by Decree no. 112 of 25 June 2008, converted into Law no. 133 on 21 August 2008, acts as technical support to the Environment Ministry.

✓ **Existence of specific national policies about SD**

The *Italian National Environmental Strategy for Sustainable Development* was developed by the Ministry of the Environment and Land protection, in accordance with the 6th Environmental Action Plan and the guidelines of Barcelona 2002 European Council. The NSDS was approved by the Inter-ministerial Committee for Economic Planning (CIPE) on 2nd August 2002 (CIPE deliberation n. 57 of 2nd August 2002). It focuses on four priorities: climate; nature and biodiversity; quality of environment and quality of life in urban areas; sustainable use and management of natural resources and wastes.

EU Sustainable Development Strategy - 2007 Report. First national report on the implementation of the renewed EU Strategy for Sustainable Development (EU SDS), elaborated by *Prime Minister's Office* and published in June 2007. It defines the national guiding principles for SD and identifies the implementation in Italy of the EU SDS.

National strategic reference framework for regional development policy 2007-2013 (Quadro strategico nazionale per la politica regionale di sviluppo 2007-2013 - QSN 2007/13). Elaborated by the Ministry for Economic Development (Ministero dello Sviluppo Economico) in June 2007, it has the aim of defining the European Cohesion policy resources for Convergence Objective (South Italy Regions) and Regional competitiveness and employment Objective (other Regions). Among priorities we can identify: Energy and environment: sustainable and efficient use of resources for the development (Priority 3); Social inclusion and services for the quality of life and territorial attractiveness (Priority 4); Valorisation of natural and cultural resources for the attractiveness and the development (Priority 5).

Rural Development Strategic National Plan 2007-13 (*Piano Strategico Nazionale per lo Sviluppo Rurale* – PSN *2007/13).* Elaborated by MIPAAF (last updating June 2010). The wall strategy of the Plan focuses on the sustainable use of natural resources, on the promotion of an environmental friendly agriculture and on natural resources valorisation. The Plan inserts in the objectives the SD principles (Göteborg strategy) and the priority objectives defined in the main EU environmental strategies.

✓ **Existence of specific national legislation about SD**

The *Strategic Environmental Assessment* (Directive 2001/42/EC) and the *Environmental Impact Assessment* (Directive 85/337/EEC) are regulated by the Legislative Decree April 3, 2006 n.152 (consolidated Law on Environment), modified and integrated by the Legislative Decree January 16, 2008.

✓ **Existence of specific subventions about SD**

There are not specific subventions about SD, but the SD is a cross-referring topic present in the mainstreaming of financing programs of the EU Cohesion policy:

- Operational programmes preview in the *National strategic reference framework* (ERDF, ESF, Cohesion Fund):
  - Regional Operational programmes
  - National Operational programmes (Education, Research and competitiveness, Security, Nets and mobility)
  - Inter-Regional Operational programmes (Renewable energies and energy saving; Cultural, natural amenities and tourism)
  - European Grouping of Territorial Cooperation Operational Programmes
- Rural Regional Development Programmes (RDP)

Specific founds assignable to SD are:

- Sustainable Development Fund (75 €/mln 2007/09) – Ministry of Environment
- Kyoto Protocol Adaptation Fund (200 €/mln 2007/09) - Ministry of Environment

1.B Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…).

Italy developed since long time many documents related to Environmental Education: the Communication n. 149/1996 (La Ferla) of the Education Ministry proposed the EA like a link between nature and culture; the Fiuggi Charter of principles (1997), signed by Education and Environment Ministries, oriented the EA to the achievement of a sustainable and conscious development.

✓ **Existence of specific educational national institutions about SD**

Public educational institutions directly aimed at the SD education are not present in Italy, at the national level. The Environment Ministry (MATTM) and the Education, University and Scientific Research Ministry (MIUR) are the reference institutions about SD education.

✓ **Existence of specific educational national policies about SD**

Specific educational national policies about SD are present only for primary and secondary education. These policies are not specifically referred to higher education institutions and universities.

The programmatic reference is the implementation of the UNECE Strategy on Education for Sustainable Development (ESD).

The following instruments are defined at National level:

Declaration of intent between Ministry of Environment and Ministry of Education about School, Environment and Legality (Carta d'intenti tra Ministero dell'Ambiente e Ministero dell'Istruzione su Scuola Ambiente e Legalità - July 2009). It concern the engagement to define a national plan about promotion, teaching and information on environment protection, waste cycle, sustainable consumption and eco-mafia contrast.

Guidelines for Environmental and SD Education (Linee guida per l'educazione ambientale e allo sviluppo sostenibile – December 2009). New orientations for the

definition of scholastic curricula in environmental and SD education and the organization of didactical and educational activities.

✓ **Existence of specific educational national legislation about SD**

The role of the education system and his function to guarantee an appropriate information about environmental themes is reminded in laws concerning different topics:

- waste disposal and management (art. 13, law July 14, 2008, n. 123);

- creation of a specific curriculum focused on environmental education in scholastic programs of the compulsory education period (art. 7-bis law December 30, 2008, n. 210);

- promotion of environmental sensibility in upper secondary schools and Universities by specific projects and initiatives finalized to the sustainable behaviors promotion (Art. 7-quinquies decree-law December 30, 2008, n. 208).

✓ **Existence of SD criteria in the accreditation systems of the university degrees**

SD criteria are not present in the accreditation system of the university degrees. The Ministry for Education, University and Scientific Research elaborated the *Guidelines for the governance of the University* (*Linee guida del Governo per l'Università - 2008)* which will provide for (Action A8) "actuate, according with the European engagements, procedures for accreditation of degrees and structures on the basis of quality and sustainability criteria."

✓ **Existence of specific subventions about education in SD**

The Ministry for Environment interventions in the field of the Environmental Education concern a wide range of instruments, activities and campaigns, in collaboration with local authorities and associations: school competitions, Local Agenda 21, the I.N.F.E.A. Program, the Sustainable Energy Europe Campaign (SEE), other communication campaigns.

The I.N.F.E.A. Program *(INFormazione Educazione Ambientale – Information Environmental Education),* started in 2002, is finalized to spread on the territory information, teaching and Environmental Education structures. It is a network of local Environmental Education Centers, coordinated at regional level and managed by environmental associations, enterprises, universities, research centers.

1.C University policies and experiences (Obligation and possibilities of include SD competences or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process).

Competences and contents of Life Sciences Higher Education Studies are defined at National level by the Ministry for Education, University and Scientific Research (MIUR), which defines the different degrees typologies and the "educational objectives" that qualify each degree.

We have analyzed the presence of specific objectives concerning the teaching of SD in each degree typology in Life Sciences; Universities have to conform to these objectives.
For this reason the presence of specific policies in each University has not been considered.

First cycle degree (3 years / bachelor)

Degree classification	Degree denomination	References to SD in the teaching objectives
L2	Biotechnologies	No
L-13	Biological sciences	Yes
L-25	Agriculture and Forestry sciences and technologies	Yes
L-26	Agro-food sciences and technologies	No
L-38	Zootechnical sciences and animal production technologies	No

Second cycle degree (2 years / master)

Degree classification	Degree denomination	References to SD in the teaching objectives
LM-6	Biology	No
LM-7	Agricultural Biotechnologies	Yes
LM-8	Industrial Biotechnologies	No
LM-9	Medical, Veterinary and Pharmaceutical Biotechnologies	No
LM-42	Veterinary Medicine	Yes
LM-60	Natural sciences	Yes
LM-69	Agriculture sciences and technologies	Yes
LM-70	Food sciences and technologies	Yes
LM-73	Forestry and Environment sciences and technologies	Yes
LM-75	Environment and Territory sciences and technologies	Yes
LM-86	Zootechnical sciences and animal technologies	No

✓ **Existence of specific university policies about SD**

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✓ **Existence of specific units or departments about SD**

Very few (only 3) Departments (research structures belonging to each University) in the Italian university system are specifically finalized to research in SD (the reference to SD is indicated in the denomination).

Few (6) inter-department centers and inter-universities centers are specifically finalized to research and applied studies on SD: sustainable economy, sustainable mobility, rural and local sustainable development, sustainable management and defense of mountains, sustainable development, environmental diagnostic and SD.

1.D Research policies related to SD (Specific programs, grants…). Existence of specific programs about SD

Research policies are managed at the national level by MIUR. There are not specific programs about SD, but different research topics linked to SD are present in each program. The main national research programs are:

National Research Program 2010-2012 (PNR - Programma Nazionale di Ricerca). The PNR was approved by the Inter-ministerial Committee for Economic Planning (CIPE) on March 2005. It identifies the following strategic objectives: sustaining the basic research; developing human capital; intensifying collaboration between public and private research system; promoting high technologies enterprises spin off and start up. The priorities research fields are: environment, transports, energy, agro-food sector, health, ICT, new materials, nanotechnologies, biotechnologies, production systems, cultural and immaterial assets. The areas of reference are: life quality, competitiveness, sustainable development.

National Operational Program Research and competitiveness 2007-2013 (PON Ricerca e Competitività). Cofinanced by ERDF, it concerns the Convergence objective Regions (Campania, Puglia, Calabria e Sicilia) and represents an instrument for developing new solutions aimed to improve competitiveness and socio-economic conditions of the regions. SD topic is present in Axis II - Sustain to innovation; Objective: integrated actions for SD.

2. SD University Studies in ITALY:

2.A Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…).
2.B SD specific subjects in Life Sciences university studies (Not mentioned before, difference levels).

Our analysis has investigated the existence of specific universities studies and specific subjects about SD in Life Sciences in all Italian Universities. Faculties with the largest presence of Life Sciences has been selected and analyzed. The selected Faculties are:

- Faculty of Agriculture
- Faculty of Veterinary Medicine
- Faculty of Mathematical, Physical and Natural Sciences

Each Faculty (of each University) can contain different University Degrees.
The Degrees are classified by cycle:

- First cycle degree (Bachelor – Three Years)
- Second cycle degree (Two years Master)
- Interfaculty programme/First cycle degree
- Interfaculty programme/Second cycle degree

The table below shows – divided per Faculties - the total number of Universities analyzed, the total number of University Degrees and the total number of Courses (Exams).

	N° Uni	N° Degrees	N° Courses
Faculty of Agriculture	21	239	4470
Faculty of Vaterinary Medicine	12	84	1709
Faculty of Math.,Phy. And Nat. Sciences	43	705	13135

For each Faculty, we built a database in which emphasize the different level of detection on Sustainable Development:

- Presence of references to SD in the title of the Degree
- Presence of references to SD in the title of the Courses
- Presence of references to SD in the program of the Course (detected through key words: i.e. Sustainable development, sustainable management of resources, sustainable agriculture, etc.)

The data were then processed with Access obtaining the following results:

		SD in the Degrees			SD in the Courses	
	SD in Uni	Degree's Title	Course's title	Course's program	Course's title	Course's program
Faculty of Agriculture	10	18	114	172	239	625
Faculty of Vaterinary Medicine	2	2	13	53	12	145
Faculty of Math.,Phy. And Nat. Sciences	16	27	68	101	131	215

Where:

- ***"SD in Uni"***: Number of Universities in which has been detected at least one Degree with presence of references on SD in the title
- ***"SD in the Degrees":*** Number of degrees in which there is at least the presence of a reference to SD in one of: its own title (***Degree's title***); in the title of at least one Course (***Course's title***); in the program of at least one Course (***course's program***)
- ***"SD in the Courses":*** Number of Courses with the presence of at least one reference to SD in the title (***Course's title***) or in the program (***Course's program***).

The next table shows the percentage value of the previous variables.

		% SD in the Degree			% SD in th eCourses	
	% SD Uni	Degree's Title	Course's title	Course's program	Course's title	Course's program
Faculty of Agriculture	47.62	7.53	47.70	71.97	5.35	13.98
Faculty of Vaterinary Medicine	16.67	2.38	15.48	63.10	0.70	8.48
Faculty of Math.,Phy. And Nat. Sciences	37.21	3.83	9.65	14.33	1.00	1.64

Note: Faculties of Mathematical, Physical and Natural Sciences include Degrees not falling within the Life Sciences category (about 50% of the Degrees: i.e. Math, Physics, Computer Science,…), so % data concerning SD in Life Sciences of these Faculties are underestimated.

The Faculty of Agriculture (47.62%) and Math., Phy. and Nat. Sciences (37.21%) have the greater number of Universities with at least one Degree with reference to SD in the title. However the percentage of Degrees with a reference to SD in the title is low if compared with the total number of Degrees.

A higher percentage of Degrees has at least a Course with the title or the program referred to SD, with strong differences among the Faculties.

Looking at references to sustainability in the titles and programs of the Courses we can notice a low percentage compared to the total number of them. This is particularly evident in the Faculty of Math., Phy. and Nat. Sciences. In general, the faculty with the lower values is the Faculty of Veterinary Medicine.

The same type of analysis was carried out inside each type of Faculty at the cycle level:

	% SD in the Degrees		% SD in Courses
Faculty of Math.,Phy. And Nat. S	Degree's title	Course's program	Course's program
Inter-Faculty First cycle degree	60.00	80.00	10.59
Second cycle degree	6.39	12.78	1.70
First Cycle Degree	0.29	5.59	0.47

We notice, in particular, that the Second cycle degrees have a bigger number of explicit references to sustainability compared to the First cycle degrees in all the variables analysed. Interfaculty degrees have more references to SD, so it seems that they are created already with a stronger attention to the SD implementation.

	% SD in the Degrees		% SD in the Courses
Faculty of Veterinary Medicine	Degree title	Course's program	Course's program
Interfaculty First cycle degree	0.00	16.67	0.72
Single cycle degree	0.00	15.15	1.04
Interfaculty Second cycle degree	0.00	42.86	5.15
First cycle degree	5.26	10.53	0.50

The Veterinary Medicine Degree is one of the few that has kept its structure and its title during the years, and it belongs to single cycle courses (5 years). Taking into account these differences we can understand the almost absence of references to SD in the Degrees title and the law presence of sustainability in the Courses titles and programs.

In the Faculty of Agriculture we can detect a stronger orientation of the teaching to SD, especially in the higher education degrees. The second cycles and the interfaculty cycles seem to possess an higher sensitivity to communicate the SD.

	% SD in the Degrees		% SD in Courses
Faculty of Agriculture	**Degree title**	**Course's program**	**Course's program**
First Cycle degree	3.09	28.87	1.85
Second cycle degree	12.61	63.96	12.52
Interfaculty First cycle degree	0.00	45.00	2.49
Interfaculty second cycle degree	9.09	63.64	9.80

The Italian education system schedules two different types of post-graduate degrees:

- Master: one year Degrees with a strong professional characterization (after the first and/or the second cycle degree)
- PhD

The methods of analysis with regard to post-graduate activities differ from those used before. In this case, no distinctions are made for faculty, but have been identified and then highlighted all the references to the Life Sciences and Sustainable Development.

	Total	Life Sciences	SD	LS/Total	SD/Total	SD/LS
Master	1896	417	100	21.99	5.27	23.98
PhD	1629	597	88	36.65	5.40	14.74

Master and PhD on Life Science are respectively 22% and 37% of the total; Master and PhD on Life Science with explicit reference to SD represent respectively the 24% and 15% of the total of LS. Masters in LS demonstrate a bigger attention to sustainability, probably due to the more professionalizing aspects of the degrees. This leads to the remark that for the job market figures with an education on SD are becoming increasingly popular and the Universities follow the market trend.

2.C **SD practical activities (practices in enterprises or in institutions, course works, etc).**

All Universities Degrees programs schedule a stage period in enterprises. However is not possible to identify and collect information about the connection between these activities and the SD field.

2.D **How do you think education in LS contribute to SD in your country.**

2.E **Barriers for the integration of the SD and problems in the teaching methods**

In general, it seems that the topic of "sustainable development" is more considered in the second cycle degrees and/or in the more specialized training courses (Master and PhD). This can be probably interpreted also as a consequence of the presence of a bigger number of basic courses in the first cycle degrees. We must not forget, however, the presence of interfaculty first cycles, which often combine different University Degrees and that offer more specialized training oriented to a sustainable vision.

Finally, the analysis show us still a little presence of SD in Italian Universities. In general, there is a lack of comprehensive guidelines on the administrative level to encourage the inclusion and the visions of SD in the University organisation. We must recognize that, in terms of teaching, the concept of sustainability is more present in the programs of the courses, thanks to the attention of teachers for the subject.

3. Relevant Institutions related to SD in ITALY:

3.B. Research centers, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education,…)

Governmental institutions

ISPRA. The Institute's activities refer to the following topics: Acoustic and electromagnetic pollution; Agenda 21; Air quality; Contaminated sites; Directive 2001/42/CE: Strategic Environmental Assessment; Directive 85/337/CEE: Environmental Impact Assessment; Environmental emergencies; Global atmosphere protection; Green market; Impacts and Environmental Management of Ports; Integrated Pollution Prevention and Control – IPPC; Land and Territory; Nature and Biodiversity; Protected Areas; Radioactivity and radiations; Renewables; Risk of Chemicals; Seveso II: Directive on the control of major- accident hazards involving dangerous substances; *Sustainable development*; Technological Risk; Toxic algae; Waters.

National Research Centers

The National Research Council (CNR) is a public organization; its duty is to carry out, promote, spread, transfer and improve research activities in the main sectors of knowledge growth and of its applications for the scientific, technological, economic and social development of the Country. To this end, the activities of the organization are divided into macro areas of interdisciplinary scientific and technological research, concerning several sectors: biotechnology, medicine, materials, environment and land, information and communications, advanced systems of production, judicial and socio-economic sciences, classical studies and arts.

The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA). Pursuant to art. 37 of Law no. 99 of July 23rd, 2009, the Agency's activities are targeted to research, innovation technology and advanced services in the fields of energy - especially nuclear – and sustainable economic development. The Agency's main research issues in the field of sustainable economic development are: Environmental Characterization, Prevention and Recovery; Environmental Technologies; Seismic Protection; Radiation Biology and Human Health; Sustainable Development and Innovation of the Agro-Industrial System.

NGOs

A big number of Environmental Protection Associations are recognized by the Ministry of Environment (art. 13 law n. 349/86)

Foundations

The *Sustainable Development Foundation* (*Fondazione per lo Sviluppo Sostenibile)* is a think-thank, registered in Italy as "no-profit organization", born on September 13th 2008 by will of companies, firms association and sustainability experts, in order to encourage the development into the field of green economy. Today it can relay on a members network of more that 80 firms (or associations of firms) and 50 top level experts. (www.fondazionesviluppososostenibile.org)

The *Simone Cesaretti Foundation*. By establishing networks between universities, research centres, public and private bodies, and communications companies, the Foundation aims to contribute with studies, research, education and information initiatives to deepening knowledge of the issues attached to sustainable development, seen in its various dimensions – environmental, economic, territorial, social and generational. (www.portaledellasostenibilita.it)

4. International cooperation in ESD (Education in SD) ITALY:

4.C. Policies (State and local governments, university...)

Italy contributes to the implementation of the UNECE Strategy on Education for Sustainable Development. Italy chairs since 2006 an international task force on Sustainable Consumption Education, finalized to the implementation of the Marrakech Process (Cap. III Action Plan of Johannesburg) with developing a ten years framework of initiatives for a sustainable production and consumption models (Document “Here and Now. Education for sustainable consumption”)

4.D. Experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...)

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5. Good practices and relevant experiences in the Higher Education Institutions in your country:

5.A. Activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD...)

Interuniversity Research Centre on Sustainable Development (CIRPS). CIRPS is an Interuniversity Research Centre counting 300 professors, researchers and experts as Ordinary Members belonging to the eleven Italian universities joining the centre. CIRPS coordinates and participates in networks of excellence, research projects, and activities for local development at international level, and carries out its work through collaborations and agreements with Universities, Research Centres, Enterprises as well as National and International Institutions. CIRPS activities have the aim to conduct researches, develop and disseminate scientific knowledge, technological solutions and working methods, including organisation or social life that can allow sustainable development.

IFOLAMB (Informazione Formazione Orientamento Lavoro Ambientale – Environmental Information Careers guidance Work). It is an informative system – an observatory – on education and employment in the environmental sector. Realized by ISFOL (www.ifolamb.isti.cnr.it/2011/home.html)

ICSS 2010 is the second edition of the International Conference on Sustainability Science. Organised by: Interuniversity Research Centre on Sustainable Development (CIRPS) - Sapienza University of Rome; United Nations University Institute for Sustainability and Peace (UNU-ISP); Integrated Research System for Sustainability Science (IR3S) - University of Tokyo; Arizona State University (ASU). Rome, from the 23rd to the 25th of June 2010.

6. Possible future actions in ITALY:

6.C. How could be improved the education and research in SD in your country?

The analysis highlights four main limitations in the education system in Italy about SD:

- the absence of a specific plan for introducing SD education in universities degrees, concerning both the organization of the courses (interdisciplinary approach) and the contents of the teaching programs;
- the absence of national institutions with the specific aim of SD education; it would be proper the creation of an Agency with the intend of realizing guidelines and promoting good practices;
- the absence of SD criteria in the accreditation system of the university degrees;
- the initiatives that have the direct aim of realizing SD education activities (mainly for primary and secondary school level) are not provided by an adequate amount of resources.

In the research system the SD has to be considered like a cross-referring topic: topics and objectives about SD are present in the research programs but it would be appropriate to better define SD contents and improve financing priorities for research referring to SD.

6.D. How could be integrated the concept of SD in the Life Science Studies?

The concept of SD is present in the teaching programs of Life Science Studies even if in a small percentage and not equally distributed among Faculties and Degrees cycles. This because it depends from the single professor sensitivity to the topic and not from a defined policy both at national and single University level. So we propose, at national level:

- a systematic consideration of SD in the definition of the "educational objectives" that qualify each degree and in planning the different curricula;
- the definition of guidelines and the promotion of good practices for increasing Universities and single professors sensitivity to the topic.

Furthermore each University should define his policy for SD, concerning:

- increasing interdisciplinarity in curricula integrating different subjects (economy, environment, social aspects) in each degree and encouraging students to build a SD curriculum in their study plan;
- increasing practical experiences in the SD field, like international development cooperation, stage and laboratory activities;
- defining guidelines and create projects for "sustainable campus", involving teachers and students.

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STATE OF ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN LATVIA

Present situation

Part I

Higher education in Latvia, which in recent years has seen a quantitative leap, yet is unable to provide appropriate definitions of quality, including sufficient linkage with the labor market and meet with its requirements. It is necessary to continue work on the study quality improvement, as well balancing of applied and fundamental research to encourage innovation and development.

In order to solve the problems, there are several different documents that have been developed containing principles of sustainable development. As the most important of these include the Latvian long-term economic strategy, The National Development Plan and Environmental Protection Plan for Latvia. A problem solution challenge of environmental protection is also included in the various sectors of policy plans, strategies, laws and regulations.

Sustainable Development Strategy of Latvia until 2030 was approved by the Saeima the Latvian Parliament in June 10th, 2010.

In order to promote the goals of UN decade of education for sustainable development, providing joint planning and implementation of regular, mutual exchange of information on planned activities within the decade in Latvia - Ministry of Education and Science, Ministry of the Environment and the United Nations Educational, Scientific and Cultural organization of the Latvian National Commission have concluded a cooperation protocol, creating a Decade implementation working group.

Supporting efforts to promote socially responsible, economically viable and environmentally sustainable development, the UN General Assembly Council in December 20, 2002 adopted the resolution on the decade of “Education for Sustainable Development "proclamation. The period is lasting 10 years - from 2005-2014, and the leading agency for the implementation is UN UNESCO (Educational, Scientific and Cultural Organization). The main aim of 10 years acting period is to promote education as a key element for sustainable development of society and to strengthen international cooperation for innovative policies and program development.

UNESCO has defined the education for sustainable development as an opportunity to find innovative solutions to sustainability challenges in the environment, society and economy. These principles include the implementation of a number of issues relating to learning - it is the ability to learn, to ask critical questions, to create personal value system, to imagine more positive and sustainable future, to think systematically, to learn in a constructive way and to determine the studies in tradition of innovation and interaction. These aspects are a challenge for the Latvian educational system.

In September 13, 2007 the Latvian presidency organized a meeting at Baltic Sea Countries Council (BSCC) on education and science "Higher education and science in the Baltic Sea Region Sustainable Development and Competitiveness", where the higher education system, policies and practices of both competitiveness and sustainable development were analyzed. During the meeting it was decided to

establish two working groups, which shall deal with: Science infrastructure in the Baltic Sea region and Higher education, science and innovation.

BSCC presidency has been active in supporting 21 education sectors in the Baltic countries with the participation of working group on education for sustainable development and the development of the Baltic Sea region's strategic projects for education for sustainable development – "Baltic Arena: Training for innovation".

Part II

In order to promote cooperation between the institutions related to environmental science and education development and facilitate the implementation of environmental policy, the Environmental Science and Education Council was founded in 2004. This council has coordinating and consultative cross area duties, whose decision is recommendatory nature of environmental science and education development. Council aims to promote the environmental science and education related to development of cooperation of institutions to identify and effectively address the problems of environmental science and education development, as well as promote cooperation in sustainable environmental policy implementation and its development tools.

Functions:

- Identify and effectively address problems related to environmental science and education, as well as education for sustainable development (education, which contributes to each individual's opportunities to acquire knowledge, values and skills required for participation in decisions on individual or collective action at local and global levels, to improve the quality of life now, without risk to future generations);
- Promote institutional cooperation for sustainable environmental policy implementation and its development tools.

Tasks:

- To provide assessment of the situation of environmental science and education and to develop proposals for environmental science and education, as well as education for sustainable development in priority directions;
- On the request of governmental institutions to prepare proposals for legislation necessary for the environmental science and education, as well as education for sustainable development-related matters and on the draft laws and regulations;
- To promote involvement by environmental science and education, as well as the rational use of resources;
- By the request of the Ministry of the Environment and the Ministry of Education comment on the projects to be implemented in environmental

science and education, as well as education for sustainable development related area.

Environmental education components are included in the preschool institution work. It promotes quite successfully children's environmental education. Primary school curriculum includes "Nature Lessons", but the absence of any primary school in a broader environmental education subjects. Knowledge and attitudes towards the environment is developed in subjects such as biology, geography, chemistry and physics, but the consideration of environmental issues overlap and duplicate. Professional technical opportunities exist acquiring a profession in the environmental technology field, such as forestry, fish farming, etc. Latvian universities offer undergraduate, graduate and professional programs in environmental science, environmental and farm engineering and environmental management. Taught environmental subjects encompass a wide spectrum of environmental problems, which generally correspond to the national environmental science fields. Each Latvian university has created its own approach on training specialists.

Example:

Environment education levels	Tasks
Basic and general secondary education	Environmental education in the inclusion of preschool, basic general education content
Higher education in environmental science	Environmental education for sustainable development of key concepts of integration of higher education content
General upper secondary education	widely prepared environmental science professionals
Experts in vocational secondary education	Proffesionals in environment science sub-sectors
Lifelong learning and continuing education in environmental science	Further education provision of environmental scientific disciplines

Environmental studies are represented in almost all Latvian higher education establishments. Universities and research organizations and departments have developed a specialized lecture courses in environmental studies. Environmental science programs are being implemented at 6 Latvian universities: Latvia University, Riga Technical University, Latvia University of Agriculture, University of Daugavpils, Rezekne Academy and Liepaja Pedagogical Academy. Total number of students is around 1100. The proposed study subjects range reflects on variety of orientation and degree of specialization, environmental courses with a wide variety of approaches, although primarily with natural scientific orientation. Latvian higher education institutions offer a variety of environmental courses successfully serving to variety of

specialist trained for environmental problems in the field. Currently, the majority of study places in higher education institutions are intended for natural and engineering sciences. Ministry of Environment together with professionals and academics have identified a need to develop training in specific areas such as engineering geology, meteorology, climate and renewable energy, as well as environmental science and sustainable development studies in general.

Part III

Current findings on the current environmental education in Latvia:

- Environmental and social science systems are still being sought as a "basic" science
- Too superficial approach in some areas by analyzing and addressing the major challenges
- Increasing complexity of the study materials
- Attempts to "outperform" in new trends to solve problems
- The need of developing well understandable study topics and methodological materials, which would provide motivation for further studies
- The development of study content should be based around students, community and stakeholder expectations and interests
- Information must be provided at different levels, ranging from basic training topics to even complex subjects in both volume and scale
- Providing insight into both a local and global environmental problems and their solutions
- Content of studies should be developed with the aim of achieving the highest standards based and science-based education avoiding the status of "science about all (and none)"
- Environmental studies should be reflected in course content, because they can be considered as a means towards education for sustainable development
- Studies should offer a chance to get knowledge in appropriate level university studies in environmental science, the course content should not be based solely on "hot topics" reviewing

Problem:

The topicality of education for sustainable development of the country is growing. There are many positive thematic options, training materials, development and implementation of courses, workshops. It is necessary for the product identification of coordination and networking development. Similarly, diverse and obscure the understanding of the concept of "education for sustainable development", for implementing the criteria and guidelines, as well as the concept of overlap with the concept of "environmental education". There is a need to improve education for sustainable development of courses and educational content of materials.

Objective:

Continuing work on the UN and the UN decade Education for Sustainable Development Strategy implementation:

- Identifying current theme's "Education for sustainable development" Latvian-related academic courses, as well as non-formal education materials;
- To organize discussions and develop recommendations for the above courses and educational material content of the further development;
- To promote further common way and detailed educational materials development, fundraising and the course materials and further widespread usage

Expected outcomes:
Forum discussions and recommendations will contribute to the development of single course development to be approved at the Ministry of Education and Science, and further integration of Latvian higher pedagogical studies and other programs, as well as educational material development and further spread of non-formal education. Also Latvian developed product distribution within the UN Decade for international audiences.

Part IV

Non-governmental organizations:

Friends of the Earth (Zemes draugi) Combines the Latvian environmental organizations, support groups and individual supporters who work in environmental advocacy, promotion of public participation, environmental education and information. Latvian Friends of the Earth is valuable member of European and World Friends of the Earth, represented by their campaigns and activities in Latvian as well as their participation in international initiatives. There is society's website where you can find publications, audio and video resources on the most pressing environmental and social issues.

Association of homo ECOS: The aim is to create a social movement, whose members not only emotionally support eco-friendly ideas, but also practice way of life that does not harm the environment and human. In order to achieve this, the association organizes different social campaigns and calls.

Sustainable Development Agency: aims for sustainable development guidelines, implementation, promotion of sustainable development in Latvia, communication between the improvement and optimization of an information campaign and the sustainability of outreach events, sustainable development consulting and project management, research and educational activities.

Latvian Platform for Development Cooperation: brings together 28 organizations operating or tend to start movement in the field of development cooperation. Learning is characterized by the development contribution towards poverty eradication and

sustainable development through education, alleging human rights, social responsibility, gender equality.

Environmental Education Foundation: is a Latvian representative of FEE (Foundation for Environmental Education) - an international public organization, whose goal is to promote sustainable development through environmental education.

Foundation for Environmental Education programs: working closely with all stakeholders in environmental protection organizations and institutions in an effort to promote inter-sectoral cooperation in promoting sustainable development. Among the long-term partners in environmental education is the Ministry of Environment, Latvian Environmental Protection Fund and the Ministry of Education, as well as over 20 other national institutions. Foundation is also working closely with community organizations working on environmental education and sustainable development issues. Foundation for Environmental Education has been awarded a public benefit organization status.

Latvian Green Dot: is a worldwide association which brings together 30 national representatives, "Packaging Recovery Organisation Europe s.p.r.l." (PRO Europe) member. Students' educational process is of great importance due to a close cooperation with the teachers.

Environmental Education Association: is an organization that brings together the voluntary environmental education stakeholders. The association brings together like-minded, who feel the need to educate the public about the environment, allowing it to engage in practical environmental protection, with direct experience of the outside world.

Environmental organization "Green Freedom": information on environmental protection and sustainable development.

Association for Sustainable Development Education for Sustainable Development Association (AIIA): is an organization established in 2007 with a view to encouraging individuals and different institutions in understanding and practical work experience for the sustainable development of education in Latvian and in the world, contributing to a variety of activities at regional, national and international levels.

Green Belt Ltd.: makes an important contribution of all segments of environmental education - starting with the younger generation, who each year are involved in the ambitious contests, and teachers in environmental education awareness-raising, and continuing with the whole of society-wide campaigns, with particular attention to economically active population. Educational programs, books for students and teachers, the organization of seminars, designed for the shares and distributed educational materials, addressing the public officials and public opinion leaders. We recognize that to achieve a true respect for the environment around us and motivated people who act according to that position every day, not an easy job, but believe that more and more are moving educated and responsible public.

State institutions:

Ministry of Education: is a leading public institution of education, science and sports sectors, as well as youth and state language policy.

Ministry of Environment: is leading a national regulatory authority environmental protection, including environmental protection, nature conservation, natural resource conservation and rational utilization, Hydrometeorological and use of subsoil segments. Ministry of Environment website access to the documents governing the sustainable development processes in Latvia.

Ministry of Environment subsidiary bodies:

- Environmental Science and Education Council: coordinating and advisory body cross area institution, whose decision is recommendatory nature of environmental science and education development. The functions: to identify and effectively address problems related to environmental science and education, as well as education for sustainable development.
- Sustainable Development Council: is a consultative body whose decision is recommendatory nature for sustainable development. Council aims to encourage sustainable development integration of environmental, social and economic fields and coordinate the sustainable development process, promoting public participation, and encourage the provision of the proposal on issues related to sustainable development. According to the Cabinet of Ministers 01.09.2003. Order No.549 October 2003 Minister for the Environment established the Sustainable Development Council, which aims to encourage sustainable development integration of environmental, social and economic matters and coordinate the sustainable development process in Latvian. The Board shall consist of one representative from the ministries: Defence, Foreign Affairs, Interior, Education and Science, Finance, Economic, Cultural, Health, Welfare, Justice, Regional Development and Local Government, Transport, Agriculture and Environment ministries, the Latvian Union of Municipalities, Latvian Association of Free Trade Unions , Latvian Employer's Confederation, Latvian Council of Science, Latvian Rectors' Council, Latvian regional university associations, the Latvian Academy of Sciences and the Environment Protection Club.

Part V

References:

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Ministry of Education and Science Republic of Latvia: http://izm.izm.gov.lv/58.html
Council for Environmental Science and Education: http://www.vzip.lv/
Latvian sustainable development indicators: www.meteo.lv/public/28988.html

Friends of the Earth: http://www.zemesdraugi.lv
Association of homo ECOS: http://www.homoecos.lv
Sustainable Development Agency: http://www.sdagency.org/index.php?lang=en
Foundation for Environmental Education programs: http://www.videsfonds.lv
Latvian Green Dot: http://www.zalais.lv/en/for_the_clients/5733/
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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN LITHUANIA

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1. Sustainable Development (SD) policies in Lithuania

Planning, investment and management strategies of the State and local governments to promote SD

Main body concerned to sustainable development in Lithuania is Ministry of Environment. 2000 were established Lithuanian Commission on Sustainable Development (LNCSD). It is main body for planning, investment and management strategies in the field of SD policy. LNCSD is involved also in initiation of legal acts and its changes taking into account the necessity of sustainable economic, environmental, social and cultural needs of the society as well as preservation of natural resources [1].

Since the beginning of restoration of independence in Lithuania the attention has been focussed on targets of sustainability policy. During the last ten years Lithuania had an obligation and a possibility to choose the way, in which life of the State and society is going to be developed. Lithuania has chosen the democratic way, based on the priority of market economy and private property. The representatives of Lithuania took part in the United Nations conferences on Environment and Development in June 1992 in Rio and in September 2002 in Johannesburg. They declared by signing its documents for the way of sustainable development suggested by the modern world. Lithuania has joined a new era of economic growth - growth that is forceful and at the same time socially and environmentally sustainable [2-7].

Sustainable development was defined as development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. At the Earth Summit the Agenda XXI was prepared and it induced national governments and regional international organizations to arrange strategies and action plans for the implementation of the Agenda XXI. To accomplish these tasks, a balance must be kept between growth and prosperity, the needs of economic development and nature conservancy must be realized not in the future but since today. The restoring Lithuanian economy needs to promote the introduction of environmentally friendly products with a reduced consumption of natural resources, energy, and decreased emissions of pollutants. Therefore, environmental considerations must be more extensively regarded in the economic decision-making. In the environmental policy it is necessary to set new ecologically motivated priorities in the areas where anthropogenic intervention will result in optimal positive environmental effects. In environmental legislation a range of administrative and economic instruments should be used to provide the means for innovative measures to protect the environment. Socio-cultural development must be based on reliable scientific information, knowledge acquired by public education and ecological education especially [2, 6, 7].

The problems of sustainability are particularly important in our country, because the reasons exist, increasing a risk of instability in Lithuania and requiring to draw a permanent attention to the study and development of sustainability [4].

The Lithuanian Environmental Strategy and Action Program adopted by the Parliament in 1996 are also based on these principles. In 1996-1998 the National Strategy for the Implementation of Framework Convention on Climate Change, the National Strategy and Action Plan for Biodiversity Conservation, Ecological Education Strategy and Action Plan were elaborated and adopted by the Government and the Parliament. But every effort of the Ministry of Environment turned out to be insufficient for the implementation of sustainable development principles into all sectors of national economy and activity of social structures. National Sustainable Development Strategy (NSSD) were prepared by LNCSD and in 2003 accepted by the Government. It was updated on 2009.09.16 by the resolution of Lithuanian Government. The NSSD defines quantitative sustainable development indicators, based on EU recommendations and national characteristics, in order to monitor the implementation of the strategy. These development indicators are grouped in accordance with the four main sustainable development sectors: environmental quality (18 indicators), economic development (29), social development (22) and regional development (8) [4, 7].

Despite the lengthy global economic crisis, the main sustainable development objective of Lithuania remains the same, namely to reach the EU average in terms of economic and social development and resource efficiency indicators by 2020, not to exceed permissible EU levels of environmental pollution, to meet the requirements of international conventions limiting environmental pollution and impacts on the global climate. It can only be achieved by introducing the latest and more environmentally friendly technologies. The strategy gives particular attention to scientific progress and knowledge. One of Lithuania's sustainable development priorities is modernisation of old blocks of flats and significant reduction of heat energy costs in the housing sector. Whereas heat insulation of such buildings is very poor and the heat supply infrastructure is old, the efficiency of energy use for housing needs in Lithuania is some 1.8-fold lower than in the majority of EU member states. By modernising blocks of flats and reducing energy costs for heating, Lithuania will contribute to the universal efforts to reduce climate change. It will be sought to use renewable energy resources and energy generated from waste for this purpose as much as possible [1-5].

The updated strategy gives much attention to the ensuring of energy security. High-voltage electricity networks of Lithuania are scheduled to be merged with Scandinavian and Polish networks. It is also planned to build a new nuclear power plant meeting EU safety requirements [1].

The Government has approved a specific plan of measures for the implementation of the strategy. It indicates the operators and time limits for implementation of each of the measures. The minister of environment has set up a new group of experts that has been charged with assessing the course of implementation of this strategy and preparing recommendations [1, 4, 7].

The Lithuanian Environmental Strategy and Action Program were adopted in 1996 by the Parliament of Lithuanian Republic. In 2003 Lithuanian Government accepted

National Sustainable Development Strategy (NSSD). It was updated on 2009.09.16 by the resolution of Lithuanian Government. The Ministry of the Environment is authorised to co-ordinate the implantation of the NSSD and to establish a taskforce from representatives of the various Ministries for the preparation of biennial reports on the implementation of the NSSD [1, 4].

Sustainable Housing Development Program accepted by the Lithuanian Government in 2009 foresee subventions for sustainable and energy saving reconstruction of old flats' blocks. The world crisis forced to reduce the percentage of projects' subventions of Lithuanian Government. Funds for programs of public environmental awareness on SD are allocated from the 2007-2013 EU structural assistance in accordance with the approved funds for 2007-2013 Cohesion Promotion Action Program. Support in accordance with 3.1. Priority "Local and urban development, cultural heritage and nature conservation and adaptation for tourism development" tools "VP3-1.4-AM-08-V the Public Information System on the environment and development" and "VP3-1.4-AM-09-C Public Information and Education about the environment and the implementation of the measures". Totally 3.200.000 EUR for the 1st measure and 5.800.000 EUR for the 2nd measure was allocated for the period from the EU funds [1].

Higher Education policies related to SD.

Environmental and sustainable development education is provided at several professional education establishments. Higher education study programs that are related to the topics of sustainable development are offered at Panevezys College, Utena College and other professional higher education establishments.

Topics of environment protection, and sustainable development and climate change are broadly common in study programs of university higher education. The study programs which are offered by Lithuanian University of Agriculture, Vilnius University, Vytautas Magnus University, Vilnius Gediminas Technical University, Kaunas University of Technology, Klaipeda University and Siauliai University have integrated some aspects of sustainable development issues. Students have possibilities to broaden their knowledge in sustainable development, environmental design, analysis of sensitivity of ecosystems, eco design, environmental impact assessment, etc. However there is lack of sustainable development issues in environmental study programs [8].

Education for needs of sustainable development is one of the most important measures while achieving long-term objectives. Competence in this domain includes knowledge, skills, and attitudes integrated in the programs of different subjects: natural sciences (biology, chemistry, physics), geography, fundamentals of the civic society, ethics, and others. Guidelines to be prepared for integrated programs will be related to General Programs and Updated Standards for Primary, Basic, and Secondary Education Preparation of the Action Plan and the Strategy of Formation, Assessment, Update, and Introduction of the Contents of General Education is started. While preparing this Strategy and as well as implementing its Action Plan, the principles and objectives of sustainable development will be followed [4, 5, 8].

Sustainable development as a process requires implementation of new teaching and learning methodologies based on studies of ”developing knowledge''. The analysis of case studies is an important methodological approach communicating sustainability

principles and developing creative thinking by the students. Using this methodology, a cross-section of complex problems could be interpreted from social, economic, environmental, ethical and other perspectives [5, 8].

Important changes in education system of SD should be implemented to realize the principles of sustainable consumption and production focusing on different age and social groups:

- Revision of curricula and study programs at secondary and higher schools, so that all the topics were presented in the context of sustainable consumption and production paying special attention to refocusing of business, management, marketing and other similar programs;
- Renewing in-service training programs for educationalists;
- Supplementation of educational programs for organization managers and public servants with environmental management courses, in which the basics of sustainable consumption and production were presented;
- Evaluation of possibilities and development of the mechanisms, encouraging business representatives to participate in the educational programs dedicated to business presenting the principles of sustainable consumption and production and emphasizing the positive influence of environmental requirements on competitiveness.

Sustainability is a process of ensuring the wise use of all resources within the framework in which environmental, social and economic factors are integrated. The universities are committed to placing sustainability at the heart of its mission: making sustainability integral to the delivery of research, teaching and operational objectives; taking positive action promoting the continual improvement of the environment; and setting and achieving clearly defined objectives and targets for sustainable development [6, 5, 8].

Environmental education is incorporated into the educational programs of primary and secondary schools according to the National Sustainable Development Education Program for the period 2007-2015, which was approved by the Government of the Republic of Lithuania on 2 October 2009.

The National Scientific Programme "The Ecosystems of Lithuania: Climate Change and Impact of Human's Activities" (Official Gazette, 2008, No. 116-4427) was approved by the Government of the Republic of Lithuania in 2008. One of its objectives is the acquisition and supply of modern scientific knowledge related to the consistency and mechanisms that determine the integrated effect of global climate change and anthropogenic activities on the Lithuanian land/soil and water ecosystems [4, 7].

Accreditation system of university degrees in Lithuania is based on Laws of the Republic Of Lithuania (Law on Higher Education and Research, Law on Education, Law on Non-formal Adult Education) and Orders of Minister of Education and Science [9]:

- Rules for the assessment of research and higher education institutions
- Description of study programme accreditation regulation
- Description of general requirements for master's study programmes

- Regulations for undergraduate, specialised professional and integrated study programmes

Resolution of Lithuanian Government On Approving the Procedure of Establishing Higher Education Institutions and Issuing Permissions to Execute Study Programmes and Regulations for the description of a study program approved by the Order of director of the Centre for Quality Assessment in Higher Education (SKVC) are important for specification of the structure and form of the study program of higher education what is important when supplement the permission to execute studies by a new field, level or mode of study. However there are no specific rules of criteria in accreditation system which would be related to sustainable development or environmental sciences. The information about accreditation system in Lithuania could be found on web-page of SKVC [9].

No specific subventions about education in sustainable development are allocated by the Lithuanian Government.

University policies and experiences.

There are no specific obligations to include SD competences or contents in Life Sciences Higher Education Studies in Lithuania. However the SD subjects are integral part of environmental and life science studies and usually it is supported by the departments of ecology and related sciences at Lithuanian Universities. Some aspects of SD are presented in economy and management studies of Lithuanian universities. The teaching of SD related subjects is supervised by the departments of ecology and related sciences which are in 7 Lithuanian Universities from total 15 universities and 26 colleges of non-university level higher education. The following units are supervising the SD and environmental studies [10-16]:

Lithuanian University of Agriculture -
Department of Ecology (http://www.lzuu.lt/me/ek/en/11387)

Vilnius University –
Center of Ecology and Environmental Research (http://www.eac.gf.vu.lt/)

Vytautas Magnus University -
Department of Environmental Sciences (http://aplinkotyra.vdu.lt/)

Vilnius Gediminas Technical University –
Department of Environmental Protection (http://www.aak.ap.vgtu.lt/en/)

Kaunas University of Technology –
Institute of Environmental Engineering (http://www.apini.lt/?lang=en)

Klaipeda University –
Department of Ecology (http://www.ku.lt/eng/gmmf/)

Siauliai University -
Department of Environmental Research (http://www.su.lt/en/su-faculties-and-institutes/fi-faculty-of-natural-sciences)

The research area “Eco-systems of Lithuania: climate change and human impact” is one of the main areas included in the list of National Science Program of Lithuania. This

area includes also SD aspects and according research projects are supported by the Lithuanian Science Foundation which is under Research Council of Lithuania [1,3].

2. SD University Studies in Lithuania:

There are no specific study programs and specialisations of SD in Life Sciences Higher Education Studies in Lithuania. The subjects related to SD are lectured at BSc and MSc level in 7 Lithuanian universities [10-16].

The following subjects related to SD are lectured in Lithuanian universities:

University	Level of studies	Title of subject	ECTS credits
Lithuanian University of Agriculture	BSc	Basics of sustainable development	3
	MSc	Sustainable development of Baltic region	4
Vilnius University	MSc	Harmonious Development	6
Vytautas Magnus University	BSc	Environment and Development	4
	BSc	Environmental resources management	4,5
	MSc	Sustainable development	6
Vilnius Gediminas Technical University	BSc	Nature Resource Management, Environment and Buildings	6
	MSc	Sustainable industry development	4,5
Kaunas University of Technology	BSc	Principles of sustainable development	6
	MSc	Sustainable Water Management	6
	MSc	Sustainable Industrial Development	6
Klaipeda University	BSc	Ecological education and sustainable development	3
Siauliai University	BSc	Environment and Sustainable Development	6

In some universities the environmental science study programmes including SD courses are presented in English (Vilnius Gediminas Technical University, Kaunas University of Technology, Klaipeda University - MSc level, Siauliai University - BSc level) or planned to be implemented in English (Lithuanian University of Agriculture, BSc and MSc levels from 2011/2012 study year). Besides it there is possible to study environmental sciences and SD related subjects at all 7 mentioned universities, but the courses in English are thought only if at least 5 international students are registered for the course [10-16].

There is no SD related subjects in other than environmental study programmes, except some particular exceptions. For example some MSc specialities of Faculty Economics and Management at Lithuanian University of Agriculture have subjects which include elements of SD (Continuous development of agriculture and Continuous development of economics - 6 ECTS cr. each) [10].

Training practice in the field of environmental sciences is planned only in BSc level. MSc level suppose only research work or research training. There is no specific training

practice related to SD. The following training practices in the field environmental sciences in BSc level are presented in Lithuanian universities [10-16]:

University	Title of practice	ECTS credits
Lithuanian University of Agriculture	Training practice in environmental sciences	1,5
	Professional practice of ecology	6
Vilnius University	Training practice in ecosystems	4
Vytautas Magnus University	Practice of environmental sciences	6
Vilnius Gediminas Technical University	Industrial Practice	12
Kaunas University of Technology	Professional practice	15
Klaipeda University	Training practices	12
	Industrial practice	3
Siauliai University	Integrated Educational Practice	4,5
	Industrial Practice	6
	Practices of environmental sciences	4,5

Life Science studies in Lithuanian universities are only study programs which really include and support the SD aspect in education at university level. Educated degree specialists could contribute to implementation of SD policy and SD ethics in Lithuanian economy and ethical values of the population.

Relations of environmental sciences and SD with other study programmes (such as engineering, economics a.o.) are very week. The governance of the universities should be convinced to include more SD elements in other study programs. The equipment of environmental and SD studies should be also improved.

3. Relevant institutions related to SD in Lithuania

Main governmental institutions relevant to sustainable development in Lithuania is Ministry of Environment and Lithuanian Commission on Sustainable Development (LNCSD). The Prime Minister of the Republic of Lithuania is head of the commission. The members of the commission are Ministers of Environment, Social Security and Labour, Economy, representatives of Ministry of Environment, Culture, Health Care, Transport, Science and Education, Public Administration Reforms and Local Authorities, Foreign Affairs and Agriculture. Members of the commission were also representatives of NGO's, invited members - representatives of scientific institutes, universities, organisations of local authorities, trade, industry and business. The practical problems of sustainable development in Lithuania are now coordinated by by the Ministry of Environment ant its units (Nature Protection Department, Protected Areas And Landscape Department, Pollution Prevention Department, Territorial Planning, Urban Development And Architecture Department, Environmental Protection Agency a.o.). Main practical aim of the Commission was the preparation and implementation of the National strategy on sustainable development. For now the functions and composition of the commission are discussed. Lithuanian Municipalities

also contribute to SD policy by the supporting of SD related projects on local municipality level [1, 4, 7].

Research in the field of environmental sciences and SD is taking place in according Lithuanian universities. Centre of Research, Studies and Business "Valley Nemunas" plays important role integrating the potential of Lithuanian LS universities in research solutions and application of investigations in the field of life sciences and SD.

NGO's – Nature Protection Policy Club and Lithuanian Green Movement are playing important role in SD policy and environmental education of population in Lithuania.

Some enterprises are also very active in preparation of environmental and SD strategy (UAB Eika, UAB Cowi Lietuva a.o.). Lithuanian Real Estate Development Association (LNTPA) plays important role in supporting of SD aspects in building industry.

4. International cooperation in education in SD (ESD) in Lithuania

Lithuanian institutions were involved in several EU supported projects on international cooperation in environmental and SD education (EU TEMPUS, INTERREG, Cross-border Co-operation Programme, FRAMEWORK etc.). Several important projects took place in past, such as:

TEMPUS S_JEP project "Implementation of an Educational Program in Environmental Protection and Sustainable Development at the Universities in Lithuania" (1994-1997)

EU ERA-NET project "BONUS for the Baltic Sea science network of funding agencies" was related to environmental issues and SD of Baltic See on 2004-2008.

GRUNDTVIG project "SEREC: Sustainable Europe - Rural Educational Centres" (2004-2005)

GRUNDTVIG project "Development and Testing of Training Courses for AGENDA 21" (2005-2007)

COMMENIUS project "EDUC - Education for change - Perspective for education and participation in sustainable development" (2005-2008)

ERASMUS thematic network "ISEKI-Food (I & II) - Integrating Safety and Environmental Knowledge Into Food Studies towards European Sustainable Development" (2002-2008)

There are important actual projects:

ERASMUS IP project "The role of agriculture in territorial identity and competitiveness of rural areas" (2008-2011)

ERASMUS thematic network "ISEKI-Food 3 - Integrating Safety and Environmental Knowledge Into Food Studies towards European Sustainable Development" (2008-2011)

ENPI project "Cross border cooperation programme Latvia/Lithuania/Belarus" (2007-2013). It includes important elements of environmental and SD education.

NORDPLUS project "Sustainable lifestyle: how much does the knowledge cost" (2009)
NORDEN project "How to develop methods to measure and to describe key competences in the non-formal adult educational system in order to strengthen NGO's and their work, to strengthen local democracy, sustainable development and coherence in the society."(2009)

NORDEN project "Strengthening Belarusian Environmental NGO's in the field of sustainable development" (2009)

NORDEN project "Sustainable lifestyle: how much does the knowledge cost" (2009)

All Lithuanian universities having environmental science studies are participating in EU LLP/ERASMUS exchanges. All 7 universities are realising the mobility of teachers and students in the field of environmental sciences. For example in ERASMUS exchanges of Lithuanian University of Agriculture in 2009-2010 participated [10]:

- 6 ecology students studied at partner universities in Austria, Germany, Spain, Norway and Finland;
- 6 teachers visited for lecturing visits the Estonian, Spanish, German, French and Polish universities in the field of environmental sciences.

Lithuanian University of Agriculture is involved in preparation and realisation of LLP/ERASMUS CD project BIOLANDMAN (MSc program Management of Biodiversity and Multifunctional Landscapes) regular exchanges between Baltic LS universities is taking place. This study program is realised in Estonian University of Life Sciences and is strongly related with SD. Lithuanian University of Agriculture is also applying in 2011 on ERASMUS IP project "Role of agriculture and natural resources in sustainable rural development - AGSURUDE" as a coordinating institution of intensive programme with participation of 15 partner institutions.

5. Good practices and relevant experiences in the higher education Institutions in Lithuania

International network of Baltic & Black Sea Circle Consortium in Educational Research (BBCC) together with the Journal of Teacher Education for Sustainability (JTEFS) are involved in cooperation on the sustainability education in Baltic & Black Sea region. The problems of the policy in education of sustainable development will be presented and discussed in international JTEFS/BBCC conference "Sustainable Development. Culture. Education" which will take place on 18-21 May 2011 in Siauliai University, Lithuania
(http://www.su.lt/en/general-information)[16].

Several sections of regular international scientific conference "Rural Development" are directly related to SD (Integrated and sustainable rural development, Agriculture in Transition towards Sustainable Development: Economics, Management and Policy, Challenges and Solutions in Sustainable Farming, Sustainable Development of Forestry etc.). This conference is organised in Lithuanian University of Agriculture and next conference will take place on 24-25 November 2011 (http://www.lzuu.lt/rural development) [10].

6. Possible future actions in Lithuania

The study management units of Lithuanian universities could support the efforts to include more SD elements in environmental, engineering and management study programs. The equipment and literature support of environmental and SD studies should be also improved. The specialised SD education course for teachers could be arranged involving local and foreign specialists.

SD elements should be integrated in the most important subjects presented for Life Science study programmes. There should be prepared separate recommendations and examples of SD for different science areas (economics, management, engineering, educology etc.). It will enable the efficient incorporation of SD in separate subjects.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN LUXEMBOURG

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1. Sustainable Development (SD) policies in Luxembourg:

Different institutions in Luxembourg are more or less specifically related to SD. The Ministry for Sustainable Development and Infrastructure regroups the departments for urban and regional planning, environment, transport and public infrastructure. Four main objectives have been defined within the framework of the ministry's policies:

- Implement and strengthen a transversal policy of SD
- Create strong links between the strategic components and the implementation of the development of the national territory
- Implement an integrated transport policy
- Overcome the gap between infrastructure construction and environmental protection

The High Council for Sustainable Development is the organ of reflection, discussion and advice on SD. It is composed of representatives from the national government, municipalities, labor unions, employer's associations, NGOs, scientists and the National Ethics Committee. The Executive Board may also seek, where appropriate, independent experts to assist it in its opinions. Finally, this body can also suggest research and studies in areas related to SD.
The Inter-ministerial Commission on Sustainable Development prepares the drafts of the national plan on sustainable development and ensures the integration of SD into sectoral policies. It may, if necessary, appeal to outside experts.

The national plan on sustainable development is produced every 4 years. It specifies the priorities, targets and concrete actions to be taken in the context of SD. It is a policy document for which the Government has the ultimate responsibility and is supposed to guide the Government on the path of SD. It must include at least the following topics:

(i) designation of key areas where special measures must be taken to ensure SD and formulation of objectives related thereto in time,
(ii) definition of measures, means and time frames necessary to achieve the objectives of the Plan and the priorities to respect,
(iii) financial, economic, social and ecological consequences of the measures taken in the interest of SD.

The national report on the implementation of SD is established every two years. It describes in a scientific manner and as objectively as possible the situation concerning SD in Luxembourg. It does also assess, based on relevant assumptions, the consequences of action or inaction on SD.

27 economic, social an environmental indicators have been defined in order to be able to measure the progress made towards SD.

The law of June 25, 2004 on the coordination of the national policy of SD defines the framework, organs and instruments needed to implement the national policy in the area of SD.

Although there are a lot of different subventions whose objective is to reduce human impact on the environment, they are not defined specifically in relation to SD: for example subventions for nature conservation measures in agriculture, energetic optimization of existing buildings or the purchase of less consuming cars or refrigerators.

Therefore, the values of the indicators "1.A" of the guidelines for Luxembourg are:
- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ No existence of specific subventions about SD

In Luxembourg there are no specific national institutions of education, national educational policies or educations legislation related to SD. The accreditation systems of the university degrees know no specific SD criteria. Also there are no specific subventions concerning SD in education.

Therefore, the values of the indicators "1.B" of the guidelines for Luxembourg are:
- ✓ No existence of specific educational institutions about SD
- ✓ No existence of specific educational policies about SD on a national level
- ✓ No existence of specific educational legislation about SD on a national level
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ No existence of specific subventions about education in SD

Luxembourg has only one university, *Université du Luxembourg* (UL). The University joined the International Sustainable Campus Network (ISCN) in April 2008 and is chairing one of four working groups. In March 2009 the UL created a cell dedicated to SD.

A *Strategic Action Plan on Sustainable Development* (2010-2013) has been produced in a participatory process setting out activities relating to the following goals:

- Applicability to practice of research and teaching that centres on environmental and social issues
- Connections between disciplines to explore the complexities of societal challenges
- Greater integration of research, teaching, campus operation, planning and civic engagement.

"The main goal for the UL relating to sustainable development is to define and convey to students, staff and interested civil society basic knowledge on principles and practice of SD, and the capacity to develop and implement solutions to reduce environmental impacts and improve social cohesion by drawing on different disciplines. The associated learning processes are conceived as being situated in a community. Learning in a community places active participation, practical experience, inquiry-based learning and real-world problem solving at its centre. The aim is to complement and leverage academic theory in approaches to learn about and act upon the multi-causality of environmental and social issues, transcending disciplines."

In July 2010 Rolf Tarrach, rector of the University of Luxembourg has signed the ' Sustainable Campus Charter ', which highlights the clear commitment of the university to organise its future development also in view of affecting beneficial environmental and social impacts. The charter was developed by the International Sustainable Campus Network (ISCN) and the Global University Leaders Forum (GULF).

The University of Luxembourg has a "Cell for Sustainable Development" The main mission of the Cell is to foster learning, teaching, research and action to address the complex environmental and social challenges that have to be faced. The mission of the Cell is also to facilitate continued improvement in campus operation, management and planning to minimise impacts on the environment and provide a good social environment, governed by respect for natural resources and social equity considerations. For this purpose the Cell develops University Position Statements that define sustainability-related goals and targets, management, planning, as well as approaches to monitoring and review of achievements. The process to develop these positions relies on participatory processes involving students, faculty, and concerned administrative staff. The draft position papers are then formally adopted by the UL Working Group on Sustainable Development, and by the rectorate.

Therefore, the values of the indicators "1.C" of the guidelines for Luxembourg are:

- ✓ Existence of specific university policies about SD
- ✓ Existence of specific units or departments about SD

The national research fund (*Fonds national de la recherche*) is funding public research in Luxembourg and pursues a three-fold strategic objective:

- supporting researchers to build up scientific quality and excellence;
- improving Luxembourg's research environment and institutional framework;
- promoting scientific culture, particularly among the young.

One of the core thematic domains that are funded is the sustainable resource management in Luxembourg:

- sustainable management of water resources
- sustainable uses and sources of energy
- understanding ecosystems and biodiversity

- sustainable agro-systems management
- spatial and urban development

The *Centre de recherche publique Gabriel Lippmann* (CRP) is a public establishment devoted to applied scientific research and technological development, as well as permanent technology transfer and high-level training. One of the units of the CRP is the Environment and Agro-Biotechnologies Department which studies the mechanisms of natural and anthropic ecosystems, with a view to develop assessment tools for safeguarding natural resources, and to protect their quality:

- sustainable management of aquatic and terrestrial ecosystems
- agricultural and forest biotechnologies
- geohydrosystems and land-use management
- nutrition and toxicology

Sustainable management of natural resources which requires a major scientific and technological effort that can only be achieved through a multidisciplinary scientific approach is one of the key subjects of the CRP.

Another institution doing research in fields related to SD and helping to implement the results ("eco-innovation") is the Resource Centre for Environmental Technologies (CRTE) that fosters innovation in environmental science and technology. The main fields of CRTE's expertise are environmental management, life cycle assessment, process engineering, modelling of environmental processes and environmental risk assessment.

CRTE's main goal is associating the socioeconomic development in Luxemburg and the Greater Region to the protection of the environment through adopting an integrated and pro-active environmental protection approach. Special attention is given to a sustainable management of substances and energy flows and the implementation of ecotechnologies. Most of its activities are related or can be attributed to one of the following sectors:

- cleaner production
- renewable energies, rational use of energy
- urban water cycle

Therefore, the value of the indicator "1.D" of the guidelines for Luxembourg is:

✓ Existence of specific programs about SD

2.- SD University Studies in Luxembourg:

The University of Luxembourg offers bachelor studies in life sciences, which are divided into 3 branches: biology, medicine and pharmacy.

The University also offers a specific master study "Sustainable development". The study lasts two years. Teaching languages are French and English. The Master is developed in collaboration with the University of Liège (B), Campus d'Arlon (Master in Science and Environmental Management). The branch "Energy – Environment" is located at the University of Luxembourg. The studies are organized within the framework of an ERASMUS agreement.

Therefore, the value of the indicator "2.A" of the guidelines for Luxembourg is:

- ✓ Existence of specific studies about SD

SD isn't a specific subject in Life Sciences studies at the University of Luxembourg. The *Strategic Action Plan on Sustainable Development* (2010-2013) is rather destined to convey the idea of SD to students and staff and to reduce the ecological footprint of the University as such.

A specific trans-disciplinary course related to SD will start during the summer semester 2010/2011. The course with the title "Science and citizens meet challenges of sustainability - An interdisciplinary and cross-faculty course for exploring responsibilities citizens can assume in a knowledge society" is open to applications from the public and students from all degree programmes. Fourteen lecturers from diverse disciplines such as ecology, political science, physics and psychology are giving courses in five thematic units: water, agro-food production, sustainable energy cultures, shaping the environment: quantity and quality, sustainable education: measuring and reasoning.

Therefore, the value of the indicator "2.B" of the guidelines for Luxembourg is:

- ✓ No existence of specific subjects about SD in the degrees

There are no specific practical activities related to SD in the degrees of the UL. The Cell for SD creates opportunities for linking learning about SD with practical experience though and offers a range of internships and research opportunities that are organized in conjunction with the *Cross-Faculty Courses*. All internships and research projects aim at building capacities for effective practice including collaboration with others across differences and managing the complexity and uncertainty of real challenges.

Therefore, the value of the indicator "2.C" of the guidelines for Luxembourg is:

- ✓ Existence of specific practical activities about SD in the degrees: In some of the degrees on a voluntary basis

The University of Luxembourg was only founded in 2003. It is thus too early to see any specific contribution of the university studies to SD on a national level.

3.- Relevant Institutions related to SD in Luxembourg:

The relevant institutions related to SD in Luxembourg are represented in the High Council for Sustainable Development.

4.- International cooperation in ESD (Education in SD) in Luxembourg:

The University of Luxembourg joined the International Sustainable Campus Network (ISCN) in April 2008. The Sustainable Campus Network aims at enhancing universities' commitments to construct, redesign, and organize their campuses in an exemplary and sustainable way, and to include the experiences in their research and education mission. Facilitating an ongoing experience exchange on best practice on campus sustainability is the key goal of the ISCN.

5.- Good practices and relevant experiences in Luxembourg:

The national plan on SD stipulates 155 measures in order to fight 14 unsustainable trends and to make progress towards a sustainable society. Some of these measures have been or are being implemented already, whereas others will only be realized in the middle or even long term.

The good practices devised by the Cell for SD concern the implementation of the idea of SD in every day life at the UL rather than integration in education itself. The elaborated position statements that require completion and implementation and continued review and improvement concern for example fair trade, energy, water or waste management at the UL or the design and equipment needed to make laboratories and data centres more sustainable.

6.- Possible future actions in Luxembourg:

With the creation of a "Cell for Sustainable Development", the implementation of the *Strategic Action Plan on Sustainable Development* and the specific trans-disciplinary course related to SD, the conditions are set to see an integration of SD as a specific subject of Life Science Studies at the University of Luxembourg.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN MALTA

In 2002, the Government Malta has set up a National Commission for Sustainable Development (**NCSD**), in terms of the Environment Protection Act (2001). The National Commission for Sustainable Development is the main institutional catalyst responsible under the Environmental Protection Act for promoting sustainable development and drafting the National Strategy for Sustainable Development in Malta.[1]

In Malta, the structure for sustainable development (**SD**) policy-making is centralised by the NCSD. Due to the small size of the Maltese Islands services are usually centralized by the government, leading to limited responsibilities by local councils. As a consequence local councils lack the necessary resources (technical personnel and financial, etc) to manage their rural and urban environments. However the report on the national strategies for sustainable development (**NSSD**) was prepared in consultation with the local councils and Non-Government Organizations (**NGOs**). In case of amendments local councils and NGOs are consulted. These are also consulted in policy making decisions and major urban development processes. Through its composition the NCSD has links to the Malta Council for Economic and Social Development and the various other players representing the social, economic and environmental aspects of sustainable development.[2]

The main functions of the NCSD's are[3]:

(a) to advocate sustainable development across all sectors of Malta, review progress in the achievement of such sustainable development and to build consensus on action needed to achieve further progress;

(b) to identify any relevant process or policy which may be undermining sustainable development and propose alternative processes or policies to the Government for adoption;

(c) to identify trends which may significantly give rise to unsustainable development and which will not be reversed on the basis of current or planned action, and recommend action to reverse such trends;

(d) to increase awareness of the need that development must be sustainable;

(e) to encourage and stimulate good practice in the use and management of natural resources, in particular their minimal use and maximum reuse by recycling in an environmentally sustainable manner;

(f) to prepare a National Strategies from time to time for Sustainable Development of the Maltese Island.

Malta's Government Commitment

The Maltese Government, committed itself to adopt a National Sustainable Development Strategy, so as to 'build upon and harmonise the various sectorial, economic, social and environmental policies and plans that are operating in the country'.

The basic goals of this strategy were to[4]:

- ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations
- be based on a thorough assessment of the current situation and initiatives
- be developed through the widest possible participation

The Malta Environment and Planning Authority[5]

The Malta Environment and Planning Authority (**MEPA**) is the national agency responsible for the sustainable development of policies and laws of the Maltese Islands. MEPA was established under the mandate of the Environment Protection Act (2001) and the Development Planning Act (1992) of the Laws of Malta. MEPA is responsible for land use planning and the implementation of Directives, Decisions and Regulations under the EU Environmental Acquis.

In addition, MEPA acts as the national focal point under a number of international environmental conventions and multilateral agreements, including the Aarhus Convention on access to information, public participation in decision-making and

access to justice in environmental matters. The Authority employs personnel from a wide range of backgrounds to help solve and shape the Maltese Islands environmental and sustainable development of land-use issues. In addition, there are a number of appointed boards and committees, which provide strategic guidance or expert advice to the directorates to ensure that the organization fulfils its functions and responsibilities efficiently and effectively, in line with its legal obligations.

Malta Government Subventions to Sustainable Development

The Government of Malta has recently made a number of subventions to SD on the islands. These include subsidies on solar and photo-voltaic panels, schemes to replace old polluting cars, schemes to replace old energy wasting appliances and other similar schemes.

The sister island of Malta has been ear marked to become an **eco-island (Eco-Gozo)**[6] by **2020.** The idea is to transform Gozo and Gozitan society into a sustainable reality in its wider sense not only environmentally, but also socially and economically. Action and change in many sectors have started with the Government investing to contribute towards this aim, involving the, agricultural, tourism, the environment, water management, education, energy, research, waste management and transport sectors. This new way of governing and managing the island of Gozo will make change happen, in both small, everyday practices which will have a significant impact on the SD of the island. Eco-Gozo provides an assurance for sustainable development in Gozo, and a continued success for the eco island concept in the future.

A project within Eco-Gozo is The Gozo Experimental Farm. The main aim of this project is the re-establish the local animal breeds and crop varieties, as these breeds and crops may be more sustainable to the local environmental conditions.

Non-Governmental Organizations lobbying for Sustainable Development

There are a number of NGOs lobbying and working for SD in the Maltese Islands. Some of them are partners with international environmental organizations. They are mainly involved in the conservation of Maltese nature by promoting environmental

awareness, managing areas of natural and scientific interest, and lobbying for effective environmental legislation. They are also highly involved in environmental education through various means and through their educational projects. NGOs are contributing to environmental awareness, nature protection and sustainable development of the Maltese Islands. NGOs strongly believe that education is the best tool to create awareness on nature conservation through SD. Some of these NGOs, notably Nature Trust Malta[7], publish a good number of literature and information leaflets on the Maltese habitats and biodiversity. They organise various activities such as natural history courses, marine biology courses, ecological guided walks, school visits and field work in nature reserves. Nature Trust Malta owns and runs environmental education centres in nature parks and one of them has a hostel for overnight stays for local and foreign students. NGOs are also carrying out many environmental projects in Malta such as afforestation, habitat conservation and the creation of marine protected areas. Some NGOs are also involved in the management of EU LIFE projects in collaboration with governmental and academic institutions.

University Studies in Life Sciences

The aim of Maltese tertiary education in life sciences is to provide the necessary tools and formation of students as prospective candidates to work in the various sectors of life sciences. The areas with a major input to SD are agriculture, environment and biology/chemistry.

The Institute of Earth Systems at the University of Malta is currently offering a Diploma course and a Bachelors course at the undergraduate level and a Master's degree at the postgraduate level.[8]

The Diploma in Agriculture (1 YEAR) is based on a broad inclusion of all rural sciences and food systems. Out of a total number of 60 ECTS, 18 ECTS are dedicated to SD. These study units are: Principles of Farm Management, Soil Fertility and Nutrient Management, and Good Agricultural Practice. Principles of Farm Management deals with the economics of the farm, Soil Fertility and Nutrient Management deals with the rational use of agrochemicals and their impacts on the soil, while Good Agricultural

Practice more broadly deals with the management of crops and animals with minimal impacts on the environment. The other study units incorporate elements of SD.

A second course is the Diploma in Water Operations Management. Although this course is not currently offered, the main aim of this course is to instil in students the understanding of the rational use and extraction of water for agriculture, in the light of understanding the potential threats of water wastage and loss. The study units are aimed towards sustainable development with minimal impacts on the local water resources.

The B.Sc. (Mediterranean Agroecosystems Management) has been designed to emphasize the importance of SD within the field of agro-ecosystems. The students are instructed on the rational use of resources with minimal impacts on the production system and the surrounding environment. The appreciation and recuperation of the local animal and crop genetic resources are also considered. The latter contributes indirectly to SD, with a sensible introduction of new varieties/strains without considerable loses to the old varieties.

The Master in Environmental Management and Planning is based on sustainability in most of the study units delivered within this programme. 40 ECTS out of 120 ECTS are based on sustainability. Typical study units include Fundamentals of Environmental Management and Sustainability, Managing Environmental Hazards and Risk, Sustainable Land Management, Integrated Coastal Management and Planning, Planning for Conservation and Restoration Ecology, Pollution and Waste Management, Sustainability of Energy Provision and Use, and Education for Sustainable Development.

The Departments of Biology and Chemistry[9] within the faculty of Science offer first degree (B.Sc. Hons) and postgraduate (M.Sc., M.Phil. and Ph.D.) degree courses. They both carry out research in the area of SD. The Biology department focuses it research on marine environment while the Chemistry department has an area on environmental chemistry. Apart from teaching, the Faculty is trying to make a direct contribution to the sustainable management of the islands natural resources, through its research programmes.

The Institute for Sustainable Energy[10] aims at assisting the development of national energy plans through studies in the use of new and renewable energy resources and methods of energy conservation. The Institute organises and participates in teaching programmes and research projects in the field of sustainable energy technology.

The Institute for Sustainable Development[11] was set up in 2009 to promote sustainability through the adoption of interdisciplinary research. It focuses on the deployment of Information Technology, such as Geographic Information Systems to support decision making and strategy, whilst encouraging science and technology commercialisation to enhance infrastructures, productivity and entrepreneurship. In looking at sustainable development the Institute aims at initiatives and research that enhance Malta's quality of life.

Within the offered courses, the students are introduced to the practical aspects of sustainability assessment and management. This is performed through dissertations and visits to environmentally sustainable sites abroad. Most departments and Institutes at the University participate in international networks and research programs related to SD.

Barriers for the integration of the SD and problems in the teaching methods

Due to size limitations, University works in partnership with several Governmental institutions and private companies in order to achieve the practical aspects of SD. The problem is the direct involvement of the stake holder. Course for the general public in environment studies and SD are not always well attended. In certain instances the general public does not perceive rural and environmental issues as scientific in nature. Therefore the concept of rational use of resources is not well understood. From our experience when our Institute organised course for farmers, they were not always well attended and many farmers could not perceive the idea and concepts of SD.

Possible future actions

It is empirical that SD activities and research are funded through national, European and international scheme. As a group of small islands SD becomes more important as natural resources are limited. It is suggested that the topic of SD education should be integrated in all life science programs particularly at the tertiary level.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN NORWAY

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1. Sustainable Development (SD) policies in Norway:

By sustainable development is meant a development that fulfills our needs without having negative effect for future generations, but it also demands a more equal distribution of the resources in the world. The Brundtland Commissions Report confirms that the industrialized countries have a special responsibility to implement sustainable production and consumption. The Norwegian government has had a special emphasis on these topics since then. The original name of The Brundtland Commissions Report in 1987 was “Our Common Future”. The report has also been given the name The Brundtland Report from the leader of the commission, the former prime minister of Norway, Gro Harlem Brundtland. In 1990 the Norwegian government proposed some strategies to follow up the guidelines from the report. The goal was to reduce CO_2, to implement sustainable production in the oil industry, develop global trade, especially towards developing countries and in general, how to increase people’s life standard with less load on the environment.

The report states that the overall objective of the world community (and the Norwegian society) is that development should be economically, socially and ecologically sustainable. The basis for sustained use of nature and its resources shall be preserved. Within this framework, a promotable stable and healthy economic shall be developed to give a society with high quality of life, and also to contribute to the world's poor to be given the opportunity to material welfare and quality of life.

In Norway, the plan focuses on seven main areas:

- International cooperation for sustainable development and poverty reduction
- Climate change, ozone layer and long-range trans-boundary air pollution
- Biodiversity and Cultural Heritage
- Natural Resources
- Hazardous and harmful chemicals
- Sustainable economic development
- Sami perspectives on environmental and natural resource management.

As part of the implementation of this Action Plan is proposed some indicators, a national set of indicators, which should tell us whether the development is sustainable. This will make it easier for those who govern, to have a sustainable exploitation of the

resources we manage. We will only reap any of the profits and not to use the resources fully.

A set of totally 18 indicators are proposed to evaluate how these points from the Action Plan can be implemented in the society. In Norway, the Minister of Finance is responsible for Sustainable Development. This is to make sure that all principles of sustainability are built into all policy areas. The indicators are focused on the fight against poverty, pollutants and climate change, biodiversity and cultural heritage, natural recourses, chemicals and toxics for people and environment and sustainable economic development as the most important groups.

A project, operating from 2009-2011, has a special focus on "Indicators of sustainable development and precautionary perspectives". This project has the goal to strengthen the sustainability indicators by establishing warning signs in the form of expert judgments, to avoid irreparable damage on the environment. The project works closely with the Norwegian Institute for Nature Research (NINA), the Directorate for Nature Management (DN), Fafo Institute for Applied International Studies of Management Center for Climate Strategy, Center for Climate Research, National Institute for Consumer Research (SIFO) and international and national experts.

Nordic level

The Nordic Council of Ministers has developed new strategy for the Nordic countries (Norway, Denmark, Sweden, Finland, Iceland, Faroe Island, Greenland and Åland) for the period 2009-2012 that replaces the previous strategy for 2004-2008. This new strategy focuses on climate change, conservation of nature and sustainable production and consumption and the Nordic welfare model. The Nordic Region has a long-standing tradition of working together to seek common answers to common challenges, to learn from each other, and cooperate on all that unites these countries. The Nordic welfare state is based on fundamental values such as equality, respect for human rights, justice, gender equality, democracy, the promotion of health and well-being, openness and commitment. The ecological footprint left by the average Nordic citizen is far larger than in many other places in the world.

Award

To encourage and inspire people and organizations to think and act for a better environment and a more sustainable future, a private foundation has established an international reward, called The Sophie Reward (US $ 100000), in 1997. The price has been given annually to various people and organizations from all over the world.

Education

The period 2005-2014 is called The Decade of Education for Sustainable Development (DESD) (UN definition). Education for SD should be included in all curricula, and not only being the task of single subjects. Education for sustainable development can contribute to critical reflection, awareness and opportunities so that new visions and concepts can be explored and new methods and tools developed.

To include sustainable development in the teaching system it is important that this focus should be included at all levels, and not thought as a specific topic. The inclusion in the teacher education is therefore important to make this a part of our general education of young people.

Type of topics that can be included in the definition of sustainable development:
- Waste and Recycling
- Biodiversity
- Participation and Democracy
- Energy
- Consumption and Resources
- Outdoor Recreation and Nature
- Health
- Conflicts of Interest
- Climate and Air Quality
- Cultural Heritage
- Natural Areas
- Water Resources

These topics will be included in all our teaching plans from basic levels in primary school, both public and private schools. Also many volunteer organizations are continuously working on Teaching for Sustainable Development. The challenge for these organizations is to facilitate popular mobilization and engagement, popular knowledge, experience and creativity, active citizenship, identity and cohesion. The activities of organizations may be a role model for all types of mobilization for Learning for Sustainable development in different arenas.

Most colleges and universities in Norway have implemented our national strategy for sustainable development; to conduct research and development programs that can strengthen and promote sustainable development and innovation and to promote innovation and sustainable development in cooperation with the private and public sector.

2. SD University Studies in Norway:

From 2011 there are eight Universities in Norway. The majority of these universities offer single courses, educational programs and/or research activities on sustainable development in one way or other.

In 2008, Norwegian University of Science and Technology (NTNU) was evaluated as the best university in Europe regarding education in sustainable development.

The Technical University/NTNU offers courses related to technical activities related to SD – such as water and environment, transport and engineering, in addition to architectural, product design, physiology and chemistry. Sustainability is included in

single courses by the focus on using sustainable raw material as replacement for the traditional methods.

The Norwegian University of Life Sciences/UMB is offering programs and courses related to Life Science studies in Norway.

UMB operates in renewable energy education at the bachelor's and master's level and through continuing education courses. At UMB a Master of Science in Environment and Natural Resources is established. This study includes Environmental pollutants and eco-toxicology, Soil and environment, Geology, Limnology and water resources, Sustainable Water and Sanitation, Ecological engineering, Conventional and decentralized wastewater treatment systems, Natural systems wastewater treatment, Health and Development. Further work on sustainable development will include research and development on themes like: Basic and applied sciences, bio-production, including aquaculture, the use and protection of nature, environment, climate change and renewable energy, development and globalization studies, landscape and land use planning, food production and food safety, technology, economics and social sciences, teacher training in science and natural resource, health for animals and humans. In 2007 a center of Bio-energy was established as teamwork from UMB, Bioforsk and Forest & Landscape (research institutions). Visions of the center are to be the preferred Norwegian Research and Development Environment in renewable energy based on biomass. The Centre will compete internationally. The Centre will give priority to research in the areas of farming, bio-fuel, and biogas and sustainability analysis.

University of Oslo/UIO offers a various number of courses related to sustainability, including: International cooperation, combating poverty, changes in consumption patterns, sustainable population development, protect and promote health, sustainable settlement patterns, decisions for sustainable development. Special focus should be on women, children and youngsters, indigenous people, volunteers, local authorities, business and industry, research and development and farmers.

University of Bergen/UIB offers a program offers a complete bachelor program that includes scientific perspective on sustainable development on: Chemistry in nature, marine ecosystems, resource management and the changing environment, economy, marine history, environment and risk perception, environment and resource economy, environment, climate and history of man.

University of Tromsø/UIT offers education on lower level, diploma and PhD-studies with a special emphasis on the vulnerable situation in the arctic region. This includes Fishery, business and continued growth in the north, the basis for prosperity, environmental understanding and sustainable resource management. Basic research is the pillar and foundation for applied research by faculty. One project of particular interest has been focusing on sustainable coastal culture. The project's primary aim has been to examine the concepts of sustainability and culture in relation to women

and men, girls and boys, and natural resource-related practices and experiences in coastal areas.

University of Agder/UIA has a special profile towards Renewable energy, energy and sustainable building design that including building integrated ventilation, energy saving solutions for homes and commercial buildings with the utilization of both passive and active solar energy, daylight and natural or hybrid ventilation.
University of Stavanger/UIS offers only few courses in City planning and urban design.
University of Nordland/UIN was established in 2011, and has so far no programs with specific focus on sustainable development.
In addition, some universities and colleges participate in the **NOVA Network** (Nordic Veterinary and Agricultural University Network) which was established in 1995. The member institutions are Life Science, Veterinary and Agricultural schools and universities from Sweden, Denmark, Finland, Norway and Iceland. The main task is to initiate, administer and promote cooperation in higher education. NOVA contribute to development within sustainable use of natural resources, food production, health and welfare protection of humans and animal, and to enhancing the use of land, water, plants and animal according to sustainable principles. In May 2011, the annual seminar is on the theme "*Education for Sustainable Development in a Nordic Life Science Perspective*".

3. Relevant Institutions related to SD in Norway:

In Norway, many institutions are involved in sustainable development. The institutions work on national, regional or local levels. They are involved in research and development on sustainable development to a various extent.
The Norwegian Research Council has supported many research projects on sustainable development throughout the last two decades.
The Norwegian government has also indicated financial support for NGO's (Non Governmental Organizations) prioritizing work on sustainable development. Many of these organizations are mentioned in ProSus Guide for the Local Agenda 21 in Norway to follow up the goals from the Rio Declaration.

4. International cooperation in ESD (Education in SD) Norway:

Norway has decided to include the strategy of the United Nations Commission for Europe (UNECE) in the national work for implementation of sustainable development.
The education for sustainable development will develop and strengthen the capacity for individuals, groups, communities and countries to make decisions for the benefit of sustainable development.

5. Good practices and relevant experiences in the Higher Education Institutions in Norway:

National, regional and local organizations have developed information material about good practices for sustainability or environmental protection.

The activities to implement SD can be summarized as follows:
• Education for sustainable development must permeate all curricula, and do not constitute a single subject
• The program will help to establish the values and principles underlying the sustainable development
• Education should stimulate critical thinking and problem-solving.
• Education should be based on the diversity of methodologies that promote the learning process. Writing, drama, art, debate, exploration, etc.
• Students / pupils should participate actively in decisions about the method used in the training
• The training should address local as well as global topics.

6. Possible future actions in Norway:

After nearly twenty years of work on sustainable development, many skeptics claim that there is still a long way to go. Norway has had some reduction in greenhouse gas emission, but we still have not reached our goal (from Kyoto). The global warming can result in millions of climate refugees, and the changing conditions of life affect our possibility of sustainable development in all areas. As the world's third largest exporter of oil and gas, Norway has a special responsibility for the future climate refugees.
Import from the least developed countries in Africa could have been better, as these countries need help to get on their feet in order to operate sustainable.
Norway has seen some reduction in soil acidification, but most of this originate from other European countries, and is thus not a result of national effort in the field.
Norway gets high score for low unemployment, high life expectancy and high education level.

A continuation of the good cooperation between different organizations on various levels will be important to implement activities of sustainable development in all levels of the population. Teaching on sustainable development has to be related to actual trends in culture, research/education in business and public work.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN POLAND

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1. Sustainable Development (SD) policies in Poland:

1.A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…)

Existence of specific national institutions about SD

There is no existing national institution dedicated only to sustainable development in Poland, but the most important one interested in and involved in implementation of Sustainable Development strategy is Ministry of Economy [1]. Article 74 of the Constitution stipulates, that sustainable development should be the duty of public authorities. The *Council of Ministers* is the highest executive body of public administration. Poland has prepared Sustainable Development Strategy for Poland up to 2025. In this process only two *non-governmental organizations* played a role during the formulation of Polska 2025: The Polish Academy of Sciences (PAN) and the Institute for Sustainable Development in Warsaw (a non-profit institute, whose task is to promote sustainability processes). However the Institute can be seen more as a symbolic representing of NGOs. [5]

Existence of specific national policies about SD, Existence of specific national legislation about SD

The new Constitution of the Republic of Poland (1997) provides guarantees (Article no 5) for safeguarding the national heritage and natural environment while pursuing the principle of sustainable development. The concept of sustainable development is defined in the Act on Protection and Environment Development dated 31 January 1980 in article 3.3a. Which says “Sustainable development isasocio-economic development, aiming to sustain access of present and future generation to environmental resources, by integration of political, economic andsocial activities respecting the balance and stability of basic natural processes” In 1991 after the political transformation, Poland has developed a framework document entitled “State Ecological Policy”, which it determined that Poland should follow a path of sustainable development. Poland has also signed a protocol of Rio de Janeiro UNEP conference listed in Agenda 21 (January 1992).
2.03.1999 Polish Parliament (Sejm) adopted a Resolution which obliged Government to work out Sustainable Development Strategy for Poland up to 2025[2]. On the 3rd of August 2000, the Council of Ministers handed the strategy over to the Sejm, which was voted.

The “Sustainable Development Strategy for Poland up to 2025” (Polska 2025) is the main framework, elaborated by the Polish Government. In this Strategy sustainable development is perceived in a long-term perspective, as a process that allows for gradual balancing of growth, social cohesion and environmental protection. The overall strategy aims for Poland to catch-up with the developed countries. The SD Strategy for Poland up to 2025 should be treated as a compass for the state and society – and as such is not concentrated upon any quantified objectives. The strategy defines wealth as covering the material needs enabling people to achieve a better life in a healthy environment [5].
Moreover Poland as a member of EU respects the international agreements defined in:

- Agenda 21
- Assumptions of the FifthProgramonEnvironment Protection and Sustainable Development of EU
- The recommendationsof the Transformation ProgramofOrganization ofEconomic Cooperation and Development (OECD) [2]

On 17.06.2009 Council of Ministry proposed a new project “Poland 2030 Challenges of Development”. It is not dedicated for sustainable development however it contains some aspects of SD. “Poland 2030. Development challenges” lists 10 key challenges to be faced by Poland over the next two decades – growth and competitive edge of economy, demographic developments, high professional activity and adaptability of labour resources, adequate infrastructural potential, energy and climatic safety, knowledge-based economy and development of intellectual capital, solidarity and regional cohesion, enhancement of social cohesion, efficient state, and an increase in the social capital. Response to those challenges shoulddrive the country’s development, the pace of economic growth, the status of Poles and the position of Poland on the economic and social maps of Europe.
The report features an analysis of the current standing of Poland in those areas and indicates guidelines for the state policy to meet development challenges – evade threats and fully capitalise on the emerging prospects and chances. It also identifies the path for sustainable development of Poland aligned to the polarisation diffusion model.
The document lists five key drivers which may facilitate meeting these objectives: development of conditions for swift increase in investments, growth in professional activity and mobility of Poles, boost in productivity and innovations, effective diffusion on the regional and social level as well as reinforcement of the social capital and efficiency of the state [6].

Existence of specific subventions about SD

Among specific subventions concerning sustainable development Agri-environmental payments for farmers can be highlighted. The payments are funded by European Agricultural Fund for Rural Development (EAFRD). Farmers realizing following program are granted support: 1 Sustainable farming, 2 Organic farming 3 Extensive permanent grassland, 4 Protection of endangered bird species and natural habitats outside of

Natura2000 areas, 5 Protection of endangered bird species and natural habitats in Natura2000 areas , 6 Preservation of endangered genetic plant resources in agriculture, 7 Preservation of endangered animal genetic resources in agriculture, 8 Protection of soil and water, 9 Buffer zones [3].
Most of local governments has already prepared their own strategy for sustainable development of theirs region (provinces, cities, municipalities). The period of its viability depends on each community, but in most cases it is valid beyond 2020. Each region has its own specific condition, however the frame of their activity is shaped by Polish Strategy for Sustainable Development to 2025.

1.B. Higher Education policies related to SD (Organization, structure,responsibilities, policies, legislation, integration in the accreditationsystems, subventions…).

Existence of specific educational national institutions about SD

In Poland there is no special, central institution dedicated to sustainable development. However, there are several institutions responsible for fulfilment of sustainable development principles and are specific for a particular department of national economy. Education is subordinate to Ministry of Education i.e., but national economy in general is subordinate to Ministry of Economy.The Ministry of Education use the National Strategy of Ecological Education as a criterion of the activities concerning sustainable development.

Existence of specific educational national policies about SD, Existence of specific educational national legislation about SD

Polish Strategy for Sustainable Development to 2025 determined the education is an important measure to achieve to goals of SD [2]. Implementing the recommendations of Agenda 21,Ministry of Education and Ministry of Environmental Protection, Natural Resources and Forestry signed an agreement concerning co-operationin a field of environmental education (April 1995). The national strategy of environmental education was the main outcome of that co-operation. The Strategy was approved by Polish Parliament (Sejm) in 1998. Continuous reformation process forced the authors to update the document in year 2000. [4]
The Strategy contained targets regarding most important issuesandareas ofsustaining of the development process. National Strategy of Environmental Education proposesspecific tasksand programs for localcommunities which are devoted to promoteideas ofsustainability development by individualwhichcarries outeducational projects.

The basicobjectives of theNational Strategy for Environmental Education are as follow:

1. Spread out the sustainability idea within all areas of humanlife regarding work and free time, which means covering every inhabitant of Poland by on-goingecological education.

2. Implement ecological education and interdisciplinary learning program on each step of formal or informal education.
3. Create specificecological education program within a frame of National Strategy for Environmental Education that meet the needs of every level of local government.
4. Propagation of good experiences in a range of the methodologyof environmental education [4].

The objectives of environmental education are as follow:

1. Formation of awareness and driving interests of the public, into mutually related issues of economy, society, politics and ecology.
2. Improvement the quality of the environment by facilitating access to the knowledge.
3. Creating new patterns of behaviour, formation of the desirable attitude to the environment, promoting values of individuals as well as groups and societies regarding concern forthe environment [4].

To achieve mentioned goals it is required to:

1. Accept that ecological education is one of the basic conditions to realize National Strategy of Environmental Education.
2. Introduce elements of ecological education to each sphere of social life, regarding cultural, ethics and religious values.
3. Provide the information about environment condition to the society.
4. Accept that ecological education is the basic condition to change consumerism[4].

Existence of SD criteria in the accreditation systems of the university degrees

Education program at Universities level should undertake following measures to achieve the goal of sustainable development:

1. The environmental education of universities should give elementary knowledge on the field of natural, techno-economy and humanistic science and should rise the environmental awareness of students
2. The curriculum at universities should cover problems of didactics and methodology of teaching issues concerning environmental protection.
3. Academies should serve as a platform of organization post-diploma studies, courses for teachers, administration officers, journalists and others person interested in environmental issues.
4. Academies should be active in a field of publishing of items regarding environmental protection problems and development seen as social, economic and cultural issues.
5. Propagation of the environmental awareness should play important role among the duties of academy staff.
6. Academies should support and cooperate, with every institution influenced by theirs activity,aiming at rising environmental awareness [4].

Existence of specific subventions about education in SD

There are no data available.

1.C. University policies and experiences (Obligation and possibilities ofinclude SD competences or contents in Life Sciences Higher EducationStudies, organization, policies, specific departments, influence of theBolognaprocess).

Existence of specific university policies about SD

There are no specific university policies concerning sustainable development, but majority of universities offer subjects covering environmental issues. Every renowned university prepared specific study program devoted only to environmental protection. Usually this type of studies is managed by faculty or department of biology, soil science or agriculture.
Due to the Bologna Process, many universities co-operate each other providing many opportunities for students. Exchanging program (Erasmus or CEPUS) becoming more and more popular.Studies are offered in 2 levels, the 3-rd level of studies very often in not adjusted jet.They work together in order to enhanceand maintain the quality of education.

Existence of specific units or departments about SD

There are no specific units or departments dealing with SD, it is only a part of scientific interests of particular scientists.

Research policies related to SD (Specific programs, grants…). The following indicator must be included in the description:

Existence of specific programs about SD [7]

Title	Head	Institution	Scientific discipline
Sustainable development of metropolices in Poland	Jacek Rudewicz M. Sc., Eng.	University of Szczecin/Faculty of Earth Sciences	Geography and Oceanlogy
Impact of integration on sustainable development of selected farm villages	Franciszek Woch **PhD** Sc.	Higher School of Infrastructure and Management /Faculty of Spatial Planning and Infrastructure	Regional Policy, Social and Demographic Policy
Sustainable development of rural areas in Lower Silesia	Hanna Adamska PhD	Wrocław University of Environmental and Life Sciences/ The Faculty of Life Sciences and Technology	Regional Policy, Social and Demographic Policy
Monitoring indices of selected tools for management of sustainable development of tourism oriented areas	Małgorzata Borkowska-Niszczota **PhD**, **Eng**	Bialystok University of Technology Faculty of Management	Management Sciences
Infrastructure availability and sustainable development of a region	Anna Berenika Oleńczuk-Paszel **PhD**	*West Pomeranian University of Technology* *Faculty of Economics*	Regional Policy, Social and Demographic Policy
Socio-spatial sustainable development of communities located in area of influence of national parks	Konrad Jacek Podawca, **PhD**, **Eng**	Warsaw University of Life Sciences – SGGW/ Faculty of Civil and Environmental Engineering	Regional Policy, Social and Demographic Policy
Formation of sustainable living area structures in dense urban areas	Tomasz Andrzej Bradecki **PhD**, **Eng**	Silesian University of Technology Faculty of Architecture	Architecture and Design

2. SD University Studies in Poland:

2.A. Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…). The following indicator must be included in the description:

Existence of specific studies about SD - In the majority of the universities

There is no specific studies on SD at Polish universities, however majority of universities teach on certain elements of sustainable development, regardless of the type of university.Many of them offer Ecology and Management of Natural Resources or Environmental protection which is very much in tandem with sustainable development principles.

2.B. SD specific subjects in Life Sciences university studies (Not mentionedbefore, difference levels). The following indicator must be included inthe description:

Existence of specific subjects about SD in the degrees:

In majority, the degrees follow so called minimal standards for teaching. It is a document precisely describing the subjects which are obligatory in particularly curriculum of studies.

2.C. SD practical activities (practices in enterprises or in institutions, courseworks, etc).
The following indicator must be included in the description:

Existence of specific practical activities about SD in the degrees

In some degrees there are programs regarding practical activities, students are obliged to take practical training in relevant institution. For example students of agriculture at Warsaw Universities of Life Sciences does practical training on a farm and in administration unit.

2.D. How do you think education in LS contribute to SD in your country.

Education in a field of Life Sciences contribute to the Sustainable Development significantly however it is still needed to incorporate some more specific programs or subjects.

2.E. Barriers for the integration of the SD and problems in the teaching methods

Among barriers for integration SD issues in the teaching methods may be the lack of such requirements in the minimum teaching standard. Introducing such standards for teaching sustainable development subject instead of working on 3 or 4 independent subjects related to sustainable development would force rapid development of education projects about SD. The definition of SD define it as a complex of factors (economical, social and environmental). Usually subjects lectured at universities concern one of them. Students then have to put together the gained knowledge.

3. Relevant Institutions related to SD in Poland:

3.A. Research centres, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education,…)

Name of Institution	Description, influence on SD	Participation in SD education
Polish Academy of Science Institute of Soil Science and Plant Cultivation **The Research Institute of Pomology and Floriculture**	Each of 7 division can contribute to common SD program Institutestrongly affect PolishAgriculture Institute significantly affect the fruit and vegetable production	
Sendzimir Foundation Institute for Sustainable Development Ekoconnect- organic agriculture moving east	NGO carrying out courses entitled “Challenges of Sustainable Development in Poland” and active in publishing NGO focused on promotion of sustainable in rural areas German NGO organization that help promote organic agriculture very active in Poland	Does
National Fund for Environmental Protection and Water Management	State agency administrative funds for environmental protection activities.	

4. International cooperation in ESD (Education in SD) in Poland:

4.A. Policies (State and local governments, university...)

Sustainable Development Strategy for Poland up to 2025 and Poland 2030 Challenges of Development are usually indicated in this context. No other sources are available.

4.B. Experiences in ESD in Life Sciences (linked programs, participation offoreign professors or students, applicable exchange programs...)

In Poland there is no special cooperation in ESD in Life Sciences, but the cooperation in this field exists in the frame of Bologna Agreement and ERASMUS. Additionally, WULS is a member of EUROLEAGUE in Organic Farming and Organic Food Production Chain.

5. Good practices and relevant experiences in the Higher Education Institutions in Poland:

5.A.Activities to implement or promote the SD (conferences about SD,energy and water efficiency measures, environmental protectionmeasures, green transport, training programs in SD for academic staff,instruction materials of SD...)

Plenty of such initiatives exist, both in scientific and commercial areas. There is no central registration of such however. Nevertheless, it is possible to list some examples:

- Organic Marketing Forum organized by Ekoconnect.org – 6-7.05.2010, Warsaw
- Challenges of Sustainable Dvelopment in Poland, 07.2010 Mogilany, Cracow, *http://www.sendzimir.org.pl/program*
- Europower 2010 – International conference of Energy – 22-23.09.2010, Warsaw, *http://www.europower.com.pl/en,index.html*
- Renewable energy resources – perspective of development – 15.09.2010, Bielsko-Biała, *http://www.seo.org.pl/f_konferencje.php?id_sp=0&id_p=0&id_sc=145&id_c=0&m=t*
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6. Possible future actions in Poland:

Most probably there will be continuation of recent activities described in Polska 2030

6.A. How could be improved the education and research in SD in yourcountry?

The incorporation of Sustainable development subject as a complex of subjects realized as a project work or case study would be very beneficial to every student.That would help to raise awareness of SD and the possible action to undertake in everyday life by everyone.

6.B. How could be integrated the concept of SD in the Life Science Studies?

It could be integrated by distinguishing special subject called SD. It would help concentrate every participant of that educational project on the issues of SD as a holistic matter. At present the knowledge is divided into particles and that limit the possibilities of practical application.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN PORTUGAL

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1. Sustainable Development (SD) policies in Portugal:

1.A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…)

In Portugal the leading institution responsible for the Sustainable Development (SD) strategy process is the Ministry for Environment and Spatial Planning. The Portuguese Environment Agency (APA), which belongs to the Ministry for Environment and Spatial Planning, is responsible for proposing, developing and monitoring the implementation of environmental policies, particularly in the context of integrating the environment into sectorial policies, including health and transport and in tackling climate change, protection of the ozone layer, air quality, prevention and control of noise, waste recovery and use of soil and other contaminated sites, prevention and control integrated pollution, prevention of major industrial hazards, environmental safety and populations, eco-labelling, green purchasing and voluntary environmental management. To support the formulation, development and monitoring of environmental policies, APA is responsible for SNIAmb (National Information System Environment), founded on a set of strategic partnerships nationally and internationally. In this connection, APA provides, maintains and disseminates the reference centre for environmental data and promotes the integrated analysis of the results of monitoring the implementation of policies and measures, producing reports on the pressures and current state of the environment.

Representatives of local communities participate in the National Council for the Environment and Sustainable Development (NCESD). The establishment of the National Council of Sustainable Development by the States is a consequence of Principle 10 of the Rio Declaration, which points out that "Environmental issues are best handled with participation of all concerned citizens, at the relevant level.” and pursuant to chapter 8.7 of Agenda 21, paragraph 24 of the Programme For Further Implementation of Agenda 21 (Rio+5) establishes that “Sustainable development strategies are important mechanisms for enhancing and linking national capacity so as to bring together priorities in social, economic and environmental policies and all sectors of society should be involved in their development and implementation”. The National Council of the Environment and Sustainable Development / CNADS was set up by decree law n. 221/97 of August 20th. It was later reinforced and its members

increased by decree law n. 134/2004 of June 3rd. CNADS is an independent body that aims at advising Government members responsible for the environment and the sustainable development, public entities and NGOs on all matters associated with the environment and sustainable development. It is also a forum for the design and implementation of environmental and sustainable development policies. The CNADS' tasks are: environmental policy; strategic plans and programmes for environmental and sustainable development policies; public participation for decision-making; international agreements (ratification and internal regulatory process); follow-up of international and EU policies; follow-up of the co-operation policy, mainly with Portuguese-speaking countries community (CPLP); follow-up the implementation of the framework law on environment; to give advice on the National Plan for the Environment and the National Strategy for Nature Conservation.

In Portugal the National Sustainable Development Strategy (ENDS 2015) and the Implementation Plan (PIENDS) were approved by Cabinet Resolution n.º 109/2007, of August 20th. This resolution also established a working group of operational coordination for the implementation of the strategy, led by Prof. António Gonçalves Henriques, who was responsible for the progress reports under the supervision of the National Coordinator of the Lisbon Strategy (CNEL) and the Technological Plan (CNEL-PT).

The ENDS 2015 is a transversal policy and was designed as an integration architecture and projection towards 2015 of the various instruments of strategic planning of the Government, particularly the National Reform Programme - PNAC, the National Action Programme on Employment and Growth 2005-2008 - PNACE, the Technological Plan (PT), the National Programme of Land Planning Policy - PNPOT and sectoral strategies and measures that integrate them.

The PIENDS was built as a dynamic referential framework of the definition and regulation of the National Strategic Reference Framework – NSRF (QREN 2007-2013), the main source of funding for its implementation.

The operational structuring of the NSRF is systematised through the creation of Thematic Operational Programmes and Regional Operational Programmes for the regions in continental Portugal and for the two Autonomous Regions.

The Thematic Operational Programmes are the following (as approved by the European Commission): Competitive Factors Thematic Operational Programme (ERDF); Human Potential Thematic Operational Programme (ESF); Territorial Enhancement Thematic Operational Programme (ERDF and Cohesion Fund).

The Continental Regional Operational Programmes, structured territorially in accordance with NUTS II and co-financed by ERDF, are the following (as approved by the European Commission): Regional Operational Programme North; Regional Operational Programme Centre; Regional Operational Programme Lisbon; Regional Operational Programme Alentejo; Regional Operational Programme Algarve.

The Autonomous Regions (A.R.) Operational Programmes, supported financially by the ERDF and ESF, are the following (as approved by the European Commission): PROCONVERGENCIA – Azores Operational Programme for Convergence; PRO-EMPREGO – ESF Operational Programme for the Azores A.R.; INTERVIR+ – Operational Programme for the Enhancement of the Economic Potential and Territorial Cohesion of the Madeira A.R.; RUMOS – Operational Programme for the Enhancement of the Human Potential and Social Cohesion of the Madeira A.R.

Two Technical Assistance Operational Programmes for the NSRF have also been established, with Community financing provided by the ERDF and ESF (as approved by the European Commission): Technical Assistance Operational Programme – ERDF and Technical Assistance Operational Programme – ESF.

Other instruments supporting the SD were also launched, namely: National Programme for Climate Changes – PNAC 2006, last amendments in 2007; National Programme for the Efficient Water Use – PNUEA; National Water Plan – PNA; National Forestry Strategy – ENF; National Plan for Forest Fire Protection – PNDFCI; Sector Plan for the Natura Network – PSRN; National Strategy for Nature and Biodiversity Conservation – ENCNB; Strategic Plan for Municipal Solid Waste – PERSU II; Strategy for AgroIndustrial and Livestock Effluents – ENEAPAI; Strategic Plan for Managing Agricultural Waste – PERAGRI; National Energy Strategy – ENE 2020.

To reduce the negative effects or to promote positive behaviors related to sustainable development legislation related to actions above has been published both at national and regional levels. Several programmes have been available to fund SD activities or at least related to them.

Therefore, the values of the indicators “1.A” of the guidelines for Portugal are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

1.B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…)

There are neither specific educational national institutions about SD nor specific educational national policies, legislation and specific subventions about SD in Portugal. As for the existence of SD criteria in the accreditation systems of the university degrees we think the concept is indirectly included; however, no specific criteria about SD can be found in the criteria established for accreditation process conducted by the Portuguese Agency for Assessment and Accreditation of Higher Education (A3ES).

Therefore, the values of the indicators “1.B” of the guidelines for Portugal are:

- ✓ No existence of specific educational national institutions about SD
- ✓ No existence of specific educational regional (not national) policies about SD
- ✓ No existence of specific educational regional (not national) legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ No existence of specific subventions about education in SD

1.C. University policies and experiences (Obligation and possibilities of include SD competencies or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process)

Gago and Heitor (2007) pointed out that Portugal has reformed its higher education system in 2007, as part of the government' overall strategy of pursuing education, scientific and technological development. First, the implementation of the Bologna Process was adopted as a driver for reform, namely by: i) adopting the model of organization of higher education in three cycles, together with the European Credit Transfer and Accumulation System (ECTS); ii) introducing rules allowing for a broader access of citizens to life long learning opportunities after secondary school, including the supply of short cycles, with emphasis on polytechnic institutions. Accordingly, for the 2007-2008 academic year, around 87% of initial education programmes in Portugal were already organised in line with the Bologna framework for degrees and diplomas. Second, in order to broaden the access of higher education, structural measures were adopted by government to increase adult intake in higher education. As a result, around 10,850 new students entered higher education in 2006-07, as compared with only 900 adults entering higher education in 2005-06. Third, the legal reform of the Portuguese higher education system included the following actions in 2007:

- The new legal framework for higher education institutions approved on 10 September 2007, which establishes, *inter alia*, the organisational principles of the higher education system, the autonomy and accountability of institutions, setting up governing Boards with external participation, diversity of organisation and legal status of public institutions (namely as public foundations), establishment of consortia, recognition of research centres as part of University management framework,
- The new legal framework for the evaluation of higher education and the creation of the Higher Education Evaluation and Accreditation Agency in August 2007, both aiming at the ensuring the quality of higher education through the evaluation and accreditation of higher education institutions and their study programmes, along the best international practices in which independent external evaluation is mandatory,
- The creation of conditions to foster the national and international mobility of students and graduates, namely: i) the new "Regulations on Arrangements for Changes of Study Programmes, Transfers and Return to Higher Education", which seek to facilitate the entry of higher education students into Portugal to continue their studies, with rapid and objective recognition of their previous school education and occupational training, and to create simplified arrangements for return to higher education; and ii) the new legal framework for the recognition

of foreign higher degrees, which simplifies the system for recognising foreign degrees in Portugal,

- The introduction in September 2007 of a system of student loans with mutual guarantee underwritten by the State, which complements the system of public grants, thereby improving access to higher education for all students.

In the majority of the Portuguese Higher Education Institutions (Universities and Polytechnics) there are units or departments developing activities related to SD. The Technical University of Lisbon – TULisbon has seven schools (Faculty of Veterinary Medicine - FMV, School of Agriculture – ISA, School of Economics and Management – ISEG, School of Engineering – IST, School of Social and Political Sciences – ISCSP, Faculty of Human Kinetics – FMH and Faculty of Architecture – FA). Most of the TULisbon's schools offer courses about SD and in some cases degrees more directly related to SD, such as:

- PhD program in Climate Change and Sustainable Development Policies coordinated by University of Lisbon, in association with the Technical University of Lisbon and the New University of Lisbon, has the support of the University of East Anglia, United Kingdom, and is offered in an interdisciplinary area centred on the domains of the Environment and the Social Sciences, having strong links with areas such as Economics, Law, Politics and Ethics,

- PhD program in River Restoration and Management is a joint institutional partnership that aims to gather a well reputed teaching corps with high skills in the subjects to be taught, supported by a stronghold of theoretical knowledge and application experiences. Three institutions from the Technical University of Lisbon (IST, ISA and FA) and two foreign institutions, the University of California, Berkeley USA and the University Politechnics of Madrid, Spain, agreed to join their efforts to put together this Doctoral Course,

- PhD program in Sustainable Energy Systems (IST and ISEG) aims to promote a new generation of sustainability-aware leaders in energy systems and economics, and to generate and communicate new knowledge in energy systems core areas. Its focus is on combining a multidisciplinary effort, including engineering and economic domains, focused on energy systems analysis and design in the context of sustainable development. This program is offered as part of the MIT-Portugal initiative,

- Master on Tropical Agriculture and Sustainable Development (ISA) aims to promote and support the sustainable development in tropical regions, with emphasis on policy and food security, cooperation, development, international relations and trade with less developed countries, taking into consideration health, sustainability and quality of life.

An essential complement of TULisbon's mission is research and technical development (R&DT) and the university has several research units and groups. Currently, TULisbon is involved in various international projects funded by the European Union and other

entities as well as enterprises. Additionally, investment in R&DT enhances partnership with business and industry, adds value to knowledge and technology, thus providing a better Education. The TULisbon's Research Units and Laboratories are mainly funded by Fundação para a Ciência e a Tecnologia (Foundation for Science and Technology - FCT).

The TULisbon has seven Associate Laboratories in different Schools: Institute for Biotechnology and Bioengineering; Centre for Innovation, Technology and Policy Research; Institute for Computer and Systems Engineering: Research and Development in Lisbon; Plasma and Nuclear Fusion Institute; Institute for Systems and Robotics-Lisbon; Telecommunications Institute; Associated Laboratory for Energy, Transports and Aeronautics.

The Associate Laboratories are research institutions of recognised excellence according to external assessments following international quality criteria. The ability to contribute consistently, effectively and efficiently to achieving specific objectives of national science and technology policy is crucial to the mission of these laboratories. Based on their activities and proposed objectives, they receive funding from the Portuguese state, through the Foundation for Science and Technology (FCT).

Furthermore, the TULisbon is involved in five Centres of Excellence, also known as Competence Networks: XHMS (Centre of Excellence for Healthcare and Medical Solutions); CEMICRO (Micromanufacturing Competence Network); TECMODA(Centre of Excellence for Fashion); CEAFA (Centre of Excellence for Agriculture, Food and Forestry); and TELESAL (Competence Network for Telecommunications and Information Technology in Aveiro). The principal aim of Centres of Excellence is to create partnerships for innovation and knowledge that will work together for the economic and social development of a particular economic sector. They can be made up of companies, universities, research institutes, polytechnics, technology centres, public bodies and business associations.

The Centres of Excellence are funded by the Knowledge Operational Programme through the Portuguese Innovation Agency (AdI), which in 2006 approved nine Competence Networks, in Bioenergy, Health Care and Medicine, Digital Transactions, Fashion, Micromachinery for Moulding, Mobility, Polymers, Agroforestry and Environment, and Telecommunications and Information Technology in Aveiro.

Therefore, the values of the indicators "1.C" of the guidelines for Portugal are:

- ✓ No existence of specific university policies about SD: In the majority of the universities
- ✓ Existence of specific units or departments about SD: In some universities

1.D. Research policies related to SD (Specific programs, grants…)

Research policies are based on the ENDS 2015 and PIENDS and deal in an integrated

way with economic, environmental and social issues and where research and development (R&D) plays an important and multifaceted role. The main Portuguese Funding Agency of Research is the Foundation for Science and Technology (FCT). This funding agency is the central body of the Ministry of Science, Technology and Higher Education, and has the responsibilities in the promotion, follow-up and evaluation of Institutes, science and technology projects and programs and also, in the advanced training and qualification of human resources in the areas under this Ministry. Agência de Inovação, S.A. (AdI) is the Portuguese Innovation Agency with a main goal of promoting innovation and technological development, through the strengthening of relations between the research world and the Portuguese enterprises. This Agency has the capital divided in equal shares by the Ministry of Science, Technology and Higher Education and by the Ministry of Economy and Innovation.

As for specific programs about SD, FCT is a member of URBAN-NET (2006-2010), an ERA-NET project where 15 European research agencies from 12 countries and UN-HABITAT seek best practice as a basis for cooperation in order to strengthen European research and to support the structuring of the European Research Area (ERA). This particular project aims at setting up efficient trans-national cooperation in the field of Urban Sustainability research funding. Also contributing to the EU Strategy, URBAN-NET will allow the funding agencies to collate existing activities, compare future strategies and recommendations of consultive bodies and systematically explore opportunities for future collaboration. One of the main objectives is the implementation of common strategies for funding transnational research projects in relevant topics in the area of Urban Sustainability. Last call was entitled **Sustainable Urban Development**, to fund transnational research projects and closed on January 15th 2010.

Therefore, the value of the indicator "1.D" of the guidelines for Portugal is:

- ✓ Existence of specific programs about SD

2.- SD University Studies in Portugal:

2.A. Specific university studies in Life Sciences

Higher education in Portugal is divided into *two subsystems*: university and non-university higher education (polytechnical education) and it is provided in public and private universities and non-university higher education institutions (both public and private). Courses leading to the *Licenciado* (Bachelor) degree usually take 3 years (6 semesters), but may last for 4 years (8 semesters) depending on the field of studies, and correspond to 180 or 240 ECTS credits, respectively. Courses leading to the *Mestre* (Master) degree have the duration of 2 years (4 semesters), matching 120 ECTS credits. Depending on the nature of the course, the master degree could be organised as Integrated Master, taking 5 or 6 years (e.g., Medicine) and corresponding to 300 or 360 ECTS credits, respectively. The doctor (Ph.D) degree in the field of Life Sciences is only awarded by a university institution after at least 3 to 5 years of study (180-300 ECTS

credits). The doctoral programs include the attendance of lectures and the elaboration and defence of an original thesis (doctoral thesis).

Due to the high number of courses/Institutions in Portugal, the present review only reports the Public University Studies, in a total of 15, distributed by Portugal Mainland and Azores and Madeira Islands (Figure 1).

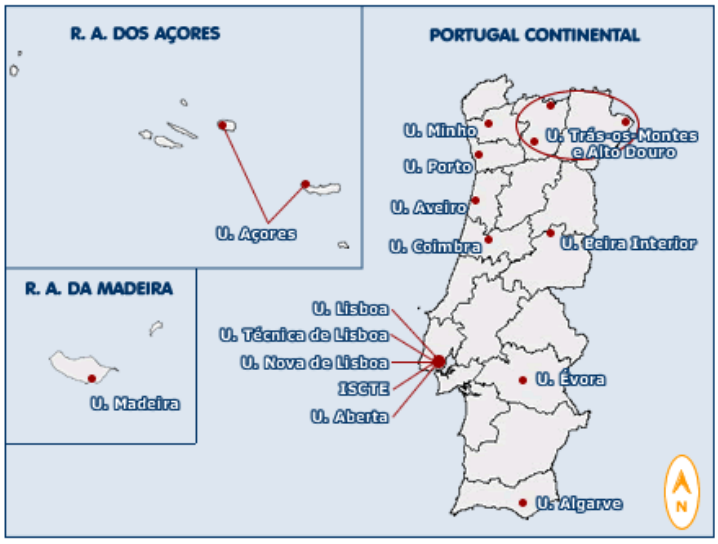

Figure 1. Geographical distribution of Public Universities in Portugal.

The number of specific university studies in Life Sciences is very high and for this reason in the present work only the studies that have been available last years and can be found at the Public University's websites are listed (annex 1). However, the number of specific studies about SD is low. In table 1 are shown some studies about/more related to SD taught in the public Portuguese Universities as well as one taught in a private University. Some advanced and post-graduation studies have been available last years (table 2).

Therefore, the value of the indicator "2.A" of the guidelines for Portugal is:

- ✓ Existence of specific studies about SD: In some universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Climate Change and Sustainable Development Policies	University of Lisbon (UL)+ +New University of Lisbon (UNL)+ +TULisbon	3rd	6	180
Energy and Environment / Energy and Sustainable Development	UL/Faculty of Sciences (FC)	3rd	6	180
Energy for Sustainability	University of Coimbra (UC)/Faculty of Sciences and Technology (FCT)+ UC/Faculty of Economics (FE)	2nd	3	90
Environmental Sciences - Management and Environmental Sustainability	Universidade Aberta (UAb) (e-learning)	1st (Minor)	2	60
Environmental Citizenship and Participation	Universidade Aberta (UAb) (e-learning)	2nd	4	100
Geological Resources and Sustainable Development	University of Trás-os-Montes e Alto Douro (UTAD)	2nd	4	120
Social Sustainability and Development	Universidade Aberta (UAb) (e-learning)	3rd	6	180
Sustainable Energy Systems (MIT Portugal)	University of Aveiro (UA)	2nd	4	120
	UC/FCT+UC/FE+ +University of Porto (U.Porto)/Faculty of Engineering(FEUP)+ +UL/FC+ +TULisbon/School of Engineering (IST)+TULisbon/ School of Economics and Management (ISEG)	3rd	7/8	228
Sustainable Management of Rural Spaces	University of Algarve (UAlg)/Faculty of Sciences and Technology (FCT)	2nd	3	90
Tropical Agriculture and Sustainable Development	TULisbon/School of Agriculture (ISA)	2nd	4	120

Table 1. Studies about Sustainable Development taught in Portugal

University	Title	Duration	ECTS	Remarks
New University of Lisbon (UNL)/Faculty of Sciences and Technology(FCT)	Advanced Studies in Territory, Environment and Sustainable	1 year	60	

	Development			
University of Algarve (UAlg)/ Higher Institute of Engineering	Post-graduation in Planning and Sustainable Building	1 year	60	Master Degree will start in the 2011/12 academic year
Portuguese Catholic University (UCP)/ School of Biotechnolgy	Post-graduation in Education – Action for Sustainable Development	1 year	45	Private University
	Post-graduation in Local Agenda 21 and Sustainability	1 year	50	

Table 2. Some advanced and post-graduation studies about Sustainable Development taught in Portugal

2.B. SD specific subjects in Life Sciences university studies

In the plan studies of Portuguese Life Sciences Higher Education Institutions (Universities and Polytechnics) there are a lot of ecological and environmental subjects with teaching units related to the SD. Some examples can be found in the different degrees listed in the annex 1. For example, at ISA the following subjects are related to the SD:

1rd Cycle: Animal Resources; Biodiversity and Conservation; Ecology; Ecosystems Monitoring; Environment and Energy; Environment, Resources and Society; Environmental Policy; Environmental Pollution; Food Quality and Safety; Forest Management and Certification; Forest Protection; Landscape Planning - Natural Subsystem; Landscape Recuperation and Environmental Impacts Studies; Plant Nutrition, Plant Protection; Soil Fertility and Fertilization; Soils and Plant Nutrition; Terrestrial and Aquatic Environments; Urban Environment Monitoring; Wastewater and Waste Management; Water Resources; Water, Wastewater and Waste Treatment.

2nd Cycle and 3rd Cycle: Agricultural Buildings and Environmental Control; Agronomic and Energetic Valorisation of Wastes; Applied Ecology and Nature Conservation; Biofuels; Conservation of Soil Resources; Cooperation and Development; Crop Protection; Ecological Impacts and Sustainability; Ecology and Management of Animal Populations; Ecology of Crop Systems; Economy of Natural Resources Management; Ecoturism and Valorization of Natural Resources; Energy Crops; Energy Systems; Environmental Impact Assessment; Fertilizers and Fertilizing

Techniques; Fire Ecology and Management; Fisheries and Game Management; Forest Pests and Diseases; Forest Policy and Land Management; Integrated Pest Management; Management and Conservation of Coastal and Marine Ecosystems; Management and Conservation of Freshwater Ecosystems; Management and Conservation of Terrestrial Fauna; Management and Conservation of Vegetation and Agroforestry Systems; Natural Resources Management; New Processes and Environmental Management; Organic Agriculture and Horticulture; Pesticides and Environment; Quality and Safety Evaluation; Remediation; Renewable Energies; Rural Development; Security and Food Policy; Soil Formation and Management; Solid Waste Treatment Technologies; Waste Usage; Water and Wastewater Technology; Water Conservation; Water Engineering in Rural Areas; Wildlife Management.

Therefore, the value of the indicator "2.B" of the guidelines for Portugal is:

✓ Existence of specific subjects about SD in the degrees: In the majority of the degrees

2.C. SD practical activities

In the majority of the degrees students have to do a practical activity. For students of 1st cycle usually it is an internship in an institution or enterprise. For students of 2nd and 3rd cycles the practical activity is related to their thesis and usually is carried out in research centres and universities. But, only in some degrees that practical activity is about SD.

Therefore, the value of the indicator "2.C" of the guidelines for Portugal is:

✓ Existence of specific practical activities about SD in the degrees: In the majority of the degrees

2.D. Contribution of education in LS to SD

Life sciences are among the most promising frontier technologies for the coming decades, offering opportunities to address many of the world's needs, like health, ageing, food, environment and sustainable development.

The life sciences and particularly the biotechnology are important sources of new applications in the areas of health care, agriculture, food production and environmental protection. In the context of the revised Lisbon strategy, the life sciences and biotechnology sector should have a role to play to reinforce the country's (and Europe) position on the world. Also, the life sciences should become a leading area of science, industry and employment, thus increasing prosperity and contributing to the modernisation of industry. To accomplish these objectives, the research and development, education and training are essential to built and translate knowledge into scientific and technological applications, thus contributing to increase the competitiveness of the country in areas such as industry, the economy, the environment and healthcare. To contribute to sustainable development, education in Life Sciences should be multidisciplinary and should involve all sectors of society in a

lifelong learning process where environmental, economic and social dimensions are addressed and interlinked

2.E. Barriers for the integration of SD and problems in the teaching methods

In Portugal, almost all Higher Education Institutions (HEI) of Agriculture, Forestry or Environmental Sciences are pursuing efforts to include directly or indirectly sustainability in their programs. The increase of public awareness about environmental problems such as water scarcity, climate changes, high carbon dioxide emissions, natural disasters, loss of biodiversity, food crises, health risks, social vulnerability and insecurity are driving to these achievements. However, a deep cooperation between the HEI and their stakeholders (state institutions, municipalities, private sector, industries, civil society, and NGOs) is needed to promote more deeply the sustainability in the teaching and training practice.

3.- Relevant Institutions related to SD in Portugal:

Governmental Institutions: *Ministério do Ambiente e do Ordenamento do Território*, *Ministério da Agricultura, Desenvolvimento Rural e Pescas*, *Instituto Nacional dos Recursos Biológicos*, *Ministério da Ciência, Tecnologia e Ensino Superior*, *Fundação para a Ciência e Tecnologia – FCT*.

Research Centres: *Centro de Ambiente e Tecnologia Marítimos, Centro de Biologia Ambiental, Centro de Botânica Aplicada à Agricultura, Centro de Ciência Animal e Veterinária, Centro de Ecologia Aplicada Prof. Baeta Neves, Centro de Ecologia Funcional, Centro de Economia Agrária e Sociologia Rural, Centro de Estudos de Ciência Animal, Centro de Estudos em Engenharia de Biossistemas, Centro de Estudos de Recursos Naturais, Ambiente e Sociedade, Centro de Estudos Florestais, Centro de Estudos da Macaronésia, Centro de Estudos de Ecossistemas Mediterrânicos, Centro de Estudos de Energia Eólica e Escoamentos Atmosféricos, Centro de Estudos de Hidrossistemas, Centro de Estudos em Gestão de Ecossistemas, Centro de Estudos em Inovação e Dinâmicas Empresariais e Territoriais, Centro de Estudos em Inovação, Tecnologia e Políticas de Desenvolvimento, Centro de Estudos Jurídicos, Económicos e Ambientais, Centro de Investigação em Ambiente e Sustentabilidade, Centro de Investigação de Montanha, Centro de Investigação e de Tecnologias Agro-ambientais e Biológicas, Centro de Investigação e Tecnologia Agrária dos Açores, Centro de Investigação Interdisciplinar em Sanidade Animal, Centro de Investigação Marinha e Ambiental, Centro Interdisciplinar de Coimbra, Centro de Investigação Universidade Atlântica, Centro de Modelação e Análise de Sistemas Ambientais, Centro de Oceanografia, Centro de Pedologia, IICT - Tropical Research Institute, Instituto de Ciências Agrárias Mediterrâneas, Unidade de Investigação em Eco-Etologia, Unidade de Investigação Química Ambiental.*

Associate Laboratories: *Centro de Biotecnologia e Química Fina, Centro de Estudos do Ambiente e do Mar, Centro de Estudos Sociais, Centro Interdisciplinar de Investigação Marinha e Ambiental, Instituto D. Luís, Instituto de Biotecnologia e Bioengenharia,*

Instituto de Ciências Sociais, Instituto de Sistemas e Robótica - Lisboa, Instituto de Tecnologia Química e Biológica, Laboratório Associado de Química Verde – Tecnologias e Processos Limpos.

Non-Governmental Organizations: *Associação Bandeira Azul da Europa* (Blue Flag Association of Europe, *Associação Portuguesa para a Educação Ambiental*, CENTROP (Centre for Tropical Studies and Development), *Grupo de Acção e Intervenção Ambiental* (Portuguese Association for Environmental Education), *Grupo de Estudos de Ordenamento do Território e Ambiente* (GEOTA), QUERCUS, S*ociedade Portuguesa da Vida Selvagem, Sociedade Portuguesa de Ecologia, Liga para a Protecção da Natureza* (League for the Protection of Nature).

On the national scene, the activities related to the implementation of the Decade (United Nations Decade of Education for Sustainable Development, DESD) have been streamlined especially for the National Commission for UNESCO (CNU), the scientific community and non-governmental organizations (NGOs) such as the Blue Flag Association of Europe (ABAE), the Portuguese Association for Environmental Education (ASPE), the League for the Protection of Nature (LPN) and Almargem. To them is due to creation of spaces for the dissemination, discussion and, somehow, monitoring of implementation of the DESD. The ABAE, for example, made a full adherence to the principles of ESD Examples of Eco-Schools Program, combining its main purpose of setting the principles of Agenda 21 with the objectives of DESD.

Enterprises

The Business Council for Sustainable Development (BCSD Portugal) is a non-profit association, established in October 2001 on the initiative of Sonae, and Cimpor Soporcel, members associated of WBCSD (World Business Council for Sustainable Development), together with over 33 companies first line of the national economy, with a mission to implement a national guiding principle of the WBCSD. The main mission of the BCSD Portugal is doing that business leadership as a catalyst for change toward sustainable development and promotes business in eco-efficiency, innovation and social responsibility. BCSD Portugal is, since its establishment, a member of the WBCSD regional network and currently has 134 members.

Its main objectives are*:*

- To disseminate the principles that characterizes Sustainable Development,
- To coordinate the cooperation between the business community, governments and civil society to promote Sustainable Development,
- Promoting education and training to disseminate the principles of sustainable development,
- To implement projects and case studies that illustrates and stimulates sustainable development. Join or promoting other initiatives that contribute to the Sustainable Development of the Portuguese business.

Some activities of BCSD Portugal are: Launching of several projects (Young Managers Team Portugal, Industrial Symbioses, SD in the Building Sector, SD in Information & Communications Technology, SD in the Finance Sector); Annual Public Conference;

BCSD Portugal LD Meeting; Workshops on CSR, Eco-efficiency, Energy Efficiency, Reporting, Innovation, Stakeholders Engagement; CEO Meeting; Translation and publication of several WBCSD brochures into Portuguese.

Examples of Regional Centres of Expertise (RCE) on Education for Sustainable Development

- CRE_PORTO integrates the International network of Regional Centres of Excellence (CRE), consisting of 61 centres that are spread over all continents and which aim to achieve the main objectives of the UN Decade of Education for Sustainable Development (2005-2014). Environmental education is thus a form of comprehensive education of citizens through a process that seeks to instil in students a critical awareness of environmental issues. Projects developed by the Environmental Education Association of Enterprise and Maia and Porto Metropolitan Area: Schools Program, Families Program, Senior Program, Projects of Other Entities.
- RCE AÇORES, Regional Centre of Expertise in Education for Sustainable Development.
- CREIAS-Oeste – Regional, Centre of Innovation and Education Associated with Sustainability of the West Region.

4.- International cooperation in ESD (Education in SD) in Portugal:

One of the state and governments policies is the internationalization of universities through the development of international networks and partnerships grouping science and technology schools worldwide. In this way Portuguese Universities are actively involved in international scientific and educational cooperation both through agreements with specific universities and research institutes, and in the framework of associations, networks and programmes for universities. In general, they aim at promoting mutual participation in research projects, co-tutorship of doctoral programmes and mobility of teaching staff and students (undergraduate and postgraduate levels).

ERASMUS (*Lifelong Learning Programme-LLP*) is the most common mobility programme in all Portuguese universities and students may study in European universities during 1 semester or one year.

Another mobility programmes are: TIME (Top Industrial Managers in Europe), Double Degrees, Erasmus Mundus (Master and PhD), Tempus, ALFA (Latin America - Academic Training), ALBAN, Atlantis, EU-Canada, EU-USA, EU-INDIA, EU-JAPAN; EU-AUSTRALIA, ASIA-Link, Fulbright, PIMA, SMILE (Latin American countries), Santander grants (Brazil) etc. Students may study abroad during two years.
PhD programmes with MIT, CMU, UT-Austin and EPFL were also available in some Portuguese universities.

Students can also take advantage of short duration courses such as ATHENS, Intensive Programmes (ex. PIG - Sustainable Pig Production in Europe).
Some programmes like IAESTE and VULCANUS, focused on traineeships in companies or research units, have been available for students as well.

Some Universities participate in Leonardo da Vinci (LLP for training and vocational education)

In Portugal the development of cooperation is also based on the historical, cultural and linguistic links established with former colonies. EDULINK is an ACP-EU higher education cooperation programme. It finances cooperation projects between higher education institutions from ACP (Africa, Caribbean and Pacific) countries and European Union Member States that have signed the 9th European Development Fund.

ISA has tradition in the development of cooperation with Portugal's former colonies. CENTROP (Centre for Tropical Studies and Development), located at ISA, aims at promoting and supporting SD in tropical regions by participating in projects, carrying out several scientific researches on agriculture and rural development, disseminating and promoting training activities related to SD.

Another important Portuguese institution is the Tropical Research Institute (IICT) which aims to promote tropical knowledge by pursuing interdisciplinary research of relevance to countries in tropical regions. It has a special mandate towards the Community of Portuguese Speaking Countries (CPLP), whose members are Brazil, East Timor, five African nations and Portugal. Established in 1883 as the Commission of Cartography, IICT is the oldest autonomous government agency that conducts research for development in human and natural sciences. In 1983 IICT became a state laboratory under the supervision of the Minister for Science, Technology and Higher Education. Through the output of over 100 researchers, it seeks to increase the scientific and technical capacity of developing countries and also to ensure the preservation of its documental collections. The strategic objectives underlying the work program are 1) helping promote the Millennium Development Goals with special emphasis on CPLP countries; and, 2) facilitating access of CPLP countries to its vast historic and scientific heritage, as recommended by the CPLP Ministers of Science and Technology in 2003.

5.- Good practices and relevant experiences in the Higher Education Institutions in Portugal:

In Portugal all Universities are carrying out R&D projects aiming direct or indirectly the SD. Some examples can be found at the websites of Universities and Research Centres as well as FCT, AdI, etc. already listed above. The Research Centres have been a reference as technological agents in the evaluation and management of the environment - natural resources and their interaction with the agricultural activities, meeting the demands of the civil services, the society and eco-companies looking for a sustainable and competitive development. Conferences, congresses, seminars, etc. have been a good practice to promote the SD as well, and they have been organised by Universities, Research Centres, etc.

The technological innovation and, the technology and knowledge transference are important actions for SD too. TULisbon, through the Technology and Knowledge

Transfer Office (OTIC, http://www.otic.reitoria.utl.pt/), supports the protection of know-how developed by the Technical University of Lisbon (TULisbon), and participates in its transfer to society, stimulating innovation and competitiveness and identifying technological contents that can be transferred to the corporate world. OTIC, created in 2006, is TULisbon's institutional tool to support and reinforce partnerships between researchers, enterprises, and institutions. OTIC's activities are guided by respect for property rights, confidentiality and transparency and is a technology and knowledge platform for synergies between TULisbon Schools and other development structures, as INOVISA and IST's Technology Transfer Office. These structures, known as "company incubator", promote the technological innovation and support the development of business plans and analyses of company feasibility from the results obtained in the research.

INOVISA (Association for Innovation and Enterprise Development), located at ISA (School of Agriculture, TULisbon), is a private non-profit institution, looking to promote direct partnership between the University and enterprises in the agro-forestry, food, environmental and landscape areas. The mission of INOVISA is to contribute to the transformation of the entrepreneurial tissue in the areas where it is active, aiming at promoting a culture of innovation and entrepreneurship through the following activities: technology transfer support of the university to the enterprises; technology based enterprises incubation support (incubation services for the development of technology based enterprises); R&D joint venture projects developing a partnership with the companies; participation in R&D projects and advanced training in areas related with the intellectual property protection, technology transfer and entrepreneurship. In this context, INOVISA acts on three complementary levels of activities: Entrepreneurship and Enterprise Development; Innovation and Technology Transfer; R&D and Training.

IST's Technology Transfer Office, located at IST (School of Engineering, TULisbon), supports the Executive Board of the School in its links to Society, namely through the economic exploration of IST's knowledge base. Specifically, the Technology Transfer Office manages IST's intellectual property and is the point of contact for entrepreneurship and corporate relations.

Despite all these activities that have been developed, the activities in the frame of *Agenda 21 Local* have being a driving force for the implementation and promotion of SD in our country as well, especially at local and regional levels. The School of Biotechnology (Portuguese Catholic University, a private University) is one of the Portuguese Universities that has been actively involved in the promotion, dissemination and implementation of *Agenda 21 Local* and consequently in the SD in Portugal.

6.- Possible future actions in Portugal:

Sustainable development is a complex and wide concept, concerning an assortment of social, techno-economic and environmental issues. A multidisciplinary approach is

needed to address all these issues. Without this approach, teaching of sustainable development for Life Science students will not be complete.

Despite the actions, programs, projects, etc. that have been done in the field of SD in Portugal the available information is difficult to gather. Experiences in this field from other EU universities and results from ISLE will be very useful to improve the education and research in SD in Portugal as well as the integration of SD concept in the Life Science Studies.

7.- References

Gago, J.M. and Heitor, M. (2007). A Commitment to Science for the Future of Portugal. In: *The Future of Science and Technology in Europe*. pp. 403-416. (http://www.mctes.pt/archive/doc/Future_of_Science_livro_.pdf)

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Advanced Optometry	UMinho/EC	2nd	4	120
Agricultural Enginnering	UÉvora/ECT	2nd	4	120
Agricultural Sciences	U.Porto/FCUP;	3rd	6	180
	UAlg/FCT; UÉvora/ECT	3rd	8	240
Agriculture	TULisbon/ISA; UAç; UAlg/FCT; UTAD	1st	6	180
	TULisbon/ISA, UAç, UTAD	2nd	4	120
	UTULisbon/ISA	3rd	6	180
Agriculture and Forest Sciences	UTAD	3rd	6	180
Agriculture Engineering	U.Porto/FCUP	2nd	4	120
Agronomy	UÉvora/ECT	1st	6	180
Analytical, Clinical and Forensic Toxicology	U.Porto/FFUP	2nd	4	120
Animal Production Engineering	TULisbon/ISA+TULisbon/FMV; UTAD	1st	6	180
		2nd	4	120
		3rd	6	180
	UAç	2nd	4	120
Animal Science	UÉvora/ECT	2nd	4	120
	U.Porto/ICBAS	3rd	8	240
	UTAD	3rd	6	180
Animal Science and Technology	UÉvora/ECT	1st	6	180
Applied Biology	UMinho/EC	1st	6	180
	UA	2nd	4	120
Applied Ecology	UTAD	1st	6	180
Applied Microbiology	UL/FC	2nd	4/3	120/90
Aquaculture and Fisheries	UAlg/FCT	2nd	4	120
Aquatic Sciences	U.Porto/ICBAS	1st	6	180
Areas of Basic and Applied Biology	U.Porto/ICBAS+ U.Porto/FCUP+ U.Porto/FMUP	3rd	8	240
Bioanalytical Sciences	UC/FF	1st	6	180
Biochemistry	UA; Ualg/FCT; UBI; UC/FCT, UÉvora/ECT; UL/FC; UMa, UMinho/EC; UNL/FCT; U.Porto/FCUP; UTAD	1st	6	180
	UA; UBI; UC/FCT; UÉvora/ECT; UL/FC; UMa; U.Porto/FCUP+ICBAS	2nd	4	120
	UBI; UC/FCT; UÉvora/ECT; UL/FC	3rd	6	180
	UNL/FCT	3rd	8	240
Biochemistry and Food Chemistry	UA	2nd	4	120
Biodiversity and Conservation	UMa	2nd	4	120
Biodiversity and Insular Ecology	UAç	2nd	4	120
Biodiversity and Marine Conservation (Erasmus Mundus)	UAlg/FCT	2nd	4	120
Biodiversity and Plant Biotechnology	UAç; UC/FCT	2nd	4	120
Biodiversity, Genetics and Evolution	U.Porto/FCUP	2nd	4	120
	UL/FC+U.Porto/FCUP	3rd	8	240

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Study Title	University	Cycle	Duration (semesters)	ECTS
Bioenergy Systems Engineering	TULisbon/ISA+UL/FC+TULisbon/IST	2nd	4	120
Bio-Engineering	U.Porto/FEUP	Integrated Master	10	300
	UTAD	1st	6	180
	UMinho/EENG	2nd	4	120
	UMinho/EENG+TULisbon/IST+UNL/FCT (MIT/Portugal)	3rd	8/10	240/300
Bioengineering and Nanosystems	TULisbon/IST	2nd	4	120
Bio-Informatics	UMinho/EENG, UL/FC	2nd	4	120
Bio-Informatics and Computational Biology	UL/FC	2nd	4/3	120/90
Biological Aquatic Resources	U.Porto/FCUP	2nd	4	120
Biological Engineering	TULisbon/IST; UAlg/FCT; UMinho/EENG	Integrated Master	10	300
Biological Sciences	UMa	3rd	6	180
	UAlg/FCT	3rd	8	240
Biological Sciences and Health	UAç	1st	6	180
Biology	TULisbon/ISA; UA; UAç; UAlg/FCT; UC/FCT; UÉvora/ECT; UL/FC; UMa; U.Porto/FCUP; UTAD	1st	6	180
	UC/FCT UNL/FCT; U.Porto/FCUP; UTAD	2nd	4	120
	TULisbon/ISA; UL/FC; U.Porto/FCUP	3rd	6	180
	UA; UÉvora/ECT; UMinho/EC; UNL/FCT	3rd	8	240
Biology and Ecology of Global Changes	UA+UL/FC	3rd	8	240
Biology and Geology	UA; UMinho/EC; UTAD	1st	6	180
Biology and Geology Teacher Education for Middle and Secondary Schools	UA; UAlg/FCT; UC/FCT; UÉvora/ECT; UL/FC; UMa; UMinho/EC+UMinho/IE, U.Porto/FCUP; UTAD	2nd	4	120
Biology and Water Quality Management	U.Porto/FCUP	2nd	4	120
Biology of Conservation	UL/FC	2nd	4/3	120/90
Biomedical and Biophysics Engineering	UL/FC	Integrated Master	10	300
	UL/FC	3rd	6	180
Biomedical Engineering	UTAD	1st	6	180
	TULisbon/IST; UC/FCT; UMinho/EENG; UNL/FCT	Integrated Master	10	300
	U.Porto/FEUP	2nd	4	120
	TULisbon/IST+UL/FM; UC/FCT; UMinho/EENG; U.Porto/FEUP	3rd	8	240
	UNL/FCT	3rd	8	240
Biomedical Materials and Devices	UA	2nd	4	120
Biomedical Pharmacy	UC/FF	1st	6	180

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Biomedical Sciences	UA; UAlg/DCBM; UBI	1st	6	180
	UAç; UAlg/DCBM; UBI; UNL/IHMT	2nd	4	120
	UAlg/DCBM; UL/FM; UNL/IHMT; U.Porto/ICBAS	3rd	8	240
Biomedicine	UBI	3rd	6	180
	U.Porto/FMUP	3rd	8	240
Biomedicine and Molecular Genetics	UNL/FCT	2nd	4	120
Biomolecular Methods	UA	2nd	4	120
Biopharmaceutical Sciences	UL/FF	2nd	4	120
	UL/FC	3rd	8	240
Biophysics and Bionanosystems	UMinho/EC	2nd	4	120
Biosciences	UC/FCT	3rd	6	180
Biosystems Engineering	UÉvora/ECT	2nd	4	120
	TULisbon/ISA	3rd	6	180
Biotechnological Sciences	UAlg/FCT	3rd	8	240
Biotechnology	UA; UAlg/FCT; UBI; UÉvora/ECT	1st	6	180
	TULisbon/IST; UA; UAlg/FCT; UNL/FCT	2nd	4	120
	TULisbon/IST, UNL/FCT	3rd	8	240
Biotechnology and Bio-Entrepreneurship in Medicinal and Aromatic Plants	UMinho/EC	2nd	4	120
Biotechnology and Food Quality	UTAD	2nd	4	120
Biotechnology for Health Sciences	UTAD	2nd	4	120
Biotechnology in Biological Control	UAç	2nd	4	120
Cardiovascular Pathophisiology	U.Porto/FMUP	2nd	4	120
Cardiovascular Sciences	U.Porto/FMUP	3rd	8	240
Catastrophe Medicine	U.Porto/ICBAS	2nd	4	120
Celular and Molecular Biology	UNL/FCT	1st	6	180
Celular Biology and Biotechnology	UL/FC	2nd	4/3	120/90
Chemical and Biochemical Engineering	UNL/FCT	Integrated Master	10	300
		3rd	8	240
Chemical and Biological Engineering	UMinho/EENG; U.Porto/FEUP	3rd	6	180
Chemical and Biological Sciences & Engineering	UNL/ITQB	3rd	8	240
Climate and Climate Change	UTAD	2nd	4	120
Climate Change and Sustainable Development Policies	UL+UNL+TULisbon	3rd	6	180
Clinical Analysis	UL/FF; U.Porto/FFUP	2nd	4	120
Clinical and Health Services Research	U.Porto/FMUP	3rd	3	180
Clinical Biology Laboratory	UTAD	2nd	4	120
Clinical Nutrition	UC/FM; U.Porto/FCNAUP	2nd	4	120
Coastal and Ocean Sciences	UA	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Cognitive Science	UL/FC+UL/FL+UL/FM+UL/FPCE	2nd	4	120
	UL/FC	3rd	8	240
Comparative and Technological Molecular Genetics	UTAD	2nd	4	120
	UTAD	3rd	8	240
Conservation and Rehabilitation of Fresh Waters	UÉvora/ECT	2nd	4	120
Conservation Biology	UÉvora/ECT	2nd	4	120
Consumer Sciences and Nutrition	U.Porto/FCUP+U.Porto/FCNAUP	2nd	4	120
	U.Porto/FCUP+U.Porto/FCNAUP	3rd	3	180
Dental Medicine	UC/FM; UL/FMD; U.Porto/FMDUP	Integrated Master	10	300
	U.Porto/FMDUP	3rd	3	180
	UL/FMD	3rd	8	240
Earth and Atmospheric Sciences	UÉvora/ECT	1st	6	180
Earth and Life Sciences	UTAD	2nd	4	120
	UTAD	3rd	3	180
Earth, Atmospheric and Space Science	UÉvora/ECT	2nd	4	120
Ecohydrology (Erasmus Mundus)	UAlg/FCT	2nd	4	120
Ecological Management of Catchments (Euro Master)	U.Porto/ICBAS	2nd	4	120
Ecology	UC/FCT; UMinho/EC	2nd	4	120
Ecology and Environmental Management	UL/FC	2nd	4/3	120/90
Ecology, Biodiversity and Ecosystems Management	UA	2nd	4	120
Ecology, Environment and Territory	U.Porto/FCUP	2nd	4	120
Ecotourism	UMa	2nd	4	120
Educational Psychology	UMa	2nd	4	120
Energy and Bioenergy	UNL/FCT	2nd	4	120
	UNL/FCT	3rd	6	180
Energy and Environment	UÉvora/ECT	2nd	4	120
Energy and Environment / Energy and Sustainable Development	UL/FC	3rd	6	180
Energy and Environmental Engineering	UL/FC	Integrated Master	10	300
Energy for Sustainability	UC/FCT+UC/FE	2nd	3	90
Engineering and Management of Water Systems	UAç	2nd	4	120
Engineering Rheology (Euro Master)	UMinho/EENG	2nd	4	120
Engineering Sciences	U.Porto/ FCUP	1st	6	180
Environment	UNL/FCT	3rd	8	240
Environment, Health and Safety	UAç	2nd	4	120
Environmental Citizenship and Participation	UAb	2nd	4	100
Environmental Contamination and Toxicology	U.Porto/ICBAS	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Environmental Education	UAç	2nd	4	120
Environmental Engineering	TULisbon/ISA; UA; UTAD	1st	6	180
	TULisbon/IST; UAlg/FCT; UC/FCT; UNL/FCT; U.Porto/FEUP	Integrated Master	10	300
	TULisbon/ISA; UA; UAç; UTAD	2nd	4	120
	TULisbon/ISA; TULisbon/IST; UC/FCT; U.Porto/FEUP	3rd	6	180
	UA	3rd	6/8	180/240
Environmental Management	UMinho/EENG	2nd	4	120
Environmental Management and Engineering	UAç	1st	6	180
Environmental Quality and Management of the Environment	UÉvora/ECT	2nd	4	120
Environmental Sciences	UAb; UMinho/EC	1st	6	180
	Uévora/ECT	3rd	6	180
Environmental Sciences and Engineering	UA	3rd	6/8	180/240
Environmental Science and Technology	U.Porto/ FCUP	1st	6	180
	U.Porto/ FCUP	3rd	6	180
Environmental Studies (JEMES – Euro Master)	UA	2nd	4	120
Evolutionary developmental biology	UL/FC	2nd	4/3	120/90
Food Consumption Sciences	UAb	2nd	4	120
Food Quality	UNL/FCT	3rd	6	180
Food Safety	TULisbon/FMV; UTAD	2nd	4	120
Food Science	UTAD	1st	6	180
Food Science and Engineering	TULisbon/ISA	1st	6	180
	TULisbon/ISA	2nd	4	120
	TULisbon/ISA	3rd	6	180
Food Service Management	U.Porto/FCNAUP	2nd	4	120
Food Technology	UÉvora/ECT	2nd	4	120
Food Technology and Safety	UAç, UNL/FCT	2nd	4	120
Food Technology, Science and Safety	U.Porto/FCUP	2nd	4	120
Forensic Genetics	U.Porto/FCUP	2nd	4	120
Forensic Psychology	UA	2nd	4	120
Forensic Sciences	U.Porto/FMUP; U.Porto/ICBAS	2nd	4	120
	U.Porto/FMUP+U.Porto/ICBAS+U.Porto/FMDUP+U.Porto/FDUP+U.Porto/FCUP+U.Porto/FFUP+U.Porto/FPCEUP	3rd	8	240
Forestry	UTAD	1st	6	180
	UTAD	2nd	4	120
Forestry and Natural Resources	TULisbon/ISA	1st	6	180
	TULisbon/ISA	2nd	4	120
	TULisbon/ISA	3rd	6	180
Functional Biology	TULisbon/ISA	2nd	4	120
Functionalized Advanced Materials and Engineering (FAME – Euro Master)	UA	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Gastronomical Sciences	TULisbon/ISA	2nd	4	120
Genetic Counselling	U.Porto/ICBAS	2nd	4	120
Genetics and Biotechnology	UTAD	1st	6	180
Genetics and Molecular Biology	UL/FC	2nd	4/3	120/90
Genomics and Bioinformatics	UA	2nd	4	120
Geological Resources and Sustainable Development	UTAD	2nd	4	120
Gerontology and Geriatrics	U.Porto/ICBAS+ U.Porto/FMUP+ U.Porto/FADEUP+U.Porto/FLUP+U.Porto/FCNAUP	3rd	6	180
Golf Course Management and Maintenance	UAlg/FCT	2nd	4	120
Health and Aging	UNL/FCM	2nd	4	120
Health Management	UNL/ENSP	2nd	4	120
Health Sciences	UL/FC+UL/FM+UL/FF+UL/FMD+UL/FPCE	1st	6	180
	UMinho/ECS	2nd	4	120
	UMinho/ECS+UC/FM+UNL/FCM	3rd	8	240
Health Sciences and Technologies	UC/FF	3rd		
	UA; UL/FF	3rd	8	240
Horticulture and Fruticulture	UAlg/FCT	2nd	4	120
Human Biology	UÉvora/ECT	1st	6	180
Human Biology and Environment	UL/FC	2nd	4/3	120/90
Human Ecology	UÉvora/ECT	2nd	4	120
	UNL/FCSH	3rd	8	240
Human Evolution and Biology	UC/FCT	2nd	4	120
Integrated Coastal Area Management	UAç	2nd	4	120
Integrated Studies of Oceans	UAç	2nd	4	120
Laboratory Analysis	UTAD	2nd	4	120
Life Sciences	UC/FCT	2nd	4	120
	UNL/FCM	3rd	8	240
Management and Conservation of Natural Resources	UÉvora/ECT	2nd	4	120
Management and Conservation of Nature	UAç	2nd	4	120
Management of Ecosystems	UTAD	2nd	4	120
Marine Biology	UAlg/FCT	1st	6	180
	UA; UAlg/FCT	2nd	4	120
Marine, Earth & Enviromental Sciences	UAlg/FCT	3rd	8	240
Marine Ecology	UL/FC	2nd	4/3	120/90
Marine Sciences	UA	1st	6	180
Materials Derived from Renewable Resources	UA	2nd	4	120
Medical Informatics	U.Porto/FMUP+U.Porto/FCUP	2nd	4	120
Medical Microbiology	UNL/FCM	2nd	4	120
Medical Sciences	U.Porto/ ICBAS	3rd	8	240
Medicinal Chemistry	UC/FCT	1st	6	180
	UMinho/EC	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Medicine	UAlg/DCBM	Integrated Master	8	240
	UBI, UC/FM; UL/FM; UMinho/ECS; UNL/FCM; U.Porto/FMUP; U.Porto/ ICBAS,		12	360
	UBI; U.Porto/FMUP	3rd	6	180
	UMinho/ECS	3rd	6/8	180/240
	UNL/FCM	3rd	8	240
Medicine (Basic)	UAç	1st	6	180
Medicine of Emergency	U.Porto/FMUP	2nd	4	120
Metabolism – Clinical and Experimental	U.Porto/FMUP	3rd	8	240
Microbiology	UL/FM	1st	6	180
	UA	2nd	4	120
Micro/Nano Technologies	UMinho/EENG	2nd	4	120
	UNL/FCT	Integrated Master	10	300
Molecular and Cell Biology	UA	2nd	4	120
Molecular and Cellular Biology	UC/FCT	2nd	4	120
Molecular and Environmental Biology	UMinho/EC	3rd	8	240
Molecular and Microbial Biology	UAlg/FCT	2nd	4	120
Molecular and Oncology Medicine	U.Porto/FMUP	2nd	4	120
	U.Porto/FMUP+U.Porto/ICBAS	3rd	8	240
Molecular Biomedicine	UA	2nd	4	120
Molecular Genetics	UMinho/EC	2nd	4	120
Molecular Physiology of Plants	U.Porto/FCUP+UMinho/EC	2nd	4	120
Nanosciences and Nanotechnologies	UA	3rd	6/8	180/240
	UNL/FCT	3rd	8	240
Natural Resources Management and Conservation	TULisbon/ISA+UÉvora	2nd	4	120
Natural Sciences	UNL/FCT	1st	6	180
Nematology (EUMAINE – Euro Master)	UÉvora/ECT	2nd	4	120
Neurosciences	U.Porto/FFUP+U.Porto/ICBAS	3rd	8	240
Nutritional Sciences	U.Porto/FCNAUP	1st	8	240
Ocean Sciences	UA	1st	6	180
Oceanography	UAlg/FCT	2nd	4	120
Oenology	UTAD	1st	6	180
	UTAD	2nd	4	120
Oliviculture and Olive Oil	UÉvora/ECT	2nd	4	120
Oncology	U.Porto/ICBAS	2nd	4	120
Optometry And Optotechnics – Applied Physics	UBI	1st	6	180
Optometry In Vision Sciences	UMinho/EC	1st	6	180
	UBI	2nd	4	120
Orthognatic Surgery and Orthodontics	U.Porto/FMUP	2nd	4	120
Pathology and Molecular Genetics	U.Porto/ICBAS+ U.Porto/FMUP	3rd	8	240
Pharmaceutical Engineering	TULisbon/IST+UL/FF	2nd	4	120
Pharmaceutical Medicine	UA	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Pharmaceutical Sciences	UAlg/FCT; UBI; UC/FF; UL/FF; U.Porto/FFUP	Integrated Master	10	300
	UL/FF; U.Porto/FFUP	3rd	8	240
Pharmaceutical Technology	U.Porto/FFUP	2nd	4	120
Pharmacy	UC/FF	3rd		
Physics of Advanced Materials	UMinho/EC	2nd	4	120
Plant Biology	UTAD	2nd	4	120
	UMinho/EC	3rd	8	240
Plant Biology (BioPlant)	U.Porto/FCUP +UA+Uminho	3rd	8	240
Plant Molecular Biotechnology	UTAD	2nd	4	120
Polymer and Composites Engineering	UMinho/EENG	3rd	6	180
Polymer Engineering	UMinho/EENG	Integrated Master	10	300
Properties and Technology of Polymers	UMinho/EENG	2nd	4	120
Psychology	ISCTE-IUL; UA; UAç; UAlg/FCHS; UBI; UÉvora/ECS; UMa; UTAD,	1st	6	180
	ISCTE-IUL; UA; UAlg/FCHS; UBI; UÉvora/ECS; UTAD	2nd	4	120
	UC/FPCE; UL/FP; UMinho/EPSI U.Porto/FPCE	Integrated Master	10	300
	ISCTE-IUL; UAlg/FCHS; UBI; UC/FPCE; UÉvora/ECS; UMa; UMinho/EPSI; U.Porto/FPCE,	3rd	6	180
	UA	3rd	6/8	
Psychology of Education	UAç	2nd	4	120
Quality Control	U.Porto/FFUP	2nd	4	120
Quality in Analytical Laboratories (Erasmus Mundus)	UAlg/FCT	2nd	3	93
Renewable Energies	UAç	1st	6	180
Renewable Energy and Energy Management	UAlg/FCT	2nd	4	120
Renewable Energy Engineering	UÉvora/ECT	1st	6	180
River Restoration and Management	TULisbon/ISA+ TULisbon/IST+ TULisbon/FA	3rd	6/8	180/240
Sciences of Earth and Space	UÉvora/ECT	3rd	7	196
Sciences of Territory and Environment Engineering	UÉvora/ECT	3rd	6	180
Sciences of Sea and Environment	U.Porto/ICBAS+U.Porto/FCUP+UA+UAlg/FCT	3rd	8	240
Sciences of the Sea-Sea Resources	U.Porto/ICBAS	2nd	4	120
Sea Sciences	UAlg/FCT	1st	6	180
	UL/FC	2nd	4/3	120/90
	UC/FC	3rd	6	180
Social Sustainability and Development	UAb	3rd	6	180
Structural and Functional Biochemistry	UNL/FCT	2nd	4	120

Annex 1. Studies in Life Sciences at Portuguese's Public Universities

Study Title	University	Cycle	Duration (semesters)	ECTS
Sustainable Chemistry	U.Porto/FCUP+U.Porto/FFUP+U.Porto/ICBAS +TULisbon, UNL/FCT	3rd	6	180
Sustainable Energy Systems	UA	2nd	4	120
	UC/FCT+UC/FE+U.Porto/FEUP+UL/FC+TULisbon/IST+TULisbon/ISEG (MIT/Portugal)	3rd	7/8	228
Sustainable Management of Rural Spaces	UAlg/FCT	2nd	3	90
Tissue Engineering Regenerative Medicine and Stem Cells	UMinho/EENG	3rd	6	180
Toxicology and Ecotoxicology	UA	2nd	4	120
Traditional Chinese Medicine	U.Porto/ICBAS	2nd	4	120
Tropical Agriculture and Sustainable Development	TULisbon/ISA	2nd	4	120
Tropical Health	UNL/IHMT	2nd	4	120
Veterinary Medicine	TULisbon/FMV; UÉvora/ECT; U.Porto/ICBAS; UTAD	Integrated Master	11	330
Veterinary Sciences	TULisbon/FMV; UÉvora/ECT	3rd	6	180
	U.Porto/ ICBAS	3rd	8	240
Vinifera (Euro Master)	TULisbon/ISA	2nd	4	120
Viticulture and Enology	UÉvora/ECT; U.Porto/FCUP+TULisbon/ISA	2nd	4	120
Water and Coastal Management (Erasmus Mundus)	UAlg/FCT	2nd	3	90

ISCTE-IUL – Lisbon Universitary Institute
TULisbon – Technical University of Lisbon, FA – Faculty of Architecture
TULisbon – Technical University of Lisbon, FMV – Faculty of Veterinary Medicine
TULisbon – Tecnhical University of Lisbon, ISA – School of Agriculture
TULisbon – Technical University of Lisbon, ISEG – School of Economics and Management
TULisbon – Technical University of Lisbon, IST – School of Engineering
UA – University of Aveiro
UAb – Universidade Aberta
UAç – University of Azores
UAlg – University of Algarve, DCBM – Department of Biomedical Sciences and Medicine
UAlg – University of Algarve, FCHS – Faculty of Human and Social Sciences
UAlg – University of Algarve, FCT – Faculty of Sciences and Technology
UBI – University of Beira Interior
UC – University of Coimbra, FCT – Faculty of Sciences and Technology
UC – University of Coimbra, FE – Faculty of Economics
UC – University of Coimbra, FF – Faculty of Pharmacy
UC – University of Coimbra, FM – Faculty of Medicine
UC – University of Coimbra, FPCE – Faculty of Psychology and Education Science
UÉvora – University of Évora, ECS – School of Social Sciences
UÉvora – University of Évora, ECT – School of Sciences and Technology
UL – University of Lisbon, FC – Faculty of Science
UL – University of Lisbon, FF – Faculty of Pharmacy
UL – University of Lisbon, FL – Faculty of Letters
UL – University of Lisbon, FM – Faculty of Medicine
UL – University of Lisbon, FMD – Faculty of Dental Medicine
UL – University of Lisbon, FP – Faculty of Psychology
UL – University of Lisbon, FPCE – Faculty of Psychology and Education Sciences
UMa – Madeira University

UMinho – University of Minho, EC – School of Sciences
UMinho – University of Minho, ECS – The Health Sciences School
UMinho – University of Minho, EENG – School of Engineering
UMinho – University of Minho, EPSI – School of Psychology
UMinho – University of Minho, IE – Institute of Education
UNL – New University of Lisbon, ENSP – National School of Public Health
UNL – New University of Lisbon, FCM – Faculty of Medical Sciences
UNL – New University of Lisbon, FCSH – Faculty of Human and Social Sciences
UNL – New University of Lisbon, FCT – Faculty of Sciences and Technology
UNL – New University of Lisbon, IHMT – Institute of Hygiene and Tropical Medicine
UNL – New University of Lisbon, ITQB – Institute of Chemical and Biological Technology
U.Porto – University of Porto, ICBAS – Institute of Biomedical Sciences Abel Salazar
U.Porto – University of Porto, FADEUP – Faculty of Sport
U.Porto – University of Porto, FCNAUP – Faculty of Nutrition and Food Science
U.Porto – University of Porto, FCUP – Faculty of Sciences
U.Porto – University of Porto, FDUP – Faculty of Law
U.Porto – University of Porto, FEUP – Faculty of Engineering
U.Porto – University of Porto, FFUP – Faculty of Pharmacy
U.Porto – University of Porto, FLUP – Faculty of Arts
U.Porto – University of Porto, FMDUP – Faculty of Dental Medicine
U.Porto – University of Porto, FMUP – Faculty of Medicine
U.Porto – University of Porto, FPCEUP – Faculty of Psychology and Education Science
UTAD – University of Trás-os-Montes e Alto Douro

Websites:
TULisbon - http://www.utl.pt/index.php?ling=2
UA - http://www.ua.pt/guiaonline/default.aspx?lg=en
UAç - http://www.uac.pt/ensino
UAlg - http://www.ualg.pt/index.php?lang=en
UAb - http://www.univ-ab.pt/guiainformativo/indexEN.php
UBI - https://www.en.ubi.pt/Cursos.aspx?grau=Licenciaturas_e_Mestrados_Integrados
UC - http://www.uc.pt/en
UÉvora - http://www.ip.uevora.pt/en/
UL - http://www.ul.pt/portal/page?_pageid=173,1&_dad=portal&_schema=PORTAL
UMa - http://www.uma.pt/portal/modulos/curso/index.php?NV_MOD=MODCURSO&NV_EAGR=EAGR_ENSINOLST&TPESQ=PESQ_ENSINOLST&IDM=EN&
UMinho - http://www.uminho.pt/Default.aspx?tabindex=3&tabid=18&pageid=81&lang=en-US
UNL - http://www.unl.pt/guia/2010/UNLGIAllCourses
UTAD - http://www.utad.pt/pt/ensino_formacao/1ciclo/

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN ROMANIA

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1. Sustainable Development (SD) policies in Romania:

1.A. Regarding the existence of sustainable development policy in Romania we can say that there are several actions that have led to outline a framework to regulate the main directions of development of sustainable Romania for the next years. Among them we can mention as most important following:

- National Strategy for Sustainable Development (NSDS) to Romania in a revised form with the objectives agreed at EU level and detailed requirements of the European Commission (EC) No. GD. 1216 of 4 October 2007;

- Decision to approve the Memorandum of Understanding between the Ministry of Environment and Sustainable Development and United Nations Development Programme in Romania on the review of national strategy for sustainable development, having regard to sustainable development goals revised European Union, signed at Bucharest on 28 August 2007.

In 2008 the Romanian Government thru the Ministry of Environment and Sustainable Development has adopted the **National Sustainable Development Strategy of Romania 2013-2020-2030** with motto:"*keep healthy what keeps you in health*".

The above mentioned document was approved by Government Decision no. 1460 on 12 November 2008.

This National Strategy aims to connect Romania to a new philosophy of development, adopted by the European Union and widely shared globally – that of sustainable development and displays a coherent vision of Romania's future in the next two decades from the angle of the generous and realistic concept of sustainable development.

The specific conditions prevailing in Romania called for a dual normative approach to development prospects. On the one hand Romania still has to overcome a number of historical discrepancies in relation to the developed countries of the European Union. On the other hand Romania has to implement, simultaneously and comprehensively, the new paradigm of sustainable development in all spheres of economic and social life, in complete harmony with the need to preserve the natural capital and to improve the quality of life. That is precisely why, relying on the performance of the past years, the Strategy envisages high rates of gross domestic product growth also in the years to come in order to achieve early convergence with European standards.

The Strategy recommends the establishment of specific mechanisms both at the level of central or local authorities and at the level of the civil society, under the aegis of the Romanian Academy, to monitor the implementation of the set objectives:

- climate change and clean energy;
- sustainable transport;
- sustainable consumption and production;
- conservation and management of natural resources;
- public health;
- education and training;
- research and development, innovation;
- social inclusion, demography and migration.

About the existence of subventions for SD in Romania, we can say that the Government creates few structures thru the Ministries which ensure a large opportunity to finance projects focused on the major objectives. One of this opportunities is represented by the *Sectoral Operational Programme „Environment" (SOP - Environment); Operational Programme 4 and 5 – Axis*.

SOP - Environment has a budget of approximately 5.6 billion Euros, of which approximately 4.5 billion Euros grant from the European Union European Regional Development Fund (ERDF) and Cohesion Fund (CF), and the difference is national co-financing (about 1 billion Euro). Also, we can mention **Decision no. 64/2005** about sustainable development of animal husbandry and livestock production sector efficiency, and rehabilitation of the fishing sector in Romania.

Therefore, the values of the indicators "1.A" of the guidelines for Romania are:

- ✓ ***Existence of specific national and regional institutions about SD***
- ✓ ***Existence of specific national and regional policies about SD***
- ✓ ***Existence of specific national and regional legislation about SD***
- ✓ ***Existence of specific subventions about SD***

1.B.The Sectoral Operational Programme for the Development of Human Resources 2007-2013, which was approved in November 2007, derived its objectives and envisaged actions from the National Strategic Reference Framework 2007-2013.

This Programme was built around seven priority axes, of which at least 3 are directly relevant for the future of the national education and training system. The National Reform Programme for the Lisbon Agenda 2007-2010 also includes the development of education and training among its strategic priorities.

In 2007, Romania prepared a Strategy on Education for Sustainable Development, which followed the recommendations of the UNECE Strategy and detailed the objectives and specific actions to be undertaken in that area.

In order to guarantee access to quality education and training and to maintain high educational standards, the following specific **objectives** will be implemented according to the established priorities of the Sectoral Operational Programme for Human Resources:

- to improve the system of assured quality standards for pre-school, primary and secondary education and for initial vocational training by providing **support to preuniversity educational establishments** with a view to

upgrading their management and ability to teach skills that are relevant on the labour market;

- to improve the quality standards in higher education by **supporting universities** to upgrade their management and ability to provide relevant qualifications;
- to improve the qualifications of teachers, tutors, trainers and other categories of educational personnel by supporting their **initial and continued professional training**;
- to broaden the framework for life-long learning by **supporting training providers** in order to develop systems of quality standards and management of quality;
- to support young researchers in their quest to acquire superior knowledge and competences through
- expanded opportunities for **doctoral and post-doctoral studies**.

A substantial improvement in the quality of **higher and post-graduate education** will come about as a result of the implementation of the National Higher Education Qualifications Framework. It will introduce transparent standards and practices describing the qualifications and validation procedures, the development of solutions relying on information technology for process management, the training of a contingent of evaluators of educational processes and of their impact on the results of higher education.

The share of universities that are expected to receive accreditation according to the new quality standards will reach 90% by 2015. Following the recommendations made in the course of public debates on this Strategy regarding the ways to overcome the resistance to change of existing ossified structures, it appears necessary to invite independent experts from Romania and from abroad and to use their expertise for peer reviews of auditing, evaluation and certification operations in accordance with internationally accepted quality standards for higher education.

Subordinated to the Ministry of Education, Research, Youth and Sports are *two Agencies: Romanian* Agency for Quality Assurance in Higher Education (ARACIS) and *Romanian Agency for Quality Assurance in Preuniversity Education* (ARACIP) which has in their structure Departments for accreditations and quality assurance for organizations providing continuing educations.

Due the University autonomies, in some of them, the board has elaborated strategies of durable development and those promote the area of research in this field of SD. Many of them developed programmes of studies (for Master or Doctoral courses) with objectives as sustainable development in different field: agriculture, social protection, natural resources management, and others, using Reflective Methods for School Partnerships on Education for Sustainable Development.

Generally, in younger universities we can find a large area of SD approach in comparison with the oldest (Romanian-American University in Bucharest , West University „Vasile Goldis" Arad, West University of Timisoara), but this is not a criterion in the accreditation systems of the Romanian universities degrees.

Therefore, the values of the indicators "1.B" of the guidelines for Romania

are:

- ✓ ***No existence of specific educational national institutions about SD***
- ✓ ***Existence of specific educational regional (not national) policies about SD***
- ✓ ***No existence of specific educational regional (or national) legislation about SD***
- ✓ ***No existence of SD criteria in the accreditation systems of the university degrees***
- ✓ ***No existence of specific subventions about education in SD***

1.C. For Education System in Romania, the transition to the Bologna System meant a restructuring of the system, adapting curricula to the new European requirements and implementing the credit transfer system for undergraduate education, which allows greater mobility of students. In the same time with these changes, the universities have created specific units or departments for Sustainable Development in their structure – some examples:

- *Bucharest University – Department of Systematic Ecology and SD;*
- *Pitesti University – Department "Pole of Arges Valey";*
- *University „Politehnica" Bucharest – Department „Sources of renewable energy and SD";*
- *University „Transilvania" Brasov – Department Product Design for SD*
- *University „Danubius" Galati – Department for Research Developement, Innovation and SD;*
- *University of Agricultural Science and Veterinary Medicine „Banatului" Timisoara – SD Department and environmental protection;*
- *University of Bucharest - Faculty of Biology – Evaluation of Environemental Impact of Projects, Strategies and Development Programmes*.

Analyzing the status of most of the universities we can say that the majority of the Romanian Universities developed policy in the field of SD and most of them have special units to implements this policy.

In conclusion, the values of the indicators "1.C" of the guidelines for Romania are:

- ✓ ***Existence of specific university policies about SD in the major of the universities;***
- ✓ ***Existence of the specific units or departments about SD in some universities;***

1.D. Related to the research policies regarding the SD we can affirm that in Romania there are specific programs about SD based on the aim of above mentioned [*National Strategy for Sustainable Development (NSDS), The Memorandum of Understanding between the Ministry of Environment and Sustainable Development and United Nations Development Programme in Romania*].

Some of the actual active grants are:

- *POR 2007-2013 - DMI 5.2 Creating, developing and modernizing the*

infrastructure for sustainable exploitation of natural resources with tourism potential;

- *POR 2007-2013 - DMI 5.1 Restoration and sustainable valorisation of cultural heritage, and setting up/modernization of related infrastructure;*
- *POR 2007-2013 - DMI 4.1 Development of sustainable business support structures of regional and local importance.*

Therefore, the value of the indicator "1.D" of the guidelines for Romania is:

✓ ***Existence of the specific programs about SD***

2. SD University Studies in Romania:

2.A. Specific university studies in Life Sciences.

In Romania there are four levels of universities studies: undergraduate, master, doctoral and postdoctoral. From Academic cycle 2005 – 2006 all the Romanian universities has adopted the Bologna Process and now there is no other form for educational training.

There are universities with specific studies about SD such as:

- Babes-Bolyai University, Cluj-Napoca - *European Master on Sustainable development strategy* (frequency Master) on 4 semesters, 2 years Objectives of the specialization: *European Strategy for Sustainable Development*;
- Technical University "Gheorghe Asachi" Iasi – *Energetic audit for SD* – Master programme on 4 semesters, 2 years;
- Academy of Economic Studies, Food Economy and the Environment - Master programme *„Rural Tourism and Ecotourism in the context of sustainable development*", 4 semesters, 2 years;
- Alexandru Ioan Cuza University, Faculty of Geography and Geology, Department of Tourism and Sustainable Development
  - *Environmental Education for Sustainable Development*
  - *Biology Current Environment and Sustainable Development*
- Faculty of Agricultural Sciences, Food Industry and Environmental Protection – „Lucian Blaga" of Sibiu - Master *Sustainable Development of rural area* of 4 semesters, 2 years .

Therefore, the value of the indicator "2.A" of the guidelines for Romania is:

✓ ***Existence of the specific studies about SD – in few universities***

2.B. and 2.C. In those cases we are not able to make a proper idea about the SD specific subjects in Life Sciences university studies and SD practical activities (practices in enterprises or in institutions, course works, etc) due the lack of verified information at national level.

However, we can estimate based on our personal knowledge that:

- ***for 2.B:***
  - ***Existence of the specific subjects about SD in the degrees: in the***

majority of the degrees;

- ***For 2.C***
  - ***Existence of specific practical activities about SD in the degrees: in few of the degrees***

2.D. How do you think education in LS contribute to SD in your country.

Considering the national importance of the SD concept we can say that it is found in the study programs and curricula at the level of providing continuing education leading to the dissemination and understanding of the concept.

2.E. Barriers for the integration of the SD and problems in the teaching methods.

Related to this aspect in Romania we are able to summarise the situation as follow:

- The National Educational System is underfunding;
- The existence of inadequate legislation in place that generates bureaucracy;
- Lack of coordination between different development directions of SD;
- In the context of current economic conditions in the implementation and enforcement of specific rules to ensure sustainable development involves costs, they may be perceived as a main barrier in implementing the concept of SD to be overcome by specific teaching methods;
- Fragmentation of information and lack of correlation between different SD areas.

3. Relevant Institutions related to SD in Romania:

In Romania there are lots of entities which provide/promote SD policies on state or local areas:

- Government of Romania;
- Ministry of Environment and Sustainable Development;
- Romanian Academy;
- Romanian Academy of Agricultural Sciences;
- Universities;
- Institute and Research Centres;
- European Economic Area (EEA);
- NGO's,.

4. **International cooperation in ESD (Education in SD) Romania:**

Most of Universities have a good experience in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs, as follow:

- University of Pitesti - In 2010 – 2011 International Relation Department

implement the Erasmus project „*Stability and security for European sustainable development*" – SSESD, ref. 10-EIP-RO PITESTI01. In the framework of this study program is involved 5 students from University of Pitesti and 20 from partner institutions (Austria, Bulgaria, Lituania, Poland and Portugal);

- University „Bioterra" Bucharest – „*Implementation and agro tourism management modality of sustainable development*", international project of interuniversity cooperation with Superior Institute for Specific Studies from Egypt (2006-2008), ref./3/4/2006;

5. **Good practices and relevant experiences in the Higher Education Institutions in Romania:**

Due the large area of sustainable development in Life Science we can make a review of the most important field where the good practices are promoted or implanted:

- Agriculture
  - The good practices in small and large farms (Code of good agricultural practice – elaborated and promoted by National Institute for Pedology and Agro chemistry);
  - Water and soil quality;
- Environmental education;
- Food quality and management;
- Green area protection;
- Sustainable transport;
- Green energy.

About the activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transport, training programs in SD for academic staff, instruction materials of SD) we can say that is a major preoccupations to promote SD in all the Life Science field. The Universities and Research institute periodical organize conferences with subjects on SD on various themes:

- University of Craiova, Faculty of Agriculture – Annual Symposium "*Durable agriculture – agriculture of the future*";
- Constanta: Conference on „*Sustainable Development in the Black Sea*", Alliance of Civilizations, United Nations Development Programme in Romania;
- Conference on important environmental sustainable development of rural tourism in Drobeta Turnu Severin: „*Sustainable development of human resources for rural tourism in Romania*"; (ID 54 620), financed by European Social Fund Operational Programme Human Resources Development 2007-2013.
- University of Brasov: Sustainable Development and Human Resources Conference is held within the „*Partnership for Sustainable Development*";

financed by European Social Fund Operational Programme Human Resources Development Association and implemented by **Save the Danube Delta** in partnership with **Active Watch** - *Media Monitoring Agency*.

6. **Possible future actions in Romania:**

6.A. How could be improved the education and research in SD in your country?

- Determining the degree of interconnectivity between the different areas both LS and other scientific fields (architecture, industry)
- Orientation towards SD research topics and dissemination of research results more efficiently to maximize the social, economic, etc.

6.B. How could be integrated the concept of SD in the Life Science Studies?

- Creating and strengthening partnerships between universities and the target groups involved in the development, dissemination and implementation of SD concept (economic, governmental agencies, professional associations, NGOs).

7. **References**

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[3] **Acad. Paun Ioan OTIMAN** *Institute of Agricultural Economics, Romanian Academy* - ***Sustainable Development Strategy of Agriculture and Rural Areas in Romania on Medium and Long Term,*** *Agricultural Economics and Rural Development, Year V, no.1-2, 2008;*

[4] www.gov.ro

[5] www.mmediu.ro

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN SLOVAK REPUBLIC

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(10) Slovak Agricultural University in Nitra. Tr. A.Hlinku 2, 949 76 NITRA

1. Sustainable Development (SD) policies in Slovak Republic:

Sustainable Development is included into the legal system of the Slovak Republic. The Slovak Republic National Strategy for Sustainable Development has been approving by Government resolution No 978/2001. Within this document, the new possibilities of the coincidence of the economic and social development of the Slovak Republic were sought at the all levels of management with the present security of Sustainable Development. In this connectivity the aims of project was concentrated for creating and approving the socially accepted and profitable National Strategy, created with participation of all groups of community.
The main challenges for the sustainable development of the Slovak Republic in the field of good governance are following:

- to strengthen the position of regions and municipalities,
- to optimise the system of public administration,
- to increase the quality and efficiency of public administration,
- to deal with availability of basic local public services to the general public,
- to increase internal and external security.

By enforcement of Sustainable Development Strategy is necessary to conform to the principles and criterions sustainable development. For evaluating of the status and development it is proposed to use the Indicators of Sustainable Development.

The Slovak Republic Action Plan for Sustainable Development for the years 2005 - 2010 represents the document of the priorities and assignment which are resulting from the Slovak National Strategy for Sustainable Development. Action plan fulfils the requirements of the European Commission for the clear assessment of the aims of sustainable development.

National Strategic Reference Framework for the period of 2007 – 2013 (NSRF) strategy has been defined on three strategic priorities and their three targets that should be achieved through the project financing during the program period of 2007 – 2013:
1. Infrastructure and regional availability - Increasing the infrastructure density in the regions and enhancing the effectiveness of the related public services.
2. Knowledge-based economy - Development of the sustainable economic growth resources and increase of competitiveness in industry and services.
3. Human resources - Enhancing employment, increasing the labour force quality for the needs of the knowledge-based economy and enhancing the social inclusion of risk groups. At the same time, the NSRF strategy also defines the horizontal priorities. One of four is sustainable development providing environmental, economic and social sustainability of economic growth.

The Council of the Government for Sustainable Development is a key government mechanism for the coordination of global environmental management in Slovakia. The Statute of the Council proposed a representative constitution of the Council:
Deputy Prime Minister as a chairman;
Vice-Chairman: Minister of Environment,
the other members of Council: Minister of Economy, Minister of Labour, Social Affairs and Family, Minister of Finance, Minister of Construction and Regional Development, Minister of Culture, Minister of Education, Minister of transport, Posts and Telecommunications, Chairman of the Statistical Office, Chairmen of the regional administrations, representatives of NGOs and representatives of the academic community.

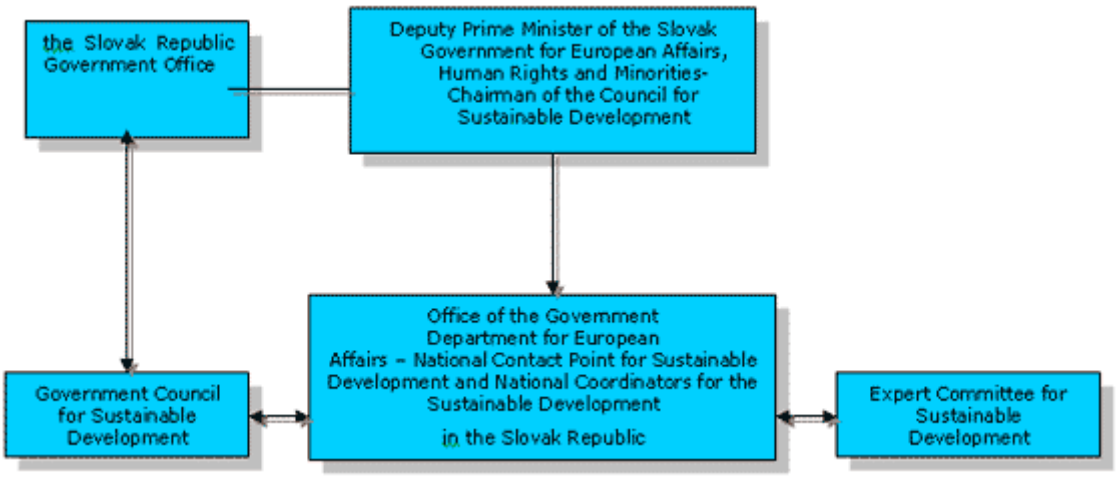

Fig. 1 Institutional structure of the Sustainable Development in the Slovak Republic

The Council of the Government for Sustainable Development is advisory and coordination body of the Slovak Government for implementation of the principles of sustainable development. The "Council" members are nominated by the Prime Minister approved by the Slovak Government.
The Expert Committee for Sustainable Development in the SR consists of sectoral experts, representatives of self-government and non-governmental organizations.

SD is fully implemented in national legislation
Example of specific legislation: Framework convention on the Protection and Sustainable Development of the Carpathians. No. 111/2006 Z. z. between Ukraine and Slovak Republic. The Parties shall pursue a comprehensive policy and cooperate for the protection and sustainable development of the Carpathians with a view to inter alia improving quality of life, strengthening local economies and communities, and conservation of natural values and cultural heritage.

Ministry of Education, Science, Research and Sport of the Slovak Republic release „Long-term plan of the state science and technology policy by the year 2015" This document partially fulfil a role of the indicator – "1B" Existence of specific educational national legislation about SD.

Since 2000 at universities the coordinated integration of environmental aspects for edification and education at universities has already evident and intercepted in new environmental curriculum. The specialised places with environmental orientation – departments as well as faculties have come into existence. They were developing and reorganizing during previous years [2].

At the most Universities, within existing courses the issues of sustainable development in particular field of study are offered. From 10 public universities and 1 private university related to LSHES (Life Science Higher Education Studies), only at the Slovak Agricultural University in Nitra special department's related to sustainable development and Sustainable Agriculture and Rural Development are established. Examples for implementation of sustainable development in Agricultural University was analysed by FEHÉR [1].

The value of the indicators of "1C"

- ✓ Existence of specific university policies about SD: in the majority of the universities.
- ✓ Existence of specific units or departments about SD: in some universities.

Research policies are driving by National Strategic Reference Framework for the period of 2007 – 2013. In Slovak Republic existence of specific programs about SD is implemented into educational process. Within the Long-term plan of the state science and technology policy by the year 2015, released by Ministry of Education, Science, Research and Sport of the Slovak Republic - there are targets related to SD policies as follows: 6.1.10 Exploitation, protection and reproduction of biologic sources-sustainable agriculture (agriculture, food processing industry and forestry), the sustainable regional development of the SR, Flexible and adaptable schemes and methods of exploitation of sustainable forestry management. 6.1.11 Environment protection - research and development in the area of measures against negative impacts of climatic changes. 6.1.12 Exploitation of domestic mineral resources. Nine International scientific and technical cooperation by 2015 raise the resources to ensure sustainable development of all specifications of groups of science and technology disciplines in Slovakia from the resources of FP 7 in near future FP 8 regardless of the substantive priorities of research and development. Research projects proposed by scientists on competitive basis are supported by grant agencies of the Ministry of Education.

2.- SD University Studies in Slovak Republic:

In the Slovak Republic there are 20 public universities from which 10 universities are related to Life Sciences. At these 10 universities there are 53 faculties from which 18 Faculties are related to Life Sciences. Biology and medicine studies dominated, followed by ecology.
Only at two public universities there are study programmes related directly to SD at some faculties: Slovak Agricultural University in Nitra (Faculty of Agrobiology and Food Resources; Faculty of European Studies and Regional Development) and Technical

University in Zvolen (Faculty of Forestry; Faculty of Ecology and Environmental Sciences).
From 10 private universities only University of Central Europe in Skalica offers partially related study program to Life Sciences on Institute of Environment and Regional Development in the study fields “Landscape Preservation and Exploitation” and “Public Administration and Regional Development”.

From 11 universities related to Life Science, only 3 Universities have some specific study programs about SD. At these Universities, excluding Health Science, there are special subject about SD in an area of Environmental sciences, Agriculture, Food science, Forestry and Landscape protection. Practical Activities about SD are implemented in degrees. Further and deeper implementation is needed. According web page of 11 universities related to LSHES and personal experiences we can validate indicators for Slovak Republic as follows:

- ✓ 2A Existence of specific studies about SD for the Slovak Republic is: in a few universities.
- ✓ 2.B. Existence of specific subject s about SD in the degrees: in the majority of the degrees.
- ✓ 2.C Existence of specific practical activities about SD in the degrees: in some degrees.

We have to prepare highly qualified people which not only understood environmental problems (the role of edification at the basic school and middle school) but also they were able to solve last or new rising environmental impacts and consequences and/or effectively prevent the nature against environmental loads.

Main barriers for integration of SD and problems in the teaching methods. In Slovakia to many new universities were founded gratuitously last decades, mainly from social science. Financial support for science and education in Slovak Republic is deeply under EU level and financial resources from National budget were allocated according to blanket method.

3.- Relevant Institutions related to SD in Slovak Republic:

In Slovakia we have organization fully or partially financed from national budget.
Organizations fully financed by Ministry of agriculture and Rural Development.
Participating in education as guests lecturers:

- The Central Controlling and Testing Institute in Agriculture
- Agency of Slovak Academy of Agricultural Sciences

Organizations partly financed by Ministry of Agriculture and Rural Development.
Participating in education as guests lecturers:

- Soil Science and Conservation Research Institute
- Food Research Institute
- The Research Institute of Agricultural and Food Economics
- Rural Development Agency

- Plant Production Research Centre Piešťany

Others:
National Forest Centre, State Veterinary and Food Institute Bratislava, State Veterinary and Food Institute Dolný Kubín, State Veterinary Institute Zvolen, State Veterinary and Food Institute Košice, State Forests of Tatras National Park, Agriculture Technical and Testing Institute SKTC-106 Rovinka.

State Institutions
Participating in education as guests lecturers: Agroinstitut Nitra.
Others: Agrokomplex - International Exhibition Center Nitra, State Enterprise Forests of the Slovak Republic, The National Stud Farm in Topoľčianky, Hydromeliorations, Breeding service of the Slovak Republic.

The most important NGO. Friends of the Earth Slovakia became Friends of the Earth International member in 1997. Since then, they have been actively participating in activities coordinated by Friends of the Earth International and its regional association, Friends of the Earth Europe. The association is a not-for-profit non-governmental organization. Friends of the Earth Slovakia consist of three organisations at present: Friends of the Earth-CEPA, Friends of the Earth-SPZ and WOLF Forest Protection Movement. Friends of the Earth - CEPA are a civic association which continues to follow the objectives of the Centre for Environmental Public Advocacy (CEPA). It was established by institutionalization of the CEPA Sustainable Economy Program, has adopted the rights and the commitments arising from the realization of this program and continues to work on its further development.

4.- International cooperation in ESD (Education in SD) in Slovak Republic:

The Regional Environmental Center for Central and Eastern Europe (REC) is an international organisation in Bratislava with a mission to assist in solving environmental problems. The REC fulfils this mission by promoting cooperation among governments, non-governmental organisations, businesses and other environmental stakeholders, and by supporting the free exchange of information and public participation in environmental decision making. A significant proportion of REC Slovakia's work is devoted to enhancing the attractiveness and quality of the urban environment, and defining criteria, principles and tools for sustainable urban open spaces. This work includes awareness raising and the development of an exchange platform on knowledge and expertise on urban open spaces, as well as the development of an assessment tool investigating climate change vulnerabilities and risks in urban areas. REC Slovakia is involved in the process from planning to high-quality education.

Slovak Agricultural University in Nitra has developed bilateral and multilateral cooperation with more than 135 universities in many countries of the world, and cooperates with universities also on the basis of joint projects. Lectures presented by visiting professors from abroad and study period of SAU students at foreign universities are very stimulating in educational process. Inspiring is the participation of

faculty and doctoral students in important international scientific conferences and other events with high professional and social credit.

5.- Good practices and relevant experiences in the Higher Education Institutions in Slovak Republic:

Universities involved in Life Sciences and university staff regularly organized scientific conferences and seminars. The schedule of these conferences is on the web pages of the universities or faculties. Example: Matej Bel University, Slovak Environmental Agency under auspices of Ministry of Education, Science, Research and Sport of the Slovak Republic organized 5. International conference. “Education to sustainable development” during 21.-22. January 2009. The closing remark and recommendations for further education to sustainable development were set up [8]. Slovak Agricultural University in Nitra participates at the international projects supported by Development of Environmental Science Study Content and Study Materials, Norway Grants Project LV0044. The aim of the project is to discuss the education for sustainable development implementation in universities as the future trend of reform of the higher education system, as well as to evaluate possibilities of using of the prepared textbook "Environment and Sustainable Development” and other educational materials in the curriculum of universities [4].

6.- Possible future actions in Slovak Republic:

- At each university to implement issues on sustainable development into Long Term Strategic Plan, approved by the Senat of the university and regular evaluation of the plan at all levels of universities.
- Apply the indicators of implementation of sustainable principles into annual reports of universities and external educational institutions.
- Create the data base of grants, conferences dealing with education and research in sustainable area on web page of Ministry of Education, Science, Research and Sport of the Slovak Republic.
- In cooperation with Ministry of Education of the Slovak Republic to elaborate and put into the force the motivation and supporting tools to fulfil the Action plan for Education, Research and Management for Sustainable Development.

Create the university council for sustainable development and incorporate the issues of sustainability into University Document for the Development and Strategy is possible way to integrate the concept of the SD inn the Life Science Studies.

To develop joint study programmes related to SD in Life Sciences, to support the international cooperation and joint effort in education and research in this field.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN SLOVENIA

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1. Sustainable Development (SD) policies in Slovenia

1.A. Planning, investment and management strategies of the State and local governments to promote SD

Sustainable Development Council is a consultative body of the Government of the Republic of Slovenia in the field of sustainable development as a harmonious economic, social and environmental development that meets the needs of the present generation without reducing the possibility of meeting the needs of future generations. The Council is designed to establish dialogue with the Government of the Republic of Slovenia, representatives of civil society and the economy on the important issues of sustainable development.
Council for Sustainable Development, the Government of the Republic of Slovenia was set up by decision of the 29th December 2003 (Official Gazette RS, no. 16/2003), a governmental advisory body on sustainable development.

Tasks of the Council for Sustainable Development
The Council shall perform the following tasks: • reception and the Government proposes guidelines and recommendations for policy-making at all levels of the principles of sustainable development • participate in the processes of preparation of strategic development documents, and key legislative proposals; • prepare an independent report on the implementation of the principles of sustainable

development in key strategic development documents of the country; • consider and make suggestions for effective implementation and synergies of the new European strategy for jobs and growth and other strategies in the work areas of the Council for Sustainable Development; • cooperate with the Ministry of Foreign Affairs, the Coordinator for sustainable development at international level in developing positions of the Republic of Slovenia for Cooperation in the United Nations Commission on Sustainable Development, • in terms of sustainable development, evaluate and make recommendations on strategic, operational, and other development planning documents; • seek consensus among state authorities, local communities, civil society and industry on policies, instruments and criteria for implementation of the principles of sustainable development.

Composition of the Council for Sustainable Development

The Council consists of President, Vice President and seven members appointed by the Government from among the representatives of science, civil society, business, local communities and authorities and government departments for a period of five years. The appointment shall be made on the basis of an invitation of proposals for the appointment of at least 30 days. Members of the Council are acting unprofessional. Operational responsibilities for the Council are performed by the Technical Secretariat of the Council under the Government Office for Climate Change. The Secretariat headed by the Director of Government Office for Climate Change.

1.B. Higher education policies related to SD

Existence of specific educational national institutions: There are no specific educational national institutions about SD.

Existence of specific educational national policies about SD: There are no specific educational national policies about SD or they are included in other documents (such as Slovenia's Development Strategy). Given the fact that Slovenia is a member of the EU and that we have adopted the Bologna process in higher education, Slovenia have to apply the same policies.

Existence of specific educational national legislation about SD: There are no specific educational national legislation about SD.

E*xistence of SD criteria in the accreditation systems of the university degrees:* There are no SD criteria in the accreditation systems of the university degrees.

1.C. University policies and experiences

Existence of specific university policies about SD: There are no specific university policies about SD in Slovene Universities.

Existence of specific units or departments about SD: There are no specific units or departments about SD in Slovene Universities.

1.D. Research policies related to SD

*Existence of specific programs, grants about SD:*There are no specific programs and grants about SD in Slovene Universities.

2. SD University Studies in Slovenia

University	Title of the Study	Degree	Duration	SD specific subjects	SD practical activities (Jih ni nikjer?!?)
University of Maribor	Biology	1.	3 years, 180 ECTS	/	
	Ecology with Nature Conservation	1.	3 years, 180 ECTS	/	
	Biology and Ecology with Nature Conservation	2.	2 years, 120 ECTS	/	
	Ecological Science	3.	3 years, 180 ECTS	/	
	Medicine	1.	6 years, 360 ECTS	/	
	Biomedical Technology	3.	3 years, 180 ECTS	/	
	Agriculture	1., 2., 3.	1. and 3. degree: 3 years, 180 ECTS;	/	

			2. degree: 2 years, 120 ECTS		
	Livestock	1.	3 years, 180 ECTS	/	
	Organic Agriculture	1.	3 years, 180 ECTS	Production Systems and Sustainable Development	
	Biosystems Engineering	1.	3 years, 180 ECTS	/	
	Management in agrifood and rural development	1.	3 years, 180 ECTS	Production Systems and Sustainable Development	
	Food Safety	2.	2 years, 120 ECTS	Production Systems and Sustainable Development	
University of Ljubljana	Biology	1.	3 years, 180 ECTS	/	
	Biotechnology	1., 2.	1. degree: 3 years, 180 ECTS; 2. degree: 2 years, 120 ECTS	/	
	Agriculture-Agronomy	1.	3 years, 180 ECTS	/	
	Agriculture-Zootechnics	1.	3 years, 180 ECTS	/	
	Microbiology	1., 2.	2. degree: 2 years, 120 ECTS	/	
	Food Science and Nutrition	1.	3 years, 180 ECTS;	/	
	Agronomy	2.	2 years, 120 ECTS	Sustainable use of Grassland, Sustainable Agriculture	
	Ecology and Biodiversity	2.	2 years, 120 ECTS	/	

	Molecular Biology	2.	2 years, 120 ECTS	/	
	Structural and Functional Biology	2.	2 years, 120 ECTS	/	
	Animal Science	2.	2 years, 120 ECTS	/	
	Bioscience	3.	3 years, 180 ECTS	/	
	Medicine	1. (enovit magistrski študij, na spletu pod dodiplomski)	6 years, 360 ECTS	/	
	Biomedicine	3.	3 years, 180 ECTS	/	
	Environmental Protection	3.	3 years, 180 ECTS	Environmental and Social Aspects of Sustainable Development	
	Veterinary	1. (enovit mag. študij)	6 years, 360 ECTS	/	
University of Primorska	Biodiversity	1.	3 years, 180 ECTS	Management of Protected Areas and Sustainable Use	
	Mediterranean Agriculture	1.	3 years, 180 ECTS	Management of Protected	

				Areas and Sustainable Use	

3. Relevant Institutions related to SD in Slovenia

There are four (3) NGOs in Slovenia:

- Umanotera
- Institute for Sustainable Development
- Focus
- Slovenian evaluation Society

Descriptions and other information:

1.) Umanotera-The Slovenian Foundation for Sustainable Development

MISSION

Umanotera is translating the principles of sustainable development into a way of life by introducing examples of inspiring good practices and increasing the availability of benevolent products.

Through its activities Umanotera fosters the values of entrepreneurship, creativity, partnership and quality.

Why sustainable development?

Umanotera understands sustainable development as a dynamic balance between man and nature, which allows social justice and intergenerational solidarity. Sustainable development also means that people should exploit the unlimited capability of their minds instead of exploiting limited natural resources. Only in this way will we be able to leave our environment and resources to future generations in the best possible condition.

VISION: SLOVENIA AS A SUSTAINABLE SOCIETY
Mission:
Lighthouse of sustainable development practices
Initiator of necessary change
Organizational values:
Global awareness
Boldness

Freedom to decide and act
Collaboration and cooperation
Effectiveness

Key abilities of the organization:
Alternative way of thinking
Education and development of new social values and structures
Strategic networking of governmental, non-governmental and economic actors
Effective implementation of goals and projects

THE CONTENT OF THE STRATEGY
Policy development and the development of a sustainable society
Establishing structures for the development of a parallel economy
Raising awareness of the necessary changes and opportunities in the transition to a sustainable society
Systematic development of good practice
Effective development of the necessary products and services

Key stakeholders:
Government
Local Communities
NGOs

Companies
Individuals
Schools
The media

STRATEGIC AREAS AND GOALS
Low carbon society:
The releases of GHG (Greenhouse gases) in Slovenia by the year 2020 has to be within the national share of the carrying capacity of the planet
Socially just society:
Society, which replaces the GDP indicator by a more appropriate one, allows equal opportunities for al and offers solidarity

Locally self-reliant society:
Basic needs of Slovenia have to be covered by local resources (energy, food, water and other natural resources) within their carrying capacity by 2020
"Good society":
Non-government sector is equivalent to the public and private one - the employment rate in non-governmental sector is 6 per cent by 2020
Participatory democracy

UMANOTERA's PROJECTS

Plan B - Initiative for a Sustainable Development

Project Plan B is a network of Slovenian environmental non-governmental organizations (NGOs) and experts, forming a broad civil society platform for sustainable development in Slovenia, along with other interested stakeholders. The primary objective of the NGO network within Plan B is to support long-term sustainable operation of environmental NGOs and to strengthen the qualification of environmental NGOs in Slovenia in two ways: by encouraging their active role in the democratic processes of policy formulation and in monitoring implementation of policies, and also by encouraging their participation and partnership. A secondary objective of the project is to improve the awareness of citizens and to encourage their engagement in environmentally-oriented public matters.

Mirror to the Government

Mirror to the Government - Green Non-Governmental Monitor is designed to monitor and evaluate implementation of the commitments and legislation of the principles of sustainable development in various sectors. The project aims to measure the gap between pre-election promises and commitments in the field of environmental protection and sustainable development, and their post-election implementation. It also aims to reduce the implementation gap by government authorities and to promote civil society as an equal partner. The purpose of Mirror to the Government is also to promote interest in sustainable development among decision-makers and in the broader public.

Rituali Green Office

The Green Office project provides comprehensive support for companies and organizations with a business activity, that wish to reduce their harmful effects on the environment. It provides counseling, education and collaboration of like-minded people, and facilitating the exchange of experience and accesses to environmentally friendly products and services, while also promoting environmentally friendlier performance. For businesses and organizations participating in the project, the project also provides the possibility of increasing positive economic, environmental and social benefits.

Inconvenient Truth Slide Show

Vida Ogorelec Wagner, managing director of Umanotera, is a certified presenter of Al Gore’s Inconvenient Truth slide show. The lecture presents comprehensive and vivid description of problems of climate change on a global scale , updated with information on Slovenia. Vida received a certificate by The Climate Project, following training in Nashville and has given over 120 presentations to various audiences in Slovenia and internationally since 2007.

Additionally, Umanotera is very active on climate change, organising events and campaigns on this issue, raising public awareness and partnering with other organisations.

Planet of Change

Planet of Change is an innovative project with educational content for young people on the issue of climate change. The project, carried out in partnership with Toyota, aims at enabling pupils, students, teachers and professors a better access to materials that show the ever more pressing issue of climate change.

Krilca, Gifts with Magic Powers

Umanotera obtained the inspiration for the project Wings from a UK charity organisation The Charities Advisory Trust, which in 2003 introduced the innovative concept of giving Good Gifts. A special, thoughtful gift is given to one of the many good deeds by individual's choice from a catalogue. Since 2007, ethical, socially responsible and sustainable gifts are also available in Slovenia. Umanotera named the gifts Krilca, darila s čarobno močjo (Wings, Gifts with Magic Powers). The purpose of the project is to provide a permanent income to selected socially responsible projects in Slovenia, former Yugoslavian countries and developing countries. The gift recipient is presented with a personally dedicated illustrated gift card, informing him of the gift cause and the donor. All gift money goes to partner charity organisations, which are committed to employ it exclusively for the chosen gift purpose.

Etc.

Electronic Newsletters Etc. (ecological weekly circular) has offered up to date and reliable access to key contents in the areas of environmental protection, climate change and sustainable development since 2001. News is issued each week with rubrics; World, Slovenia, notices, publications and websites, campaigns, trailer world, trailer Slovenia. The number of recipients of the news is constantly expanding and now there are more than thousand.

Fair Trade shop 3MUHE

The shop 3MUHE (3FLIES) is the first store in Slovenia, where products using the principles of fair trade are on sale. It is a trading partnership which seeks greater equity in international trade. An increase of income and choices for poor producers from less developed regions and the return of their dignity are just some of the goals of fair trade. The shop 3MUHE in Stari trg 30, Ljubljana gives individuals real opportunities to change the world for the better. 3MUHE are the evidence that a fair purchase is possible.

2.) Institute for Sustainable Development (ISD) is a private non-profit institute founded in 1995.

The **broader objective** is implementation of the principles of sustainable development in the praxis as well as their integration into national and EU strategic development programmes.

S**pecific objectives** are:

- implementation of SD sustainable development in agriculture and rural development,
- protection of nature in agriculture and by the help of agriculture, and
- enhancement of living connections between urban – rural – nature.

Topics of ISD work are:

- Organic farming – conversion, technologies, system approach; support of marketing initiatives
- Implementation of sustainable development principles in policy and practice
- Protection of environment and biodiversity, sustainable management of natural resources in agriculture
- Agricultural and rural development policy
- Millenium Development Goals and organic farming
- Impact of our lifestyle (focus: food, fodder, fuel) on Developing Countries
- Innovative projects of sustainable rural development
- Holistic approach to nutrition and quality of food
- Sustainable production and consumption / lifestyle
- Eco-tourism / agro-eco-tourism
- Enhancing role of non-governmental organisations in development of strategic programmes on different levels (national, EU, international) and their implementation.

Methods of ISD work:

- Research and development
- Providing advisory and expertise (especially in organic farming)
- Informing, awareness raising, training, education, publication
- Organisation of conferences, seminars, workshops and other public events
- Networking and lobbying
- Focused work with target groups (farmers, rural population, experts, children...)

ISD is an active member of:

- EEB – European Environmental Bureau
- IFOAM – International Federation of Organic Agriculture Movements and IFOAM EU Regional Group

SOME RESEARCH PROJECTS

EKOTRG - Analysis of Situation and Potentials for Growth of Supply of Organic Products in the Context of the Objectives Set by the Action Plan for Development of Organic Farming in Slovenia Until 2015. Partner: Biotechnical Faculty, Dept. Zootechnology. Financial support: CRP - national Targeted Research Programme, 2008-2010.

Partner in the EU research project **EUCEEOFP - Further Development of Organic Farming Policy in Europe, with Particular Emphasis on EU Enlargement**, 5th Framework Programme, 2003-2006. A consortium of 8 partners. http://www.irs.aber.ac.uk/euceeofp/index.html

Partner in **ORGAP – European Action Plan of Organic Food and Farming**. Development of criteria and procedures for the evaluation of the EU Action Plan for Organic Farming, SSA, 6th Framework Programme, 2005-2007. A consortium of 10 partners. http://www.orgap.org/

Partner in **SAFO - Sustaining Animal Health and Food Safety in Organic Farming**. 6th Framework Programme, Concerted Action, EU QRLT – 2001 – 02541, 2003-2005. http://www.safonetwork.org/

Partner in **Structural Problems and Development Challenges of Slovenian Rural Areas in the European Frame (Strukturni problemi in razvojni izzivi slovenskega podeželja v evropski razsežnosti**). Partners: FF - Department for Geography; BF - Institute for Agricultural Economics; Institute for Sustainable Development. Co-financed by: Ministry of Higher Education, Science and Technology; Ministry of Agriculture, Forestry and Food as a national Targeted Research Programme. 2004-2005.

Participation in **ORGIN – Organic Inputs Evaluation**. The objective of the project is to develop recommendations for harmonized and standardized procedures for the evaluation of plant protection products, as well as for fertilizers and soil conditioners authorized for use in organic agriculture according to Council Regulation 2092/91. Concerted Action, 5th Framework Programme. 2003-2005. http://www.organicinputs.org/

Participation in **ORGREV – Organic Farming Revision**. The overall objective of the project is to provide recommendations for development of the EU regulation for organic agriculture. 6th Framework Programme. http://www.organic-revision.org/

SUPPORT AND DEVELOPMENT PROJECTS

"The leap ahead: Implementation of the Slovenian Action plan for organic farming". Partners: Organic Farmers' Association Central Slovenia, Umanotera; DEBIO (Norway). Financial support: Financial Mechanism EGP and Norwegian Financial Mechanism, July 2008 - December 2009.

"ECOFEST and ECOWEEK: Fostering Sustainable Consumption". Project aimed at **a**wareness-raising and promotion of organic food and farming, ecological products and services, Fair Trade movement and FT products, Sustainable and healthy Lifestyles. Phase II (2008-2010) upgraded on the basis of Phase I (2002-2007). Support: City Municipality of Ljubljana, Min Envi, Min Agri, others.

Partner in **Plan B for Slovenia: Initiative for Sustainable Development** (coordinated by Umanotera, http://www.planbzaslovenijo.si/english).

"Conversion of farms in the Community of Ljubljana into organic agriculture". Facilitation of conversion of urban and peri-urban farms, situated in environmentally sensitive areas of capital city's community, into organic farms). Funded by the City Community of Ljubljana. 1998-2009.

"Organic Farm as a Workshop on Environment Protection". Development and implementation of education on environment protection and organic farming on organic farms, for the children in primary schools. Funded by the City Community of Ljubljana. 2000-2009, on-going.

Coordination of **"Organic farmers' market in Ljubljana".** Setting-up, co-ordination and further development and of the first organic farmers' market in Slovenia and support of other organic marketing initiatives. Funded by the City Community of Ljubljana. 1999-2009, on-going.

"Preparations of Slovenian Environmental NGOs for Slovenian Presidency to the EU Council".

"**NGO contribution to the national and EU Action plan on organic farming and promotion of the public debate"**. Organisation of workshops for representatives of the civil sector (NGOs); governmental officials, business etc. on the further development of organic farming in Slovenia and in the EU; promotion of implementation of sustainable rural development and organic farming. Funded by EU/PHARE SP Programme of the Delegation of European Commission in the RS,

Ministry of Environment and Information Office of the Government of RS. 2004-2005.

"**Sun Kitchen: let's cook and eat organic and healthy".** Development of trainings on organic food and farming and healthy nutrition for primary and secondary school teachers and organic farmers, preparation of a toolkit / manual for teachers, establishing co-operation between schools and organic farms, and a concourse "7 top breakfasts from the Sun Kitchen" for school classes. In co-operation with USOFA (Zveza BIODAR). Co-funded by the Ministy of Health. 2003-2005.

Partner in the project **YOUTH-FARM - Educational kit for young farmers in the accession countries**. Leonardo da Vinci programme, 2003-2006. Elaboration of training modules for young farmers in the new EU member states.

Participation in the project **»NGO Environmental centre«** (a consortium of 6 NGOs), since 2005**.**

»Common website EKOKMETIJSTVO«. Development of a website with information on organic farming, Slovenian organisations active in organic farming and current agenda of events related to organic farming and food, nutrition as well as »eco & healthy« lifestyle. Co-funded by: Information Office of the Government of Slovenia. 2005.

Partner in **"Sustainable Europe - Rural Educational Centres (SEREC)"**. Partners from PL, UK, DK, SK, IR, IT, PT, PL, PL, SI. Co-funded by Socrates/Grundtvig, EU. 2004-2005. http://www.ziarno.org.pl/grundtvig4.htm

Partner in **"GMO and Organic Farming".** Organisation of »8th Ekosimpozij Alpe Jadran«, an international conference in Ljubljana, in partnership with USOFA (Zveza BIODAR). Co-funded by: Delegation of the European Commission in the RS, City Community of Ljubljana, Ministry of Environment. 2004-2005.

"ECO-AGRO-TOURISM". Development of specific training and manual on ecotourism on organic farms. 2002-2003, co-funded by EU/PHARE SP Programme of the Delegation of European Commission in the RS , Information Office of the Government of Slovenia. 2003.

"Creating a favourable environment for sustainable rural development initiatives based on quality of agricultural production, co-operation and nature protection". Workshops, conference and a publication on rural development obstacles in Slovenia and their removal, with regard to sustainable rural development in the country and in the light of accession to the EU. 2002, funded by EU/PHARE SP Programme of the Delegation of European Commission in the RS.

EDUCATION/INFORMATION

Regular organisation of training courses and lectures on organic farming and food as well as eco-healthy-sustanable lifestyle and sustainable consumption.

3.) Focus

Focus Association for Sustainable Development is an independent, non-governmental, non-profit and apolitical association of individuals. Their work covers the following areas: climate change, energy, mobility, environmental fiscal reform and consumption.

Activities encompass: organising round tables and workshops, projects, awareness raising, co-operation and networking, following the work of the government, its institutions and local communities, analysing the developments in the fields of our activity, media work, participation in the decision-making processes on the national and international level, street actions and any other activity that contributes to the aim of Focus.

4.) Slovenian Evaluation Society

1. Administration

SDE (ID code 2376784000/AJPES) has been established on 7. January 2008 in Ljubljana. SDE is non-governmental, not-for profit and non-professional organisation comprised of academics, practitioners and users of program and project evaluation in a variety of fields-regional and rural development, spatial, urban and landscape planning, education, social services, business, and others. Activity of SDE is based on voluntary contribution of its members (10+) and non-members (350+).

SDE is a member of National Evaluation Societies of Europe and observer in European Evaluation Society. SDE is a member of Slovenian spatial network and a member of the Slovenian network for welfare state. SDE is also member of local civil initiatives.

2. Activity

Activity of the Society are organised in three permanent commissions:

1. Commission for ethical codex and evaluation standards (COD) - its tasks are to work on evaluation standards and ethical codex of evaluators;

2. Commission for meta-evaluation (MET) - its tasks are to evaluate results of evaluation processes from the aspect of codex and standards;

3. Commission for evaluation studies (STU) - its tasks is to collect fundamental and also intermediate new knowledge in the area (not only in evaluation but also in complexity theory, system theory, formal system, anthropology that is relevant for evaluation etc).

Society operates as a platform of the civil society aimed at reconstruction of the administrative evaluation system and at promotion of independent but effective evaluation of public policies in Slovenia and in European union. The Society does not limit its activity to members and their immediate concerns but operates as an 'incubator' of evaluation efforts for members and non-member alike. In line with this the Society established a network of evaluators, it is publishing working paper series and newsletter as a free of charge service to members and non-members; it is serving as a facilitator of activities and processes in the area of evaluation.

3. Formal structure of the Society

Chairman of the COD - Jože Grabar Kos, spatial planner, publicist and activist.

Chairman of the MET - Metod Dolinšek, international consultant.

Chairman of the STU - dr. Pavle Gmeiner, retired evaluator.

Arbitrator and Conflict Mediator - dr. Darko Štrajn, scientific councillor.

Supervisor - mag. Metod Dolinšek, International Consultant.

Chairman of the SDE - mag. Bojan Radej, independent researcher.

4. Vision and mission of the Society

Slovenian Evaluation Society has been established with the vision to affirm neutral evaluation of social phenomena, observed as complex. Social complexity means that any individual person or theory is able to fully comprehend social complexity - such as sustainable development - and its multiple meanings are persistently disagreed

collectively. What one sees and evaluates is always predefined in scope and scale of his or her observation.

There are incommensurable viewpoints and values with regard to different social realities, such as economic, social and environmental, or local and global, which provide us with very different 'numeraires' and views of the world, and they are not reducible to one common denominator. The fact that variegated forms of welfare need to be taken into account in evaluation implies that 'different principles of social primacy and legitimacy must be reckoned with and reconciled' (Wacquant). When confronted with multidisciplinary of social issues involving scientific controversy, even competent, honest and disinterested scientists may arrive at different conclusions because of systematic differences in the way they summarise available information of one and the same world (Kuhn). Kuhn concludes that theories and scientists are unable to truly reflect reality. When values are based on incommensurable oppositions, there is no objective basis for rational choice between theories and than no neutral observation of social reality is possible.

This considered, the evaluator would be seen as a kind of social conflict accountant and the assessment is his or her tool for diagnosing the 'dark matter' of the universe of social oppositions and a tool for re-processing them into a potential energy for progress. Evaluator needs to be equipped for manipulation of weak and strong oppositions with approaches that go beyond simple minded reductionism that can "increase capacity for thought and increase pool of possible reasons" (Habermas). In this way evaluator can invoke "the Foucault effect", depriving binary and antagonistic social practices of their exclusive necessity, extending the bounds of the thinkable and progressing of reason to permit the invention of others, and therefore become a real factor of change. In this way, an evaluator can *make use of conflicts instead of trying to ignore or eliminate them* (Donzelot).

5. Activities of the Society

1 Round tables & Public Lectures

2 Publishing

3 Networking

5. Good practices and relevant experiences in the Higher Education Institutions in Slovenia

5.A. Activities to implement or promote the SD (conferences about SD, energy and water efficiency measures, environmental protection measures, green transporting, training programms in SD for academic staff, instruction materials of SD….)

University	**Activities**
University of Ljubljana	Scientific conferences and symposiums
University of Maribor	Workshops, different projects, developing a methodology for ranking of universities according to indicators of sustainable development by University teachers
University of Primorska	Debates and round tables, scientific conferences

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN SPAIN

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1.- Sustainable Development (SD) policies in Spain:

The Spanish State administration approved the "Spanish Sustainable Development Strategy (SSDS)" in November 2007. This Strategy has the following priority areas: the climate change problem and clean energies, sustainability in transport, guidelines for achieving sustainable production and consumption, issues regarding to the public health challenges, natural resources management, the social projection of sustainability in relation to demography and migration and the fight against poverty in the world. Therefore, it has an approach consistent with the strategic vision of the EU, fostering an integrated approach to the economic, social, environmental and global of the sustainable development with the following objectives: to ensure economic prosperity, ensure the protection of environment, prevent the natural resources degradation, promote greater social cohesion, taking into account current demographic trends, and contribute generously to the development of disadvantaged countries according with the global sustainability.

This strategy has been developed by the Interministerial Group for the Review of the Sustainable Development Strategy of the European Union and the preparation of the Spanish Strategy for Sustainable Development, coordinated by the Economic Bureau of Spanish Prime Minister. The group, which includes representatives from most of the Ministries, is chaired by the State Secretariat for Economic Affairs and the Undersecretary of the Ministry of Environment act as secretariat.

The 2008-2012 Action Plan, the National Waste Plan, Sustainable Mobility Plans or the Spanish Strategy for Sustainable Urban and Local, are related to the production and consumption. The Renewable Energies Plan (2005-2010), the strategic line of R + D + i in energy and climate change (within the National R + D + i 2008-2011), the National Allocation Plan 2008-2012 and the National Plan for Adaptation to Climate Change, are related with the climate change. The Global Programme of Actions for the Management and Use of Water (A.G.U.A), the National Plan for Water Quality: Sewage and Treatment (2007-2015), the River Restoration Plan and the Plan of Conservation and Improving the Hydraulic Public Domain , the Natural Heritage and Biodiversity Law, the Strategic Plan for the Integrated Management of the Coastal Zone and the National Action Program to Combat Desertification, are related to conservation and

natural resource management and territory regulation. The Organic Law for Effective Equality of Women and Men and the Strategic Plan for Citizenship and Integration 2007-2010, are intended to cover the areas of poverty, employment and social cohesion. Research programs on environmental pollutants, the Strategy for Nutrition, Physical Activity and Prevention of Obesity (NAOS) and the Tobacco Prevention Law, deal with the possible implications of sustainability in the field of public health. Finally, the reform of the Spanish International Cooperation Agency (AECI), the Environmental Spanish Strategy and Master Plan for Spanish Cooperation 2005-2008, cover the objectives of international cooperation.

Several of these actions are fully legislated, and many of them currently have specific grants aimed at reducing the negative effects or promote positive behaviors related to sustainable development. However, such actions do not include specific statements about university education in any way, although it could be implied in some of the sectorial applications.

Ten of the Autonomous Communities that make up the Spanish State have sustainability strategies. These strategies have different characteristics but the objectives in their fundamental concepts are similar. Such communities are, in order of seniority, the following: Castilla y Leon, Navarra, Pais Vasco, Valencia, Andalucia, La Rioja, Murcia, Asturias, Catalonia and Extremadura. In the case of the other communities, the Community of Madrid has a guide for sustainability since 2006, with characteristics very similar to the strategies of communities mentioned above, the communities of Aragon and Galicia have strategies mainly focused in sustainable rural development; the region of Cantabria has sustainability strategy currently under discussion in the regional parliament, the Canary Islands and Castilla-La Mancha have quite advanced drafts on this issue and the Islas Baleares Community tackle the sustainability development through a foundation mainly focused towards the tourism sector. In all these cases, specific grants are similar to those of the state, acting in some cases the Autonomous Communities in conjunction with the central government or as intermediaries in administrative procedures.

Therefore, the values of the indicators “1.A” of the guidelines for Spain are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ Existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

In some of the strategies mentioned above, education is referred as one of the main factors of the social sustainability, or as a tool for transmitting knowledge about the fundamentals of sustainability in the different educational levels. Some Autonomous Communities make specific references to university education in their strategies, but at national level it is rare these strategies specify the involvement of higher education in the sustainable development. ALBA [1] stand out that in the Spanish case there are not specific ministry programs that promotes the involvement of universities in

sustainable development, neither from the Ministry of Education nor the Ministry of Environment, although there are in some regional governments.
The strategy of Castilla y Leon promotes the implementation of greening programs in all community universities. In Catalonia the strategy is focused on ensure that university degrees with the greatest influence on sustainability be greened and on promote specific areas of research in different fields of education. The Strategy of Valencia refers to the university education system in relation to its potential in professional training and research capacity in the field of sustainability. The Strategy of Sustainable Development of La Rioja mentions universities can participate in sustainability processes through Agenda 21 projects and research works. In the Autonomous Community of Madrid there is a commitment of universities implement environmental management system that make possible analyze and evaluate the activities in terms of environmental impacts and give adequate environmental information and training to all students.

Therefore, the values of the indicators "1.B" of the guidelines for Spain are:
- ✓ No existence of specific educational national institutions about SD
- ✓ Existence of specific educational regional (not national) policies about SD
- ✓ Existence of specific educational regional (not national) legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ No existence of specific subventions about education in SD

ALBA (2007) shows that in Spain have been the universities who have taken the initiative to undertake actions related to sustainability, either by training or research in this area, either in management and environmental awareness in their campuses. Experiences and university policies on sustainable development in Spain are coordinated by the Conference of Rectors of Spanish Universities (CRUE), which is a non-profit association, founded in 1994 with the aim of serving as a meeting point of debate. Currently the members of CRUE are 50 public and 24 private universities. One of its sectorial committees covering Environmental Quality, Sustainable Development and Risk Prevention (CADEP) with a working group on Environmental Quality and Sustainable Development, which was approved in September 2002 and structured as such in April 2005. This working group has submitted in February 2011 a system of indicators to evaluate the sustainability in the universities. One section of this system is dedicated to teaching and research in universities, with 13 indicators for teaching and 16 for research or technology transfer. The data obtained from this study, which is currently in progress, will supplement the specific results for the Life Sciences presented in this paper.

In brief, it may be said that the majority of Spanish universities have a policy on sustainable development, but only in some universities there are departments that teach in this subject.

Therefore, the values of the indicators "1.C" of the guidelines for Spain are:
- ✓ Existence of specific university policies about SD: In the majority of the universities

✓ Existence of specific units or departments about SD: In some universities

The Sixth Framework Programme (2000-2006) of the European Union, establish a priority line dedicated to "Sustainable development, global change and ecosystems", with the aim of strengthening scientific and technological capabilities necessary to integrate environmental, economic and social terms, especially renewable energy, transport and sustainable management of land and marine resources in Europe. In addition there is a strategic line of R + D + i in energy and climate change within the National R + D + i 2008-2011. This line includes aspects about sustainable development.

Therefore, the value of the indicator "1.D" of the guidelines for Spain is:

✓ Existence of specific programs about SD

2.- SD University Studies in Spain:

In Annex A has be included a table with the specific studies and subjects in Life Sciences about sustainable development. In this table the different studies or subjects has been grouped in three categories that include all fields listed in the guidelines as belonging to Life Sciences, these categories are: Health Sciences, Biological Sciences and Bio-Engineering. In addition, these studies and subjects have been grouped in the five possible types of Spanish university studies: undergraduate, master, "licenciaturas" (long cycle studies non adapted to the EHEA), doctorate and non-official studies. It is important to note that "licenciaturas" will disappear in few years because of have to be transformed in degrees adapted to the Bologna Process.

This table shown that only 9.5 % of Spanish universities have specific studies in Life Sciences about sustainable development. These studies are official masters, doctorates and non-official courses. Six of these studies correspond to Biological Sciences and nine to Bio-Engineering.

Therefore, the value of the indicator "2.A" of the guidelines for Spain is:

✓ Existence of specific studies about SD: In few universities

However, in the table can also be seen that 71.6 % of universities have specific courses on sustainable development related to Life Sciences. From these subjects 16.49 % belong to Health Sciences, 55.85 % belong to Biological Sciences and 27.66 % belong to Bio-Engineering. Regarding to the type of studies 14.36 % are in doctorates, 27.66 % are in masters, 13.29 % are in "licenciaturas", 27.13 % are in undergraduate and 17.56 % are in non-official studies.

Health Sciences	4	10	5	9	3	31 (16,49%)
Biological Sciences	*14*	26	13	29	23	105 (55.85%)
Bio-Engineering	9	16	7	13	7	52 (27,66%)
Total	27 (14.36%)	52 (27,66%)	25 (13.29%)	51 (27.13%)	33 (17.56%)	188

Table 1. Number of Spanish universities with specific subjects of Sustainable Development

Therefore, the value of the indicator "2.B" of the guidelines for Spain is:

✓ Existence of specific subjects about SD in the degrees: In the majority of the degrees

I has been unable to access detailed information for all subjects on sustainable development, therefore, cannot be made a precise description of their contents. However, considering that except for "licenciaturas", diplomas adapted to the Bologna Process should take a practical approach, and these are the majority, can be said that most of the courses on sustainable development have some sort of practical activities.

Therefore, the value of the indicator "2.C" of the guidelines for Spain is:

✓ Existence of specific practical activities about SD in the degrees: In the majority of the degrees

Regarding to how the education in Life Sciences contribute to SD in Spain. In Spain there are other disciplines, outside of Life Sciences, which tackle sustainable development. Specifically, has been found 38 titles on sustainable development in the Spanish universities, of which only 15 belong to life sciences discipline. Of those that not belong to life sciences 26.2 % are in Architecture, 21.7 % are in social and legal sciences, 21.7 % are related to Chemistry, 21.7 % are related to Energy and 8.7 % are in Humanities. Therefore, despite Life Sciences are very significant in the university education on sustainable development, there are other disciplines that are also relevant. However, all aspects of the sustainable development related to biology, health or bio-engineering are mainly dealt with in life sciences studies.

In 2010 CADEP (Committee of Environmental Quality, Sustainable Development and Risk Prevention) organized a conference about the integration of sustainable criteria in the university curricula [2]. In this congress, using the information of the University of Cadiz, were identified the barriers of sustainability criteria integration in the university curricula and the corresponding solutions. Such information is shown in the following table:

Barriers	Solutions
Different Departments of the University are not well connected	Review the organization
Tasks overlapping	Coordinate the tasks
Development of programs not well connected	Technical assessment
Inadequate funding	
Competitive model	Cooperative model
Verticality	Horizontality
Pressure in the search for resources and	

misallocation of resources	
Bureaucracy	Improve the communication between students, academic and no academic staff.
Few promotion of the "Green Office"	Finance and provide grants for promote education in sustainability
The University does not assume the social demands and students do not demand it	Impact on lower education levels, primary and secondary education. Offer sustainability as an institutional duty
Lack of prioritization criteria	Partition between areas of knowledge
Strategic framework not adapted to the different departments structure	Coherent policy framework and a more appropriate structural framework
Oversized bureaucracy. Fear of bureaucracy	Search mechanisms of coordination between management, teaching and research
Lack of connection between different knowledge areas	Good complementarity between areas. Good diagnostic.
Deficient training of academic staff, especially in novice professors	Initial training requirement
Students with compartmentalized knowledge, there is a preference for lectures	More participative teaching and selection of professors with sustainability criteria
Very fragmented university	Coordination between units, creating partnerships between professors.

Table 2. Barriers of sustainability criteria integration in the university curricula and the corresponding solutions

3.- Relevant Institutions related to SD in Spain:

In Spain there are many public institutions related to sustainable development, state and regional, provincial and even local. It is also important to note that more and more private institutions tackle their activities taking into account different strategies of sustainable development. However, not all of them have a direct relationship to education or research.

As there are multiple approaches of sustainable development, are very diverse activities related to its development. Among the national institutions it must be emphasized the Observatory of Sustainability in Spain (OSDE) which is responsible for: integrated tracking of sustainability at the national level, promoting activities related to the knowledge of sustainable processes and techniques, preparing research and dissemination documentation, supporting the decision-making processes and supporting the participation both public and private institutions.

More directly linked to the goal of energy efficiency throughout the sustainable development, the Institute for Diversification and Saving of Energy (IDAE) is the organism that brings together all the proposals related to saving and efficiency of energy and promoting the use of renewable energies. For this purpose, has the support of many regional agencies (EREN, AGECAM, AGENEX, AVEN, CAEEM, EVE, FAEN, FERNERCOM, ICAEM, INEGA, etc.)

The Spanish Network of Cities for Climate is the forum in which to exchange knowledge and experiences that allow Spanish cities to achieve a sustainable development model. Along with this network, the Sustainable Cities Foundation promotes responsible consumption, claims the scientific and technological development that promotes sustainability and implementation of socio-political actions that contribute to eliminate unsustainable imbalances.

From the educational point of view, Biosphere Project (Proyecto Biosfera) tackles the development of teaching materials related to sustainable education. The project Movilab assumes this role from the perspective of research and OTRI Network is responsible for the transfer of results to the companies that can apply and implement them. In this sense, it is interesting to note the role undertaken by the Education and Sustainability magazine (Educacion y sostenibilidad) which is oriented to groups working in education and provides to educators tools and ideas to integrate different aspects of sustainability in the educational activities. Environmental Education Center (CENEAM) of the Ministry of Environment, Rural and Marine Affairs, also assumes the role of disseminating specialized information in environmental education and sustainable development by promoting cooperation between public and private institutions both nationally and internationally.

4.- International cooperation in ESD (Education in SD) in Spain:

Spain participates in several international initiatives related to sustainable development. Among them it must be emphasized the Regional Centre of Expertise of Education for Sustainable Development that from the United Nations University offers programs related to education oriented to sustainable development, offering training programs and learning materials and promoting the implementation of awareness campaigns to increase public awareness of the vital role that education plays in the EDS. Spain also participates in the Education for Sustainable Development of UNESCO whose goal is to collaborate on interconnection of entities associated with ESD and thereby improve the quality of education in SD, to support member countries in the development and promotion of these EDS activities and report on the developed sustainability processes through the preparation of dissemination materials and documentation.

Among the NGOs, it must be emphasized the important role that Spain assume in institutions as WWF-Spain (before ADENA-WWF), Ecologistas en Accion, Mobility Foundation (Fundacion Movilidad), Bicycle Club of Catalonia (BAC), La Via Campesina, Greenpeace, SEO, Natural Heritage Foundation (Fundación Patrimonio Natural), etc. This institutions tackle SD from diverse points of view, many of them of great interest to the public.

5.- Good practices and relevant experiences in the Higher Education Institutions in Spain:

The activities carried out by the Spanish universities to implement or promote the SD can be summarized as follows:

- Responsible consumption
- Waste management and pollution control
- Energy saving and efficiency
- Water saving
- Sustainable Mobility
- Environmental Education and Training
- Use of sustainable criteria in purchase decisions
- Promotion of sustainability
- Voluntary activities

Some universities have been developed manuals about these good practices. In addition National, regional and local institutions, develop many information about good practices for sustainability or environmental protection, including materials for education.

6.- Possible future actions in Spain:

In Spain the most important initiative in the integration of sustainability in university studies is that undertaken by the CRUE (Conference of Rectors of Spanish Universities). In 2002, within this institution, it was set up a commission for Environmental Quality, Sustainable Development and Prevention of risks in the Spanish Universities (CADEP). The working groups of this commission are:

- Sustainable Curriculum
- Environmental Participation and Volunteering
- Labor Risks Prevention
- University Sustainability Assessment
- Environmental Improvements in university buildings
- Sustainable procurement
- University Planning and Sustainability
- University and territory
- University and Mobility
- Healthy Universities

In particular, the Sustainable Curriculum Group is in charge of to incorporate sustainability criteria in teaching and student learning, so that sustainability permeates in all aspects of learning.

The CADEP adopted in 2005 guidelines to introduce the sustainability in the university curricula [3]. From these guidelines a set of criteria and have been developed. At this moment, this working group has submitted in February 2011 a system of indicators to evaluate the sustainability in the universities. One section of this system is dedicated

to teaching and research in universities, with 13 indicators for teaching and 16 for research or technology transfer. The data obtained from this study, which is currently in progress, will supplement the specific results for the Life Sciences presented in this paper. The questionnaire will be complemented with visits to the universities.

All these actions demonstrate a clear commitment from the universities which will result in improvements to the introduction of sustainability into them.

In the part 2 of this paper it has been described the barriers of sustainability criteria integration in the university and their solutions. Considering this information, the possible future actions could be summarized as follows:

- Increase the coordination between institutions and departments
- Coordination between students, academic and non-academic staff
- Increase funding
- Increase promotion
- Develop specific grants
- Introduce sustainability criteria in the selection of professors
- Develop training programs for professors (specially for novice professors)
- Act in the previews education levels
- Use of sustainable criteria in purchase decisions

7.- References

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Annex A - Specific studies and subjects in Life Sciences about sustainable development

HS = Health Sciences BS = Biological Sciences BE = Bio-engineering
D = Doctorate M= Master L= Long Cycle Degrees G=Undergraduate N=Non official studies
X = Subjects about SD XX = Specific Studies about SD

Region / University	HS					BS					BE				
	D	M	L	G	N	D	M	L	G	N	D	M	L	G	N
Andalucía															
Universidad de Almería		X	X			X	X	X	X	X			X		
Universidad de Cádiz		X					X		X	X					
Universidad de Córdoba		X	X	X		X	X	X		X	X	X	X	X	X
Universidad de Granada				X			X	X	X						X
Universidad de Huelva	X	X				X	X	X	X		X	X		X	
Universidad Internacional de Andalucía							X			X	X	X			X
Universidad de Jaén							X		X						
Universidad de Málaga						X	X			X					
Universidad Pablo de Olavide						X	X		X	X					
Universidad de Sevilla										X				X	
Aragón															
Universidad de Zaragoza				X					X					X	
Universidad San Jorge										X					
Canarias															
Universidad de La Laguna							X		X					X	
Universidad Palmas G. Canaria	X	X		X		X	X		X	X					
Cantabria															
Universidad de Cantabria												X			
Universidad Menéndez Pelayo (UIMP)							X			X					
Castilla La Mancha															
Universidad de Castilla La Mancha								X	X	X					
Castilla y León															
Universidad de Burgos			X							X					
Universidad Católica de Ávila															
Universidad Europea M. Cervantes								X	X	X		X	X	X	
IE Universidad									X	X					
Universidad de León		X	X	X		X	X	X	X	X	X	X	X	X	X
Universidad Pontificia de Salamanca										X					
Universidad de Salamanca								X	X	X		X			X
Universidad de Valladolid												X	X	X	

Region / University	HS					BS					BE				
	D	M	L	G	N	D	M	L	G	N	D	M	L	G	N
Catalunya															
Universitat Abat Oliba CEU															
Universitat Autónoma de Barcelona		X		X	X	X	X	X	X	X					
Universitat de Barcelona	X			X		X	X	X	X	X					
Universitat de Girona						X		X	X					X	
Universitat Catalunya					X										
Universitat de Lleida		X		X	X										
Universitat Oberta Catalunya															
Universitat Politécnica de Catalunya				X			X				X	X	X	X	
Universitat Pompeu Fabra															
Universitat Ramon Llull			X												
Universitat Rovira i Virgili															
Universitat de Vic										X					
Comunidad de Madrid															
Universidad Alfonso X El Sabio															
Universidad de Alcalá							X		X						
Universidad Antonio de Nebrija															
Universidad Autónoma de Madrid							X	X	X	X					
Universidad Camilo José Cela															
Universidad Carlos III de Madrid										X					X
Universidad Complutense de Madrid		X				X	X		X	X					
Universidad a Distancia de Madrid															
Universidad Europea de Madrid															
Universidad Francisco de Vitoria															
Universidad a Distancia (UNED)								X	X						
Universidad Politécnica de Madrid											XX	XX	X	X	XX
Universidad Pontificia de Comillas															
Universidad Rey Juan Carlos									X						
Universidad de San Pablo-CEU															
Comunidad Foral de Navarra															
Universidad de Navarra							XX								
Universidad Pública de Navarra												X			

Region / University	HS					BS					BE				
	D	M	L	G	N	D	M	L	G	N	D	M	L	G	N
Comunitat Valenciana															
Universidad de Alicante	X	X					XX				X	X			
Universitat Jaume I															
Universidad Miguel Hernández									X					X	
Universitat Politècnica de València															
Universitat de València									X			X			
Universitat Cardenal Herrera-CEU															
Universidad "San Vicente Mártir"															
Extremadura															
Universidad de Extremadura							X		X						
Galicia															
Universidade da Coruña						X	X								
Universidade Santiago de Compostela											X	XX			
Universidad de Vigo							XX		X						
Illes Balears															
Universitat de Les Illes Balears															
La Rioja															
Universidad de La Rioja															
País Vasco															
Mondragon Unibertsitatea															
Universidad de Deusto															
Universidad del País Vasco							X		X						
Principado de Asturias															
Universidad de Oviedo						X			X					X	
Región de Murcia															
Universidad Politécnica de Cartagena											XX	X			
Universidad Católica de San Antonio												X			
Universidad de Murcia						XX	XX		X						

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN SWEDEN

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1. Sustainable Development (SD) policies in Sweden:

In Sweden most of such policies are integrated in the missions of different authorities and in relevant legislation.

A. Planning, investment and management strategies of the State and local governments to promote (SD) (Organization, structure, responsibilities, policies, legislation, subventions…). The following indicators must be included in the description:

✓ Existence of specific national institutions about SD

Commission on Sustainable Development (SLU:s vice chancellor was a member) – during Sweden's Presidency of the EU in the autumn of 2009

The Government set up an advisory Commission on Sustainable Development to strengthen cooperation and deepen the analysis of issues related to sustainable development.

The Commission comprised a broad spectrum of representatives from the business sector, independent organisations, the research community and political life. It was intended to serve as a forum for discussion, analysis and dialogue and, by adopting open working methods, to stimulate a broader dialogue in the community.

The Commission's work was action-oriented and focused on themes identified as essential for creating the conditions for sustainable development. Of particular interest were areas in which Sweden can develop internationally competitive concepts, technologies and services and thereby also contribute to global sustainable development.

The Commission was to analyse obstacles to sustainable development and develop cross-sectoral action strategies. Its work had an international perspective and a scientific base.

The Delegation for Sustainable Cities/Environmental Advisory Council

The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)

The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS) supports and disseminates information on research within its areas of responsibility. The Council promotes growth within the framework of an ecologically sustainable development.

The National Chemicals Inspectorate (KemI)
The National Chemicals Inspectorate (KemI) works to prevent damage to people and the environment caused by chemical and biotechnological products. The vision is for future generations to be able to live healthily in a good environment in a sustainable society.

The Board of the Swedish Nuclear Waste Fund (Kärnavfallsfonden)
The Board of the Swedish Nuclear Waste Fund administers funds set aside to finance future costs for dealing with spent nuclear fuel and other radioactive waste.

The Swedish Environmental Protection Agency (Naturvårdsverket)
The Swedish Environmental Protection Agency is a co-ordinator and promoter of environmental work, nationally, within the EU and internationally. The agency is responsible for producing and disseminating information in the field of the environment, it drafts proposals for objectives, strategies of measures and policy levers in environmental policy and implements environmental policy decisions. Its task is also to follow up and evaluate the environmental situation and work being undertaken on the environment, to be used as a basis for the continued development of environmental policy.

The Swedish Meteorological and Hydrological Institute (SMHI)
The Swedish Meteorological and Hydrological Institute (SMHI) provides climate- and waterdependent operations with background material to be used as a basis for planning and decision-making. The agency acts as a central government expert body on meteorology, hydrology and oceanography and is a resource in environmental work.

The Swedish Radiation Safety Authority
The Swedish Radiation Safety Authority has been a managing authority under the Ministry of the Environment since 1 July 2008, with national collective responsibility within the areas of radiation protection and nuclear safety.

The Energy Markets Inspectorate
The National Board of Housing, Building and Planning
The Swedish Energy Agency
The Swedish Environmental Protection Agency
The Swedish National Electrical Safety Board
The National Food Administration
The Swedish National Agency for Education
The Swedish National Agency for Higher Education
The Swedish International Development Cooperation Agency (Sida)
The Swedish National Heritage Board
Its mission is to play a proactive, coordinating role in heritage promotion efforts and to ensure that the historic environment is preserved in the most effective possible manner.

✓ Existence of specific national policies about SD

Swedish strategy for sustainable development,
Strategic Challenges - A Further Elaboration of the Swedish Strategy for Sustainable Development, Comm. 2005/06:126 (pdf 2.3 MB)
This communication represents a further elaboration of the Swedish strategy for sustainable development presented in 2004. The strategy covers all three dimensions of sustainable development: economic, social and environmental.
The strategy proceeds from a long-term vision of sustainable development. The communication also deals with the international sustainable development effort, including UN initiatives and the EU's strategy in the area.
The communication presents a set of indicators, including 12 headline indicators, for sustainable development.
Furthermore, four strategic challenges are emphasised. Opportunities and threats are highlighted, while objectives and measures are described. The challenges are:
- Building sustainable communities
- Encouraging good health on equal terms
- Meeting the demographic challenge
- Encouraging sustainable growth.
This communication also provides a general overview of the tools and horizontal conditions needed for effective implementation, as well as for the promotion of sustainable development as an objective, method and approach.

Using resources without using them up
Overall objectives
The Ministry for Rural Affairs' political activities will realise the vision through four overall objectives:

- *A dynamic and competitive business sector throughout the country, characterised by openness and diversity;*
- *An eco-efficient and resource-efficient green sector that plays a key role in Sweden's energy production;*
- *A green sector distinguished by concern, responsibility and high ethical standards.*
- *The green sector contributes to globally sustainable development.*

Plan of Action against Plant Nutrient Losses from Agriculture
The Swedish Climate Strategy
A policy for civil society

✓ Existence of specific national legislation about SD

The Constitution of Sweden
The Environmental Code (Miljöbalken)
The Plan and Building Act (Plan och bygglagen)
The Food Act (Livsmedelslag)
The Animal Welfare Act (Djurskyddslag)
The Fishery Conservation Areas Act (Lag om fiskevårdsområden)
The Forestry Act (Skogsvårdslag)
The Discrimination Act (Diskrimineringslagen)

The Health and Medical Service Act (Hälso- och sjukvårdslag)
The Social Insurance Act (Socialförsäkringslag)
The Unemployment Funds Act (Lag om arbetslöshetskassor)
The Unemployment Insurance Act (Lag om arbetslöshetsförsäkring)
The Parental Leave Act (Föräldraledighetslag)
The Wage Guarantee Act (Lönegarantilag)
The Working Hours Act (Arbetstidslag)
The Employment Protection Act (Lag om anställningsskydd)
The Work Environment Act (Arbetsmiljölag)
The Swedish Competition Act (Konkurrenslag)
The Marketing Act (Marknadsföringslag)
The Companies Act (Aktiebolagslag)
The Swedish Penal Code (Brottsbalk)
The Swedish Code of Judicial Procedure (Rättegångsbalk)

The 16 Environmental Quality Objectives are:

- *Reduced Climate Impact*
- *Clean Air*
- *Natural Acidification Only*
- *A Non-Toxic Environment*
- *A Protective Ozone Layer*
- *A Safe Radiation Environment*
- *Zero Eutrophication*
- *Flourishing Lakes and Streams*
- *Good-Quality Groundwater*
- *A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos*
- *Thriving Wetlands*
- *Sustainable Forests*
- *A Varied Agricultural Landscape*
- *A Magnificent Mountain Landscape*
- *A Good Built Environment*
- *A Rich Diversity of Plant and Animal Life*

✓ Existence of specific subventions about SD

Local Investment Programmes (LIP)
The local investment programmes (LIP) represent Sweden's largest single environmental initiative. The Swedish Parliament earmarked SEK 6.2 billion in grants for LIPs over the period 1998–2002 with the aim of improving ecological sustainability. A secondary aim was to contribute to higher employment.

Climate Investment Programmes (Klimp)
The Swedish Government's support to Climate Investment Programmes, "Klimp", is a tool for reaching the Swedish climate objective as formulated in the Swedish climate

strategy in 2002. Klimp has enabled municipalities and other local actors to receive grants for long-term investments that reduce greenhouse gas emissions.

B. Higher Education policies related to SD (Organization, structure, responsibilities, policies, legislation, integration in the accreditation systems, subventions…). The following indicators must be included in the description:

✓ Existence of specific educational national institutions about SD

There are no specific educational national institutions about SD in Sweden.

✓ Existence of specific educational national policies about SD

There are no specific educational national policies about SD in Sweden.

✓ Existence of specific educational national legislation about SD

The Higher Education Act (Högskolelagen)
The Higher Education Ordinance (Högskoleförordningen)
The Education Act (Skollagen)

✓ Existence of SD criteria in the accreditation systems of the university degrees

- In the majority of the universities

✓ Existence of specific subventions about education in SD

There are no specific subventions about education in SD in Sweden.

C. University policies and experiences (Obligation and possibilities of include SD competences or contents in Life Sciences Higher Education Studies, organization, policies, specific departments, influence of the Bologna process). The following indicators must be included in the description:

✓ Existence of specific university policies about SD

- In the majority of the universities

✓ Existence of specific units or departments about SD

- In the majority of the universities

At the ***Swedish University of Agricultural Sciences (SLU)*** there are several centers working with aspects of sustainability. For further information: http://www.slu.se/en/about-slu/units/collaborative-centres.

D. Research policies related to SD (Specific programs, grants…). The following indicator must be included in the description:

✓ Existence of specific programs about SD

- In the majority of the universities

The ***Swedish University of Agricultural Sciences (SLU)*** as the major Life Science University in Sweden has a Mission Statement:
SLU develops the understanding and sustainable use and management of biological natural resources. This is achieved by research, education and environmental monitoring and assessment, in collaboration with the surrounding community.

2. **SD University Studies in Sweden:**

A. Specific university studies in Life Sciences (Title, structure, duration, cycle, LLL…). The following indicator must be included in the description:

✓ Existence of specific studies about SD:

- In the majority of the degrees

B. SD specific subjects in Life Sciences university studies (Not mentioned before, difference levels). The following indicator must be included in the description:

✓ Existence of specific subjects about SD in the degrees:

- In the majority of the degrees

C. SD practical activities (practices in enterprises or in institutions, course works, etc). The following indicator must be included in the description:

✓ Existence of specific practical activities about SD in the degrees

- In some degrees

2.A. How do you think education in LS contribute to SD in your country.

Years of education for sustainable development in Sweden are one of the prerequisites for:

- *A quite high understanding and awareness of SD among the Swedish citizens and therefore a will to adapt their way of living (e.g. recycling,…).*
- *Educated people in the governmental offices → national policies and law are developed.*

2.B. Barriers for the integration of the SD and problems in the teaching methods

- *Rigid structure in some educational institutions – changes are sometimes difficult and time consuming.*
- *Still too little reflection about SD among the teachers.*
- *There needs to be a more systematic way for integrating SD in the teaching methods.*

3. **Relevant Institutions related to SD in Sweden:**

3.C. Research centers, governmental institutions, enterprises, associations and NGOs (description, influence on SD, participation in education,…)

Research centers in Sweden are most often connected to the universities. The major institutions related to SD in Sweden are:

Governmental:

- *The Swedish Environmental Protection Agency (Naturvårdsverket)*
- *The Swedish Board of Agriculture (Statens Jordbruksverk) – cooperates with SLU*
- *The Swedish Species Information Centre (SLU ArtDatabanken)*
- *The Swedish Biodiversity Centre (SLU and Uppsala University)*

NGOs:

- *The Swedish Society for Nature Conservation (SSNC, Naturskyddsföreningen)*
- *IWL (Project Management company that provides consultant services within the fields of Property & Construction)*
- *The Swedish Rural Economy and Agricultural Societies (Hushållningssällskapen): The Rural Economy and Agricultural Societies are independent members organisations dedicated to enhancing an enterprising spirit in rural areas and promoting good rural and urban living environments.*
- *The Federation of Swedish Farmers – LRF*
- *Svenskt sigill*
- *KRAV label*
  KRAV is a key player in the organic market in Sweden since 1985. They develop organic standards and promote the KRAV-label. The KRAV-label is well-known among Swedish consumers. The aided awareness is 98 percent!
  KRAVs vision is: "All production and consumption is sustainable and comes from a healthy earth". The label promise is "You get more". To the right you will find a link to the brand platform.
  KRAV is organised as an incorporated association with, at present, 27 members. They represent farmers, processors, trade and also consumer, environmental and animal welfare interests.
  Around 3 000 farmers and approximately 450 companies in processing and trade are associated to KRAV. At present there are more than 5 500 KRAV-certified products. Five certification bodies carry out inspections according to KRAV standards. You find them to the right.
  Organic production is present all around the world. KRAV is an active member of IFOAM – International Federation of Organic Agriculture Movements, an umbrella organisation which gathers organisations for farmers, scientists, educationalists and certifiers from almost every country in the world. KRAV takes an active part in developing the IFOAM standards and also works to influence the EU organic production legislation.
- *Odling i balans*

4. **International cooperation in ESD (Education in SD) Sweden:**

4.A. Policies (State and local governments, university...)

4.B. Experiences in ESD in Life Sciences (linked programs, participation of foreign professors or students, applicable exchange programs...)

- *Masterprogram in Agroecology – SLU Alnarp – cooperation with Etiopia and Uganda*
- *Masterprogram in Sustainable development – SLU Uppsala*

5. **Good practices and relevant experiences in Sweden:**
   A. Good practices and relevant experiences in SD (activities to implement or promote the SD)

Better air quality in Stockholm thanks to sewage sludge

The sewage treatment plants of the City of Stockholm, the capital of Sweden, produce biogas from the sludge. The gas can be used both for heating and as a vehicle gas and produces no net CO2 emissions.

Cardboard mill heats Lindesberg

In Lindesberg, in Sweden, the waste heat from the Korsnäs Frövi cardboard mill is distributed via the municipal district heating network.

Digested food waste powers Linköping's buses

Waste from canteens and restaurants is used to produce biogas in Linköping, Sweden. This has resulted in lower volumes of waste, better access to fossil-free fuel for the town's public transport and improved availability of biofertiliser for agriculture.

Hammarby Sjöstad shows an ecocycle-based approach

The goal for Hammarby Sjöstad in Stockholm, Sweden, was to halve the overall environmental impact compared with if the area had been built in the early 1990s.

Hammarby Sjöstadsverket tests new treatment methods

Hammarby Sjöstadsverket in Stockholm, Sweden, was built as part of the Hammarby Sjöstad initiative, with the aim of halving environmental impact by demonstrating new technology and innovative solutions.

Low energy use at Västervik sports centre

Västervik, in south Sweden, has saved both energy and money since modern energy efficiency equipment was installed in its swimming pool and bowling alley. Energy use in the sports centre has so far fallen by around 830 MWh/year.

Sunshine brings cheap heating to Kungälv

The second-largest solar heating facility in Europe is in the Municipality of Kungälv in Sweden. The plant delivers an average of 4 GWh of heat annually to the municipal district heating network.

Sustainable district in Malmö has become an international pioneer

Västra hamnen is a pilot project that shows how it is possible to create residential areas that are more ecologically sustainable and at the same time offer a pleasant environment for residents.

   B. Good practices and relevant experiences in ESD (academic activities, training programs for academic staff, instruction materials...)

At SLU we had seminars about Education for Sustainable development with examples from other universities in order to learn from each other. There are also special grants from SLU that teachers can apply for to run projects about ESD.
The WWF in Sweden has published a handout about ESD.

6. **Possible future actions in Sweden:**
   6.A. How could be improved the education and research in SD in your country?

We hope that the work with the I.S.L.E. network will give some of the answers.

6.B. How could be integrated the concept of SD in the Life Science Studies?

The social and economic part within sustainable development probably needs to be integrated more in the Life Science studies at SLU. More knowledge and awareness among the teachers is also needed.

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STATE OF THE ART OF SUSTAINABLE DEVELOPMENT IN HIGER EDUCATION IN THE NETHERLANDS

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Preface

Higher education in the Netherlands is offered at two types of institutions: research universities (universiteiten; WO, henceforth called universities) and universities of professional education also known as universities of applied science (hogescholen; HBO). The former comprise general universities and universities specialising in engineering and agriculture. The latter comprise general institutions and institutions specialising in a particular field, such as agriculture, fine and performing arts, or teacher training. There are 14 research universities that educate about 230.000 students and 39 universities of applied science that educate about 400.000 students. Approximately 25% students from research universities are studying in the life science sector (including 15% related to medicine and health) with the greater part following a degree at Wageningen University and approximately 5% of the students from universities of applied science are studying in the field of life science.

Since September 2002, the higher education system in the Netherlands has been organised around a three-cycle system consisting of Bachelor's, Master's and PhD degrees. At the same time, the ECTS credit system was adopted as a way of quantifying periods of study. The higher education system continues, however, to be a binary system with a distinction between research-oriented education and professional higher education.

1A. Sustainable Development (SD) policies in the Netherlands

The general state of mind of Sustainable Development in the Netherlands is high. This shows itself through a high activity of NGO's, companies, citizens, governments and media in the field of sustainable development. At the same time decision-making processes and changes are not always stimulating, entrepreneurs and pioneers to make fully use of the existing positive atmosphere. In order to understand sustainable development in the Netherlands it is relevant to understand that partners in civil society have taken many initiatives, mostly on their own instigation. Some of these

organizations committed themselves fully to this concept, others took the issue on board as part of their wider agenda. It is impossible to capture the full width of their activities.

In 2007 the minister of Spatial Planning and Environment asked for a Peer Review on the Dutch sustainability strategy of 2003. The Peer Review concluded that the existing Action Programme on Sustainable Development 'Sustainable Action' was not a coherent, systematic and integrated response to unsustainable trends and is *not a sustainable development strategy.* In response to this Peer Review the Government developed a new strategy on sustainable development called 'KADO' (Kabinetsbrede Aanpak Duurzame Ontwikkeling).

The focus in this new strategy is the organization of a process towards SD with a strong emphasis on communication. In this way it will be possible to connect the political course with the changes in society and initiatives from other companies and parties. To accomplish this, the government chose for a couple of theme's that are socially important and can strengthen the coherence between developmental cooperation, innovation and environmental policy. For every theme the targets are appointed for the long term.

The themes are :

- water and climate-adaptation
- sustainable energies
- biofuel and development of prosperity
- CO2-capture and storage
- biodiversity, food and meat
- sustainable building and rebuilding

The new strategy is also enforced through a sustainability agreement (duurzaamheidsakkoord) that was singned on the first of November 2007 by most Dutch ministries and Dutch companies. In this agreement they agree on an intensive cooperation to achieve clear goals for the reduction of greenhouse gasses, sustainable building, energy savings, sustainable mobility, sustainable procurement and the use of renewable energies and CSR (Corporate Social Responsibility)

Agentschap NL (SenterNovem) is responsible for executing sustainable policy and it also functions as an advisory organ for implementation of sustainability into society. It is part of the ministry of EL&I (economics, agriculture and innovation) (http://www.senternovem.nl/english/,January 2011).

Examples of research institutes evolved from this strategy are:

- Research centre Wetsus, a centre of excellence for sustainable water technology. Wetsus works on strategic cooperation for development of profitable and sustainable state of the art water treatment technology.

- Delta Academy, a cooperation of research institutes and universities of applied science to educate students to work on sustainable issues on the world water problems.
- Waddenacademy, a research centre that focuses on the sustainable development of the Waddensea area.
- Energy Valley, a cooperation of public and private partners to stimulate sustainable energies and innovation in the North of the Netherlands.

Legislation

The Netherlands has no specific national legislation on sustainable development. On the provincial and municipal level different arrangements occur, depending on regional and local decision making processes. Most provinces have sustainability coordinators with some organizational ad financial arrangements to work on issues of sustainable development, both inhouse and in their provincial region. Many municipalities have some sort of programme to stimulate sustainability, both in-house and within their community.

Institutional Arrangements

There are few formal institutional arrangements for sustainable development, the central government
has several programs and agencies that are dedicated to sustainable development.

The issue of sustainable development is seen and managed as a broad policy concept that includes many aspects of government policy in a comprehensive and integrated approach. Rather than organizing activities from a dedicated legal and governmental platform, the Dutch institutional arrangements around sustainable development on the national level are of a coordinating nature, acknowledging ministers have individual responsibility for mainstreaming sustainability in their own portfolios.

Despite the fact that these developments have not been implemented from a strategic platform aimed at committing all partners in each sector of society, the frontrunners have found themselves to be leaders of a growing group of organizations and institutions, that have taken on some form of sustainable development policy. One could state that sustainability spreads more like a virus than through any form of hierarchy.

Therefore, the values of the indicators “1.A” of the guidelines for the Netherlands are:

- ✓ Existence of specific national and regional institutions about SD
- ✓ Existence of specific national and regional policies about SD
- ✓ No existence of specific national and regional legislation about SD
- ✓ Existence of specific subventions about SD

1.B Higher Education policies related to SD

National Policy and Legislation

The Netherlands has no clear legislation about sustainable development in higher education. They do have some special agreements on sustainable operations. On 3 December 2008 the government signed an agreement with the council for Universities and Universities of applied science on energy reduction, called MJA3 and sustainable procurement. The agreement is to reach 2 % energy efficiency per year for a period of 15 years and to suffice for 50% to criteria for sustainable procurement, set by the government. Agentschap NL (Senter Novem) is the Agency that is responsible for monitoring the activities evolving from these agreements. There are universities and universities of applied science that actively participate on these agreements and use it as basis to work out other sustainability themes as well. University of applied science Hogeschool van Arnhem en Nijmegen (HAN) are leading in the Netherlands on energy saving and energy care systems and successfully link education with their own operations on the campus (http://specials.han.nl/focus/duurzaamheid/content/, January 2011).

For implementation of SD in curricula the government launched the Dutch programme "Learning for Sustainable Development" which tries to operationalize and practice the concept of learning on three levels (the individual, the organisation and learning society). An important part of LvDO is run by the provinces that fund regional and local initiatives aimed at raising awareness and influencing decision making processes. This program has sparked interest from other European countries (in UNECE context) as a best practice in regional and local outreach from the national level. LvDO also is an important player in the Dutch implementation of the UNESCO Decade for Education on Sustainable Development. LvDO is run by Agentschap NL. The goverment will execute an ambitious continuation on this program as it achieves serious results and is in line with the new National Strategy to start up a process for a integrated implementation on sustainability.

National Institutions about education for SD

DHO (Dutch Foundation and Network for sustainable higher education) is a network organization that works together with the project 'Learning for Sustainable Development'. DHO is a network organization that focuses on to transpose knowledge and experience on students, enriching their competence with a sustainability perspective. They developed an audit instrument called AISHE which scans complete studies and courses on sustainability. AISHE holds a ranking scale to measure the degree to which sustainable development has been incorporated in a curriculum using the Deming circle Plan – DO- Check – Act. AISHE is based on the EFQM (European Foundation for Quality Management). The instrument is acknowledged by NVAO, The Dutch- Flemish accreditation organisation as solid and reliable for achieving a special quality mark Sustainable Development. This Instrument also determines if the study counts for specific stars that represent the state of sustainability in the study that universities and universities of applied science can use for benchmarking, promoting and valuing there studies. As of date more than 120 AISHE assesments have been

performed in the Netherlands, Sweden, Finland, Germany, Belgium, Spain and the Ukraine. Circa 40 higher educational study programmes have been certified. DHO is also responsible for www.plado.nl, an online platform for sustainable education and the publication of 20 different disciplinary reviews that show what linkages there are with sustainable development and different disciplines. The disciplinary reviews have been produced in cooperation with leading scientist. DHO also cooperates on international level among others with Ghana, Mozambique and Benin. They give advice/consultancy (non-profit), training, about teaching methods etc.

Morgen is the national student netwerk organization for students that organise awareness campaigns and promote more sustainability in to higher education.

For more organisations about SD see Appendix 2

Therefore, the values of the indicators "1.B" of the guidelines for the Netherlands are:

- ✓ Existence of specific educational national institutions about SD
- ✓ Existence of specific educational regional (not national) policies about SD
- ✓ No existence of specific educational regional (not national) legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ Existence of specific subventions about education in SD

1.C. University policies and experiences

University Policies

Most universities have some sort of readerships or centres of expertise about SD linked to specific studies. Not many have strict policies on Sustainable Development other than meeting the national agreements on Energy Savings and Sustainable Procurement. There are however some universities which have specific policies or internal programmes about SD that reaches farther than energy savings plans and sustainable procurement. Wageningen UR is forerunner in this and has proclaimed the level of ambition to be leading in using sustainable technolgy and methodology in operations and curricula. A study of PriceWaterHouseCoopers showed that SD in the primary process (educating) is much further developed (mainly implicitly) than in the operations of the campuses in university buildings. This conclusion and long protest of students who wanted the university to be sustainable led to a series of theme to work on:

- Building
- Energy
- Procurement
- Waste
- Catering
- Mobility
- Research and Education

The University of Tilburg and Technical University Delft have similar ambitions and university of applied science Inholland even have a sustainability coordinator appointed. There are also some universities of applied science that have special agreements with the municipality like in Leeuwarden were the municipality organized a local climate summit to make agreements with companies and institutes of higher education. This is a good example of knowledge being put directly in to practice.

Research

The CWTS (Centre for Science and Technology Studies of Leiden University) analysed the scientific ranking of Dutch research on sustainable development and food and nutrition, energy and water. (Subjects that fall (partly) under the description of life sciences). The method employed is an analysis of citation scores in scientific publications in the Web of Science from 2001-2007. It is not easy to define research on sustainable development. Initially, the idea was that only research that takes all three P's (People, Planet, Profit) into account, may be called sustainability research. As research which complies with this criterion for sustainability research is almost entirely lacking, this definition was soon dropped. Research that is relevant for sustainable development may also explore only one of the P's, on the condition that there is a link, a connection with research that explores the other P's, the other aspects of the problem.

Dutch research on sustainable development and food and nutrition is above average in international comparison as to the number of publications and the scientific quality of the research. Of all EU countries, the Netherlands occupies third position with 370 publications (from 2001-2007) and a crown indicator* of 1.78.

Dutch research on sustainable development and energy is not top of the world, in terms of the number of publications and the scientific quality, but it occupies a position close to the top. In the EU, Denmark ranks higher (crown indicator 1.9 versus 1.38 for NL) with a smaller number of publications (66 versus 229). Dutch Research is not of overall high scientific quality. Twente University in international comparison has a very good position
(46 publications, crown indicator 2.3). The excellent score is often owed to a few researchers. Utrecht University follows at a short distance, producing more publications (67) and a crown indicator of 1.98; here too, there are considerable differences between the individual scores of researchers. Dutch research on sustainable development is not among the world's top research (132 publications, crown indicator 0.96). In the EU the Netherlands occupies seventh position; Italy is at the top, while Norway still has a better score with 31
publications and a crown indicator of 1.5. IHE/UNESCO7 and Wageningen University an Research have the best score of the Dutch research institutes (viz. 19 publications, crown indicator 0.84 and 108 publications, crown indicator 0.83). The conclusion from these analyses is that in the Netherlands top research into sustainable development and food and nutrition is concentrated at Wageningen University and Research. Research on sustainable development and energy in some universities is of high quality. However, Dutch research on sustainable development and water systems does

not rank among the top in the world. Often, the funding for this research is mixed, involving funds from the relevant university, the Netherlands Organisation for Scientific Research and ministries.
* Crown indicator = CPP/FCSm , the field related average citation index
Therefore, the values of the indicators "1.C" of the guidelines for the Netherlands are:

- ✓ Existence of specific university policies about SD: In the majority of the universities
- ✓ Existence of specific units or departments about SD: In the majority universities

1D Research Policies related to SD
Research and Innovation on SD
On 13 June 2007 Mrs. Cramer, Minister for the Environment, asked RMNO, the independent and multi-stakeholder Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment (www.rmno.nl, 2011) to make a report on research innovation and education for sustainable development in the sectors of:

- energy
- water
- Food and nutrition

The Report shows that innovation and research in the food and nutrition sector is for a large part determined by environment and sustainability goals. In the sector of energy government regulation is often the main driver for innovation. The lack of continuity and predictability (not just in financial terms, i.e. subsidies) of government policy is unfavourable for entrepreneurs, innovators and researchers for sustainable energy.

Enquiries among entrepreneurs show the main reason for them to invest not in innovation is the lack of continuity of government policy – a persistent long-term policy perspective -The quality of the policy arrangements in the Netherlands to stimulate alternative energy production and innovation was poor. Often these policy arrangements
produced unintended effects. The German "Electricity Feed-in Law" for sustainable energy is often mentioned as a good example ("creating powerful, predictable and persistent economic incentives") of an instrument to create a long term investment and innovation climate.

In the Water sector Innovation and research cannot be planned or programmed, but the conditions for innovation can be optimised. In practice, government regulation has proved to be the most powerful innovation incentive. There are too few other incentives for innovation. Government support is in fact the motor behind the recent Water Innovation Programme. The general impression is that sustainable development is not the driving principle in Dutch research and innovation programmes in the water sector. However, sustainable development pops up here and there in programmes of institutes (KWR15, Wetsus) and in the Living with Water programme.

Therefore, the value of the indicator "1.D" of the guidelines for the Netherlands is:

- ✓ Existence of specific programs about SD

2A SD University Studies the Netherlands

For the report on research innovation and education for sustainable development performed by the RMNO as mentioned above, DHO carried out a study of the state of the art of sustainability in the sectors Water, Energy, Food and Agriculture in higher education.

The findings of this report are representative for the whole Netherlands and therefore also the field of life science. For this reason the results of this study will be presented here and will give an overview of the state of the art of SD in higher education and will give an answer to section 2A and 2B.

The selected curricula were of a fundamental or more applied, a general or more specialized type. This research will be used to give some information about the state of the art of sustainable development in the study programmes.

The sectors that have been researched were also

- energy
- water
- Food and nutrition

A gradual scale has been developed to measure this degree of anchoring. It measures whether:

- basic knowledge about SD is transferred in a curriculum.
- SD is imbedded implicitly are explicitly into the curriculum.
- students can choose for special courses and diplomas related to sustainable development.
- If all three dimensions people planet profit are integrated.

By means of this assessment mechanism one can discern those curricula that adopt sustainable development in a serious way from those that have been “relabelled”.

The results have been classified according to the following categories

- Good SD embedment
- Average SD embedment
- No SD embedment

Results of studies of Universities and Universities of applied science

	Universities	Universities of applied science
Good SD	33%	31%

embedment		
Average SD embedment	47%	62%
No SD embedment	20%	7%

AISHE certificates

There are 28 studies in the Netherlands that have been rewarded stars by DHO using the audit instrument AISHE, about 30 % of them fall under the definition of life science. This number doesn't say anything about the integration of SD in studies that have not been awarded with a star, but it says more about the level of ambition of a study to integrate SD.

Results show that only few curricula, for example a theoretical curriculum in physics, do not want to take up any information about sustainable development. The other university curricula do pay attention to SD to differing degrees. For example, five university curricula in the water sector pay attention to SD, but mostly from the Planet perspective. But the Land and Water Management curriculum of Wageningen University and Research
is an example of a curriculum that is set up in an integral way and pays attention to sustainable development from a broad point of view. Sustainable development is generally better anchored in the universities of applied science) than in university curricula. For example, some HBO curricula in the food and nutrition sector pay explicit attention to SD in all its aspects and one of them has the NVAO certificate (The Dutch-Flemish accreditation organization) for SD based on criteria developed by DHO). Comparing the present situation with that 10 years ago, DHO believes that sustainable development has penetrated deeper in the curricula, although in some instances it is still at the outer margin. This conclusion holds for the sample of curricula from the food and nutrition, energy and water sector. Professional higher education institutes clearly pay more attention to sustainable development than university faculties. The reason for this is not only that they are required to educate their students for practice and that their contacts with companies urge them to do so, but can also be found in their governance structure. The Board of Directors may decide that all teachers should attend a course to acquire some basic knowledge about sustainable development. In Dutch universities, the faculties are autonomous, so attention to sustainable development in the curriculum all depends on the enthusiasm and persuasiveness of individual teachers. Some universities, such as Wageningen and the technical universities, are traditionally and in line with their present mission, more oriented to practical research. One might expect that especially in those universities the need for education on sustainable development is felt more than elsewhere in universities.

Only in some interviews with representatives of companies was the question raised whether students acquire sufficient knowledge during their education for proper functioning in companies or for practical problem-solving in general. There are some indications that some of these representatives have their doubts about the practical usefulness of the knowledge that is transferred to students.

Existence of specific studies and readerships about

There exist only a few specific studies about sustainable development:

1. The MSc. Sustainable Energy Technology of Technical University Delft completely focuses on SD and includes Energy from Biomass.

2. The University of Utrecht has a mastertrack called Sustainable Development and focuses on energy and policy.

3. **The MSc. Environmental & Energy Management of University Twente integrates all aspects of sustainable development in its study.**

4. University of applied science Van Hall Larenstein offers a full BSc. study called Fair Trade Management

5. Wageningen University offers a Msc Organic Agriculture that focuses on sustainable Agriculture

6. Univerisity of applied science Haagse Hogeschool offers a BSc. study that Climate and Energy, this course completely focuses on sustainable development.

Readerships and knowledge centres

The Netherlands know 326 readerships linked to Universities of Applied Science, 4 % of them have sustainability named in the title and 30 % have more or less aspects related to SD.

About 70 % of the universities have some sort of knowledge centre that focuses on SD. The leading ones are:

1. The centre for Food security and Sustainable Development of Wageningen University and Research Centre.
2. The University of Utrecht has a centre for earth and sustainability.

Therefore, the value of the indicator “2.A” of the guidelines for the Netherlands is:

- ✓ Existence of specific studies about SD: In few universities

2B Subjects about SD

Energy

- Sustainable Molecular Engineering
- Solar cells
- Hydrogenechnology
- Biomass
- Electrochemestry
- Energy from Biomass
- Wind Energy
- Electrical power engineering
- Energy and Society

Water

- Blue energy (energy out of water and purification systems)
- Sustainable planning and interdisciplinary decision making
- Sustainable drinking-water production and management
- Sustainable drinking- water solutions for developing countries

Food and Agriculture

- Integrated natural resource management in organic agriculture
- Analysis and management of sustainable organic production chains
- Analysis and design of organic farming systems
- Organic agriculture and society
- Excursion biological production
- Sustainable Development of Animal Systems and Future Livestock systems.
- Fair Trade Management
- Integrated views on global food production

The value of the indicator "2.B" of the guidelines for the Netherlands is:

- Existence of specific subjects about SD in the degrees: In the majority of the degrees

2C. SD practical activities

SD practical activities occur mostly in studies of universities of applied science. The ones who have sustainable development imbedded in their curriculum also organise a lot of practical activities related to this. An example is the BSc environmental science of university of applied science Van Hall Larenstein where students learn how to set up environmentally, sustainability and energy care systems for organisations conform ISO standards. Students who are doing an internship related to this subject mostly help organizations implementing sustainability theme and quality systems. There are numerous contests involved with SD in higher education like the Dutch solar boat challenge that occurs every year. Universities and universities of applied science compete to eachother.

Therefore, the value of the indicator "2.C" of the guidelines for the Netherlands is:

- Existence of specific practical activities about SD in the degrees: In the majority of the degrees

2D. How do you think education in LS contribute to SD in your country

Especially focused on the aspect of of "PLANET"(in the triple P concept),
That is : combined with aspects of People and Prosperity (profit), so to encourage the link between Beta and Gamma .

2E. Barriers for the integration of the SD and problems in the teaching Methods

- (trans) Interdisciplinary approach (less attention to specific field of study)
- Lack of skills of teaching staff
- Lack of sense of urgency
- Individual choice of staff resp. lack of steering (governance)
- Formal barriers like time tables, graduation requirements, small groups for special courses SD
- Top-down-approach
- (General) distance between teaching staff and societal development(s) i.c. SD.
- Quality systems don't focus on SD; accreditation dependents not on SD aspects.

3. Relevant Institutions Related to SD in The Netherlands, see appendix 2

4. International cooperation in ESD (Education in SD) the country

The Netherlands participates in the program of the UN Education for sustainable development. It aims to help people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon these decisions. The United Nations Decade of Education for Sustainable Development (2005-2014), for which UNESCO is the lead agency, seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century.

DHO cooperates on international level among others with Ghana, Mozambique and Benin. They give advice/consultancy (non-profit), training, about teaching methods etc. DHO is promoting AISHE internationally. A lot of scans have already been performed within the EU.

Water research institute for example has international cooperation on sustainable water research.

Therefore, the conclusion is of the indicator 4 A and B of the guidelines for the Netherlands is:

- Exisiting policies on international cooperation
- Exisiting international experiences in ESD in Life Sciences

5. Good practices and relevant experiences in the Higher Education Institutions in your country

There are numbers of good practises of the integration of SD in higher education:

1. At the moment an initiative of 14 universities of applied science is launched called DUPLHO. DUPHLO is a platform to share information and best practises about integrating SD in universities of applied science. This includes about 50% of the number of students including a number of life science courses.

2. The program LVDO of Agentschap NL and the NME are best practices of Govermental Incentives.

3. University of Applied Science Van Hall Larenstein has set up sustainability team, students, teachers and staffmembers are actively thinking on how to make educations and operations more sustainable. They also organize symposia and events about SD

4. In 2010 the minister of spatial planning an environment organized a sustainability tour and visited a lot of universities en universities of applied science. Goal of this tour was to bring up the discussion of SD with students.

5. Another example is the huge amounts of symposia with SD themes organized during the national day of sustainability.

6. DHO organizes every year a network symposium for its members and every week there is a symposium or event about SD organised in relation to Higher Education across the country.

6. Possible future actions in the Netherlands

In all types of education and at all levels there are projects aimed at sustainable development, but the step from the margin to main stream has yet to be taken:

- Quality standards within the system(accreditation) should be promoted when focusing on sustainable development.
- An evaluation of the many initiatives to create a place for sustainable development in education and curricula is desirable.
- DHO has considerable knowledge on this subject and developed the audit instrument called AISHE, This instrument should be used and promoted internationally to systematically integrate SD in higher education. It is

important to stimulate not only big programmes but also small non-profit organisations like DHO which are very valuable stimulating factors.

- One of the ways to focus more attention on sustainable development in university faculties and institutes for professional higher education is to stimulate research on sustainable development.
- Frequent alterations in the policy instruments to promote SD have a disastrous effect on the long term climate for investments for entrepreneurs. A consistent longterm policy of government and adequate long-term instruments are of utmost importance to boost innovation and SD in higher education and research.
- If future employers will demand that students have skills knowledge about sustainability this will stimulate universities to develop there curricula. Leaders for the future/ change agents in SD are asked/ wanted on the labour market in leading companies (multinationals as Royal Dutch Shell. Unilever, AKZO NOBEL, DSM, Philips, energy companies, agricultural field (Diairy co-operation) etc.

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Appendix 1
- Based on the recommendation of the RMNO to the Minister of Spatial Planning and Environment-
Sustainable development should be a fundamental component of all education curricula (primary, secondary, tertiary). The Netherlands should consider the potential of using the UN Decade for learning for SD to develop a more dynamic approach to communicating sustainable development as a concept. A communications strategy for SD should be developed.. Part of its role should be to ensure the SD concept is meaningful to everybody.

There is, of course, still considerable tension between the knowledge needed for sustainable development and the compartmentalisation of knowledge generated in line with academic tradition. However, developments in research and education since then have produced new possibilities for more integrated research within the already existing frameworks.

It is necessary to pay due attention to the relation between education and professional work in practice. If society urgently needs graduates who can think in a more integral way and who are familiar with the principles of sustainable development, higher education institutes should try to meet this need. By showing their preferences for other, more integral types of education, the students can help to create an important demand mechanism.

A second point is that graduates who are going to work in society on sustainable development should not only have certain competences, but also specific knowledge about sustainable development. Competences are important for graduates to allow them to contribute to transition processes towards a more sustainable society. They should have the competence to look beyond the boundaries of disciplines ("transboundary competence"). Sustainable development in the curriculum can create synergy with professional education.

A strong incentive to pay attention to sustainable development in professional higher education comes from the contacts with enterprises. Teachers and directors can in a more direct way get to know what practical knowledge about sustainable development these enterprises need.

An important aspect to remember is whether a combination of SD research and education is possible. An example of this combination can be seen at ETH Zürich University where it has already existed for quite some time. Interdisciplinary or transdisciplinary research programmes may have a clear spin-off to education and to society. Thus, the students' fascination for research on sustainable development could be stimulated. And by linking education to excellent research groups, sustainable development can be put better and more firmly on the map, working through in education curricula.

Appendix 2

Governmental Organisations	**Function**
SenterNovem (Agenstschap NL)	Dutch Agency for innovation and sustainable development
Rijksinstituut voor volksgezondheid en milieu (RIVM)	The National Institute for Public Health and the Environment does a lot of research into sustainable development.
Central Bureau of Statistics (CBS)	The Central Bureau of Statistics (CBS) is the government agency to collect,

	interpret and present data in the respective domains of sustainable development.
Centraal Plan Bureau (CPB)	Independent operating government planning office for analysis of data In the economic domain
Sociaal en Cultureel Planbureau (SCP)	independent operating government planning office for analysis of data social-cultural domain
Planbureau voor de leefomgeving (MNP)	independent operating government planning office for analysis of data ecological domain,
Raad voor Landelijk Gebied (RLG)	is focused on strategic policy questions on agriculture, nature, forest, landscape, outdoor recreation and fisheries. I
Raad voor Milieu en Natuuronderzoek (RMNO)	the independent and multi-stakeholder Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment has taken an active role in sustainable development.
Nationale Commissie voor Internationale Samenwerking en Duurzame Ontwikkeling (NCDO)	the National Committee for International Cooperation and Sustainable Development NCDO. Since 1995 NCDO aims to strengthen and highlight public support for development cooperation and sustainable development, and since 2000 the achievement of the United Nations Millennium Development Goals.
Educational Organisations	
Duurzaam Hoger Onderwijs (DHO)	Foundation DHO (Sustainable Higher Education) started in 1998 and by now grew a network of over 1000 professionals working together to transpose knowledge and experience on students, enriching their competence with a sustainability perspective.
Copernicus Institute	The Copernicus Institute is linked to the university of Utrecht and investigates and develops processes and opportunities for innovative change towards sustainability. The institute thus seeks to contribute to the development of knowledge and techniques as well as methods and

	instruments in the field of sustainable development, taking note of related social debates and policy processes.
Wetsus	Wetsus, centre of excellence for sustainable water technology is a facilitating intermediary for trend-setting know-how development. Wetsus creates a unique environment and strategic cooperation for development of profitable and sustainable state of the art water treatment technology.
Morgen	Morgen is a national studentnetwerk organization for students that want higher education to be more sustainable
Private organisations and companies	
MVO Platform en MVO Nederland	In response to corporate developments, the Ministry of Economic Affairs created MVO Nederland, a foundation to promote corporate social responsibility. Many NGO's and governments joined this platform. Companies and others ally with MVO Nederland*53* through a partnership, a voluntary acknowledgement of the principles of corporate social responsibility, embedded in the so-called Manifest. To date the organization collected over 160 practical examples and 120 instruments to improve or measure sustainable corporate behaviour, all submitted by over 250 partners.
Global Reporting Initiative Amsterdam	Independent organizations to strengthen the quality of sustainable reporting and to provide for reporting standards for sustainable development.
Triodos Bank	Triodos Bank is a global pioneer of sustainable banking. Their mission is to make money work for positive social, environmental and cultural change. They connect savers and investors who want to change the world for the better with entrepreneurs and sustainable companies doing just that.

ASN Bank	A bank that invest only in sustainable development, they have the same mission as the Triodos bank. But they focus more on fair trade.
Urgenda	Urgenda is the action-organisation for SD and innovation that want to create a acceleration of SD in the Netherlands together with companies, Governments, NGO's , private owned initiatives. Every year they organize the day of sustainability, where hundreds of organisations show there sustainable initiatives.
Sustainable Tuesday	Since 1999, each year a group of NGOs, led by IVN organizes Sustainable Tuesday, The NGO community collects project ideas about sustainability and requests funding by the Cabinet.
TNO	TNO is an independent research that focuses on the themes of living,industrial innovation, safety, security, built environment energy and susuatainability.

STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN TURKEY

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Turkey has first seriously involved in SD in 1992 with United Nations Earth Summit held in Rio Brazil. As a conclusion of this summit a global action plan called Agenda 21, is accepted by the all participants. This is the largest action plan ever for development and environment that is accepted by the governments including Turkey, as well. This plan is enriched by Local Agenda 21 organization after the international Habitat II conference held in Istanbul Turkey in 1996. SD policies and actions of Turkey is then well defined after the Johannesburg meeting (Sustainable Development World Summit Rio +10) held in 2002 in South African Republic.

SD is a very important topic in Turkey in recent years. Some state policies are established for SD in Turkey. For example, there are governmental Developing Plans which are made for 5 years. Sustainable Development topic is quite indicated in 8th Developing Plan (2001-2005) and also in the 9th Developing Plan (2007-2013) of Turkey. There are governmental organizations such as DPT (State Planning Organization) which is under the auspices of Turkish prime ministry. DPT has sub-departments and they are responsible for developing state plans for development included sustainable development, as well.

There are some Development Agencies in Turkey and they are responsible for the development and SD for their region. Some of them are; Çukurova Development Agency responsible for the some parts of Mediterranean Region in southern part of Turkey, İzmir Development Agency responsible for the some parts of Aegean region in western part of Turkey, Ankara Development Agency responsible for the some parts of Middle Anataloian region in the center of Turkey, Eastern Marmara Development Agency responsible for the some parts of Marmara region in northern west part of Turkey, Middle Black Sea Development Agency responsible for the some parts of Black Sea region in northern part of Turkey, Karacadağ Development Agency responsible for the some parts of southern east part of Turkey, Fırat Development Agency responsible for the some parts of southern east part of Turkey and etc.

There are some big national projects about SD such as GAP (Southern east Project), DAP (Eastern Turkey Project), DAKAP (Eastern Turkey Project) and etc. These projects are related with SD of that region concerning the development in economical, environmental and social aspects. Among those projects especially GAP is the biggest governmental sustainable agriculture project concerning the betterment and sustainability of agriculture and social life in southern east region of Turkey.

As mentioned above the principles of “Agenda 21” fully overlap with the principles of sustainable human development as adopted by the GAP, and early fruits of this approach are now being reaped.

Planning and implementation in GAP targeting sustainable human development upholds the following basic principles:

1. Participation
2. Equality and Fairness
3. Development of Human Resources

Participative approach should be understood as the presence of all parties affected by the project to all stages including early project design, implementation and monitoring-evaluation. This principle is observed in all projects. Success of individual projects is often safeguarded by raising the awareness of relevant parties, by observing the social feasibility of projects, reducing project costs and by solving problems stated by local people. This approach also contributes to the democratization of the society.

In the context of GAP, "equality and fairness in development" means the integration to the process of development of those sections of the population who are socially, economically and culturally disadvantaged. "Disadvantaged" groups in the GAP Region include women, children, landless peasants and small farmers, small-scale craftsmen and farmers living in non-irrigated areas. There are special programs developed with the participation of these groups.

To sum up, the sustainable economic growth perspective of the GAP envisages the following: Decent level of income for all; accessibility to social services including those in the fields of education, health and culture, sustainable utilization of natural resources; health environment; decent sheltering for all; mechanisms for ensuring the participation of people to decision-making and to create a sustainable society that can further develop on its internal dynamism.

This sustainable development approach adopted by the GAP has started to attract the attention of international organizations. For example, the UNDP has developed interest in the project and is now supporting it in various ways.

The GAP Administration and UNDP jointly organized the seminar "Sustainable Development and GAP" in March 1995. There were many participants from universities, governmental organizations, private sector and local governments. The seminar discussed the principles of sustainable human development in the GAP Region.

This seminar laid the basis of the joint GAP-UNDP Program for "Sustainable Development in the GAP Region", which was put in implementation starting from March 1997.

The program supports the implementation of 29 different projects that can be grouped under the following 5 headings.

- √ Promotion of social sustainability and development of social services,
- √ Promotion of agricultural sustainability and improvement of agricultural productivity,
- √ Promotion of local entrepreneurship and industrial development for economic viability,
- √ Promotion of sustainable human settlements, and
- √ Ensuring optimal and sustainable utilization of natural resources.

Examples of projects implemented through the approach of sustainable human development.

Projects listed below are in fact linked to each other in the context of human development. The grouping below is only for analytical purposes.

1. Projects for Environmental Protection: Outputs of these projects may be envisaged in the context of (i) creating conditions in which future generations may benefit from natural resources; and (ii) creating health living conditions for human beings.

- Management, Operation and Maintenance of GAP Irrigation Systems (GAP-MOM),
- Regulation of Water in Irrigation Canals and Methods and Technologies for Water Saving,
- Treatment of Urban Waste Water,
- Re-use of Irrigation Discharge Water,
- Protection of Biological Diversity,
- Environmental Work in the GAP Region,
- Environmental Work in the GAP Region - Tigris Basin,
- Assessment of Climatic Conditions in the Region for Present Day and Future,
- Adiyaman-Kuyulu Region Erosion Control Project,
- Adiyaman-Diran Micro-Catchment Rehabilitation Project,
- GAP Afforestation Project,
- GAP Agricultural Research and Development Project, A, B.

2. Urban Planning and Infrastructure Projects: These projects are developed and implemented with the participation of people. Participation makes up the social feasibility of these projects and helps in the development of a democratic culture in urban life and government. The projects envisage improving the quality of urban life.

- Participation in urban planning and zoning,
- Resettlement and employment of people affected by dam lakes,
- Atatürk Dam Lake Sub-Regional Development Plan,
- Eco-city and eco-village planning and development in pilot localities.

3. Projects Designed to Eliminate Disadvantaged Positions and Alleviate Poverty: These projects observe such fundamental principles as gender balance, closing the gap between the rich and the poor; ensuring access to education, health and other social services; contribution to the realization of an equitable process of development and creating awareness.

- Establishment of Multi-Purpose Community Centers (ÇATOM) for Women,
- Improving the Income Level of People in Non-Irrigated Areas,
- GAP Entrepreneur Support and Guidance Centers (GAP-GIDEM),
- Project for On-Contract Animal Husbandry (GAP Rings Model),

- Project for Joint Machinery Use (GAP OMAK),
- Sub-Regional Development Plan Comprising Return to Villages and Rehabilitation,
- Project for the Rehabilitation of Children Working in Streets.

4. Development of Human Resources and Institutional Arrangements: These projects enhance both efficiency and income level and also prepare the ground for both internal and external participation:

- Management, Operation and Maintenance of GAP Irrigation Systems (GAP-MOM),
- Institutional Capacity Building,
- Training and Extension Services for Farmers,
- Agricultural Research and Development Project, A, B,
- Land Consolidation,
- Social Progress for Youth,
- GAP Region Public Health Project.

There are some NGO's in Turkey as societies related with SD. These are mainly named Sustainable Development Society. The most popular one among them is "Business World and Sustainable Development Society", and their web page is http://www.tbcsd.org/?Lisan=EN. They hold meetings, seminars, conferences and etc and they host to some organizations, as well. They carry out some projects about SD topics in Turkey. Some articles and reports from this society and from their member companies about the SD and business world can be found at their web page.

Besides, many municipalities as local administrative carry out SD projects focused on social life and environment. The biggest municipality in Turkey is of course Istanbul Grand City Municipality. They have many completed and ongoing SD projects mainly focused on health, environment and integration of social and urban life. They have established big waste recycling plants. Detailed information about their works concerning SD can be found at http://www.ibb.gov.tr/en-US/Pages/Home_Page.aspx.

As it's very well understood now that the SD is related to any subject in our world. So, one can not differentiate one topic from another. Education is the starting point of this huge concept, I believe. Education has always been the first step for better introduction and understanding the importance of a particular topic. Life on earth can not continue without the existence of Life Sciences. So, if we match these two vital topics one can easily understand that SD without life sciences won't have any meaning. Opposite hypothesis is valid also. Life Sciences without concerning the SD won't have meaning in today's world.

Turkey has taken essential steps in education of SD especially in LS. Sustainable development topics are given in the majority of the agricultural faculties in Turkey. There are some voluntary and compulsory lectures about sustainable development, sustainable agriculture, organic agriculture and etc. These lectures are given either in BSc level or in MSc level. For example, almost in all Agricultural Faculties in Turkey there are lectures related with SD such as; Environmental Pollution (has 3 credits),

Using and Prevention of Natural Resources (has 2 credits), Village Sociology (has 2 credits), Organic Agriculture (has 2 credits), The Effects of Pesticides to Environment (has 2 credits), The role of Plants for a Healthy Life (has 2 credits) and, etc.

There are some lectures about SD either compulsory or volatile in education program of almost all universities which are taught in Faculties of Economy and Administrative Sciences, in Faculties of Science and Art and in Faculties of Engineering.

There are Agricultural Research Institutions under auspices of Ministry of Agriculture which are spread among the geographic regions in Turkey. Their task is to carry out researches for empowering the sustainability of agriculture for their region. For example, Black Sea Agricultural Research Institution is focused on energy plants and they carry out researches on suitability of local types of energy plants for decreasing our demand to fossil fuels. There are also NGOs focused on SD actions in Turkey.

SD education without a participation of a university can not be taught. In this sense, there many researches and projects done and still being doing for the education of SD with good practices. For example, in southern part and in middle-Anatolian part of Turkey some projects were completed for the education of SD in agriculture. Good practices of direct seeding method has been taught to farmers by the participation of Çukurova University in Adana city and some agricultural research institutions in that region. Direct seeding method has various advantages especially it reduces the soil compaction problem, which is then good for crop productivity. Besides, it reduces the number of farm works which reduces the fuel costs and also dependency to fossil fuels, also. But, before the implementation of this method an education procedure must be completed. The education of this sustainable agriculture method is given by the university and by the research institutions.

Another good example of education SD is realized by governmental organizations and by NGOs. For example, Middle-Black Sea Development Agency is a very good practice of that. Hence, the chairman of Middle-Black Sea Development Agency is the Rector of Ondokuz Mayıs University in Samsun. So, university is automatically involved to all the SD works done by this agency. The agency realizes the SD projects, holds seminars and conferences and provides consultancy service for the entrepreneurs and farmers in Black Sea region.

There are good examples of SD works where the local authorities as municipalities are involved. There are 81 city municipalities in Turkey and 16 of them are Grand City Municipality. Almost in all the Grand City Municipalities they have solid home wastes management systems. Although the grouping of solid wastes as plastic, glass, paper and etc is not done well in Turkey by the people but, there are some companies which collects and sorts the home wastes from the waste bins in the streets. These companies are mainly recycling companies but some of them are just mediator firms which provide to recycling companies the raw material. For example, Samsun is in the northern part of Turkey near Black Sea. Samsun has 3 central municipalities. A new home wastes management project has been started last year in

one them, called Atakum municipality which has 120 000 population. This recycling based project is called GEKAP. The workers of Atakum municipality gives to every house a big plastic bag, which is also made from recycling material, and asks the abiders to store their home wastes in that plastic bag. After one week they come and collect these plastic bags and they take them to solid waste management plant in Samsun.

In many cities of Turkey recycling process works very well but, just the people must be educated for grouping of the wastes by throwing them to their particular waste bins.

Education of SD must be the main task for the developing countries. State or local governments along with the higher education institutions and NGOs must gather together to widespread the importance of this topic and to carry out some good projects with concerning their good effects to environment, to social life and to the economy of that particular country. The higher education institutions, local governments and NGOs are quite aware of this important topic. Turkey is a natural bridge between Europe and Asia so; she will use this advantage to disseminate and implement the SD works from Europe to Asia.

Conclusions

Long Term Strategy (2001-2023) and Sustainable Development in Turkey

The speed of the formation of information economics and information society in the world, and the resulting new economic and social developments and the needs, necessitate many countries to free their foreign capital regimes and to shift the technological innovations into the new fields (new biotechnology, genetic engineering, nanotechnology, etc.). To keep up with these changes, it is unavoidable for Turkey to rapidly complete economic, social and politic reforms and to integrate into the global world.

In this period, Turkey's claim for becoming a member of European Union and the developments in this framework are another important doorstep. Therefore Turkey should determine its economic policies and social policies according to issues in the European agenda (These issues : Expansion, Political Union, Euro, Democracy, Common Market and International Competition, International Relationships with the USA and Information Society).

As a matter of fact, starting with the candidacy period for EU membership, the priority is given to the to political criteria- democracy and human rights criteria-, economic reforms, legislation congruity, implementation with administrative and institutional congruity, and these issues are reflected in the national development strategy and policy documents prepared for future. The Long Term Development Strategy for the period of 2001-2023 was prepared in this framework and defined the time period in two segments. According to this, it is aimed that Turkey; i) will restructure its economy and society and transform into an information society during the course of full membership to EU, ii) will be an influential world state at global level.

It is seen that the sustainable development principles are included in the Strategy. The anticipated changes in 2023 are evaluated by considering the integration of sustainable development into the sectors and the following points come to forward:

• The sectors that come forward at the end of the period (2023) are aimed to be in the order of agriculture, industry, and service according to their share in added-value
• The fundamental change in the employment is foreseen in the agriculture and services sectors.
• The share of urban population is expected to reach 90% level.
• It is expected that the share of public investments among the total investments will decrease from 30% at the year 2000 to 10% at the end of the period.
• It is fundamental for the markets and state to take complementary roles for each other to reach the societal goals. In this context, it is envisioned that organization, supervision, and inspection functions of the state should be improved, the local governments should be strengthened, and the non-governmental organizations should be supported according to the national priorities.

As a conclusion; water management, green energy and the private sector's role are considered essential for ensuring stability in Turkey's macro-economic polices and require new structural policies and support policies in the selected sectors. A reliable determination of interrelation between those areas and the selected sectors is of crucial importance in developing a national strategy for sustainable development and an action plan.

Turkey's development policies comprise principles related to sustainable development. Turkey has an economic program aimed at enhancing macro-stability in Turkey which was implemented during the last two development plans. A more detailed assessment as regards the penetration of principles related to sustainable development into the existing process, there is a need for integration with the related areas in the ninth plan in terms of development criteria and sector-related policies included in those development criteria. It was observed during the review of strategies in almost each sector (including sub-sectors) and the thematic area.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN ENGLAND

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1. Sustainable Development (SD) policies in the UK:

The UK Government published the national strategy 'Securing the Future: delivering UK sustainable development strategy' in March 2005. The strategy aims to approach the concept of SD in an integrated way through:

- A sustainable, innovative and productive economy that delivers high levels of employment.
- A just society that promotes social inclusion, sustainable communities, and personal wellbeing.
- Protection and enhancement of the physical and natural environment, and efficient use of resources and energy.
- Promotion of a clear understanding of, and commitment to, SD so that all people can contribute to the overall goal through their individual decisions.

Following publication of the UK Governments SD strategy, all government departments were required to produce a SD Action Plan detailing their commitments.

The Higher Education Funding Council for England (HEFCE) distributes public money for teaching and research to universities and colleges in England. There are currently 132 higher education institutions in England. In 2005 HEFCE published its first SD strategy 'Sustainable development in higher education', which was updated in 2008. The strategy communicated HEFCE's vision that within the next 10 years the higher education sector in England will be recognized as a major contributor to society's efforts to achieve sustainability.

HEFCE integrates sustainability within existing special funding initiatives to build and disseminate good practice in sustainability. Specific funds are:

- The Leadership, Management and Governance Fund that supports transformational change through projects that deliver clear outcomes and positive impacts on sustainability. Harper Adams is currently delivering a project under this fund to educate institutions with agricultural activities how to calculate a carbon footprint for farm activities.
- The Strategic Development Fund that supports change and innovation in higher education. For example, the Sustainable Energy Centre at London South Bank University was funding via this fund.
- The Higher Education Innovation Fund supports knowledge transfer activities. For example the fund supports the Carbon Connections project at the University of East Anglia. The project supports low carbon technologies and facilitates behavioral change by helping with the development and marketing of innovative ideas.

- Centre's of Excellence in Teaching and Learning that supports and encourages excellent learning practice. The Centre for Sustainable Futures and Centre for Sustainable Communities Achieved through Integrated Professional Education (C-SCAIPE) both focus on SD.
- The Revolving Green Fund offers recoverable grants for projects that reduce carbon emissions. Harper Adams has received a grant towards the cost of an anaerobic digestion system that will produce heat and electricity for the campus.

(HEFCE, 2008)

Wales is one of the few countries in the world to have governmental policy relating to education for sustainable development and global citizenship. The Welsh Assembly Government published 'Education for Sustainable Development and Global Citizenship (ESDGC)' in 2006. The Higher Education Funding Council for Wales (HEFCW) is working with the ESDGC Chairman to deliver the priorities for the higher education sector. In 2008 HEFCW announced additional funding would be provided to its 12 higher education institutions to (i) enable institutions to complete a self-assessment of where ESDGC was being taught in the institution and where it could be further incorporated, and (ii) encourage institutions to develop a Environmental Management System (EMS) to help minimize resource use to a sustainable level (HEFCW, 2008).

The Scottish Funding Council (SFC) has been tasked by the Scottish Government to take forward sustainable development in the Scottish higher education sector. The SFC provides funding for 20 higher education institutions. In 2010 SFC produced the document 'Learning for Change: Scotland's action plan for the second half of the UN decade of education for sustainable development'.

Currently it is not a requirement in England for higher education institutions to publish a SD strategy. In 2005 a survey by the Centre for Bioscience completed a survey of higher education teaching in the biosciences. The survey suggested 21% of institutions has a SD strategy. There are some universities that currently publish a SD policy that includes education for SD in its scope. Within the UK SD polices tend to be at the university rather than departmental level. No evidence has been found to suggest influence by the Bologna process.

Specific academic units or departments about SD only exist within a few universities in the UK. Examples of specific units or departments that focus on SD in the UK include:

- The Centre for Sustainable Futures is located at Plymouth University. Curriculum is one of the four areas of focus of the centre. Fellows are located across a number of schools and faculties at the university that engage in curriculum and pedagogical development and research in SD education (Plymouth University, undated).
- The Institute for Sustainability, Health and Environment (ISHE) is based at the University of the West of England and aims to influence and increase integration in relation to policy creation and delivery at national and international levels. Specific themes of the institute include public health and well-being, environmental sustainability, and sustainable communities.

No specific research funding available for SD in the UK, rather funding is provided for research that relates to SD in some way. The Department for Environment, Food and Rural Affairs (DEFRA) is a government department that funds £145 million of research each year. Over the next 10 years DEFRA will focus on funding research on (i) climate change and energy, (ii) natural resource protection, (iii) sustainable consumption and production, (iv) sustainable rural communities and (v) farming and food.

There are seven publicly funded research councils in the UK that invest £3 billion per year in research covering the full range of academic disciplines. In relation to life sciences, the research councils of interest are the Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Science Research Council (EPSRC), Medical Research Council (MRC), and Natural Environment Research Council (NERC). Examples of specific research interests of these research councils relating to SD in the life sciences are detailed in Table 1.

Table 1: Research interests of research councils relating to SD in the life sciences.

Research council	**Examples of research interests related to SD in the life sciences**
BBSRC	• Ageing research: lifelong health and wellbeing. • Bioenergy.
EPSRC	• Energy programme (£530 million over next five years). • Towards next generation healthcare (£6.8 million for 2010/11). • Living with environmental change programme (£3 million in 2010/11).
MRC	• Lifestyles affecting health. • Environment and health.
NERC	• Climate system. • Biodiversity. • Sustainable use of natural resources. • Environment, pollution and human health.

2. SD University Studies in the UK:

Specific courses in life sciences are delivered by some institutions in the UK, and are delivered predominantly at postgraduate level. A search of undergraduate courses in sustainable development showed 6 Bachelor of Science undergraduate degree courses focusing on this subject, whilst a search of postgraduate courses showed 77 Masters of Science courses are currently available. Commonly these MSc courses can also be studied as Postgraduate Diplomas and Postgraduate Certificates. Examples of specific university studies are detailed in Table 2.

In 2008 HEFCE published the 'HEFCE strategic review of sustainable development in higher education in England'. The report concluded higher education institutions in England are extremely heterogeneous in their approach to incorporating sustainable development into the curriculum. It is suggested SD is incorporated into the majority

of life science degrees, but that its presence may not be explicitly mapped. The 2008 report by HEFCE suggested the degree to which SD was incorporated into the curriculum was dependent on the size, history, traditions, staffing, academic focus, research interest, geographical location, market characteristics and management philosophy of different institutions. The report suggested there is a niche in the marketplace for institutions that wish to champion sustainability, and that there are institutions and departments for which SD is a low priority. The Higher Education Academy produced 'Education for Sustainable Development and Global Citizenship (ESDGC): review of curriculum audit in Wales' in June 2009. The report suggested the extent to which ESDGC was incorporated into the curriculum varied between institutions, as demonstrated in Table 3.

Table 2: Examples of specific university studies focusing on SD in the life sciences.

Title	Institution	Level	Length (years)	Department
Sustainable rural development	Aberystwyth University	BSc	3	Countryside
Climate change and sustainable development	Coventry University	BSc	3	Geography, Environmental Disaster and Management
Sustainable rural development	Millennium Institute	BSc	4	
Sustainable development	Kingston University	BSc	3 or 4 years	Science
Environmental change and sustainable development	Lancaster University	BSc	3	Environment Centre
Sustainable environmental management	Staffordshire University	BSc	3	Geography
Sustainable development	University of Exeter	MSc	1	Geography
Climate change and sustainable development	De Montfort University	MSc/ PGDip/ PGCert	1	Institute of Energy and Sustainable Development
Practicing sustainable development	University of London	MSc	1	Geography
Effective management for sustainable development	Queens University, Belfast	MSc	1	Biological Sciences
Design and innovation for sustainability	Cranfield University	PGDip/ MDes/ PGCert	1	Applied Sciences
Sustainable futures	University of	MSc	1	School of Science

	Greenwich			

BSc: Bachelors of Science; MSc: Master of Science; PGDip: Postgraduate Diploma; PGCert: Postgraduate Certificate

Table 3: ESDGC within modules and programmes at Welsh institutions (HEA, 2009).

Institution	% of modules with ESDGC	% of programmes with ESDGC
Aberystwyth University	75	100
Bangor University	60-100	Not available
Cardiff University	About 30	About 40
University of Glamorgan	14	35
Glyndwr University	90	About 100
University of Wales, Lampeter	16	About 55
University of Wales, Newport	88	Not available
Open University in Wales	Not available	100
Swansea University	35	90
Trinity University	94	73
University of Wales Institute, Cardiff	15	Not available

It is suggested SD practical activities will be incorporated into some degrees within the UK, but that these activities will be more explicit in degree courses that focus on SD. This is because all degrees within the UK include completion of a research dissertation and hence dissertations completed for SD degrees will focus on some aspect of SD. A few degrees incorporate field work. For example, the MSc environment and sustainable development at University College London includes field work based in London and abroad.

The life sciences align well with SD, and consequently it is suggested education in the LS contributes greatly to SD in the UK. An important output of education for SD is not only providing students with a knowledge and understanding of SD, but also providing them with the motivation and enthusiasm to implement SD in practice.

Barriers to the promotion of ESDGC in Wales identified by the HEA (2009) included:

- Lack of staff confidence due to a perceived lack of knowledge and understanding.
- Concerns regarding an anticipated increase in workload if ESDGC was incorporated into the curriculum.
- Institutional funding formula encouraging staff to teach within their department, rather than across an institution.
- Limited institutional drive and commitment.
- Perceived irrelevance by academic staff.

3. Relevant Institutions related to SD in the UK:

The Higher Education Academy (HEA) supports the higher education sector to provide the best possible learning environment for all students. The Education for Sustainable Development (ESD) project aims to help institutions and subject communities to

develop curricula and pedagogy that will give students the knowledge and skills to live sustainably (HEA, undated).

The Environmental Association for Universities and Colleges (EAUC) is a member run organization (280 members) in the UK that aims to work with members and partners to push SD to the forefront in colleges and universities. A key role of the EAUC is information and best practice sharing between institutional members.

Sustainability in Higher Education Developers (SHED): a network of higher education staff from across the UK that aim to contribute to whole institution transformation. Communication in the group occurs through a dedicated mailing list, an open access online database or practitioners and meetings at national conferences.

4. International cooperation in ESD (Education in SD) in the UK:

We are not aware of any current direct policies.

In 2006 Dr Peter Hopkinson and Mr Peter Hughes (University of Bradford) completed a project entitled 'Embedding ESD in a Life Science Curriculum'. The project reviewed the extent to which identifiable ESD material was present in the curricula of three degree courses (pharmacy, optometry, and biomedical sciences). A detailed map of the three programs was produced for planning, benchmarking and discussion. In addition a tool was developed to enable identification of areas of the curriculum that provide ESD and areas that have the potential to provide ESD. The tool can be used as a starting point for discussion of integration of ESD into curricula.

5. Good practices and relevant experiences in the Higher Education Institutions in the UK:

- The EAUC holds an annual conference in March/April each year. Examples of discussion areas from this years upcoming conference include sustainable procurement, student engagement with sustainability, assessing carbon emissions from business travel, and green ICT.
- Teaching and Learning for a sustainable future is a multimedia education program published by UNESCO. It contains 100 hours of professional development for use by teachers, curriculum developers, and education policy makers: Campus sustainability program is a program designed to promote sustainable universities and colleges within Scotland. The program includes the delivery of workshops that will share best practice and discuss financial support, in addition to the provision of tools and self-help material.
- Ecocampus is a national Environmental Management System (EMS) and award scheme for the UK higher education sector. The project provides a complete package where members are walked through the process of designing, implementing and auditing a fully operational EMS.

Harper Adams University College (HAUC) has been implementing a sustainable carbon management programme since 2000, with early stages involving the reduction of energy use through low energy lighting, use of Passive Infrared Sensors etc, and gradual improvements in heating system technologies. Solar thermal installations were introduced in 2001 to serve two student houses. The Bamford Library (2003), incorporated computer controlled natural ventilation, low energy lighting, natural materials, rainwater harvesting, with excavated material used to construct an off-road vehicle test track rather than for landfill.

In 2005 HAUC installed one of the largest Marley Solartile photovoltaic arrays in the UK on a new student hall of residence. More recently HAUC has introduced local remote metering of all utilities to enable smarter management. Research has been completed with resident students on perceptions of energy use at home and on-campus, and by instituting energy reduction competitions between halls of residence to raise awareness of energy costs and usage. A Travel Plan was been introduced in 2009 that includes a car-share scheme for staff, a lift-share scheme for students, a minibus service and a subsidised staff cycle purchase scheme.

HAUC's work in carbon management is recognised by a number of major awards:

2004 Institute of Civil Engineers – Runner up in Sustainability Award for an Outstanding Example of a Civil Engineering Project (Bamford Library)
2006 Short-listed in the British Renewable Energy Pioneer Awards
2007 Business in the Community Regional Award Winner in the Man Group International Climate Change Award
2008 Times Higher Education Award for Outstanding Contribution to Sustainable Development (Local Food Sourcing Project)
2009 Short-listed in the EAUC's Green Gown Awards for work that sought to understand and influence attitudes and practice in campus energy use
2010 Short-listed in the EAUC's Green Gown Awards for sustainable construction (Countryside, Leisure and Tourism Building)
2011 Estates Manager short-listed for the Energy Manager of the Year Award, which is bestowed by the Energy Institute.

6. Possible future actions in the UK:

Education and research in SD in the UK could be improved by:

- Requiring institutions within Scotland, England and Northern Ireland to review curricula to identify where SD features currently and where there is potential for it to be incorporated into the curricula.
- Staff training is needed to overcome the perceptions by lecturers that they lack sufficient knowledge and understanding to incorporate and teach SD.
- The multi-disciplinary nature of SD requires the encouragement of teaching and research across departments and faculties.

- There is limited information/ guidance for how SD could be incorporated into the curricula. The production of case studies could help demonstrate how curricula can be reviewed and modified in relation to SD.
- Additional research funding is needed to investigate the incorporation of SD into the curriculum.

It is suggested that sustainability concepts are naturally present within the curricula of the LS, but that its presence is often not explicitly identified. For example, SD has been a core element of agricultural degrees for many years. This is because the concepts of sustainability often have a direct financial impact on the rural sector. For example, climate change will affect the crops that are grown within the UK, whilst sustainable water and soil management will affect crop yields. As part of the 2010 curriculum review HAUC has endeavored to explicitly identify the presence of SD in its degrees.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN ESTONIA

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1. **Sustainable Development (SD) policies in Estonia:**

Since 1995, Estonia has **The Act on Sustainable Development** which determines the general principles of making use of natural resourses. In 1996 **The Estonian Commission on Sustainable Development** was founded as an advisory body to the Government. The task of the Commission is to analyse the policy of the state on sustainable development and to make proposals to the Government and to state and local government institutions ensuring synergy among developments in the economy, social affairs and environmental areas. Commission also has the right to propose drafting legislation and organising research on the subject. Members of the Commission are the major non-governmental organizations and the board (and vice-chairman), elected by the members for two years.

The Estonian National Strategy on Sustainable Development – **„Sustainable Estonia 21“** was approved in 2005. It names the four main development goals: viability of the Estonian cultural space, growth of welfare, coherent society and ecological balance.
Implementation and reporting processes of the strategy are coordinated by the **Strategy Bureau of the State Chancellery.**

Other important policies concerning sustainable development in Estonia are:
The Estonian Environmental Strategy 2030 - builds upon the principles of the “Sustainable Estonia 21” and serves as the basis for the preparation and revision of all sector-specific development plans within the sphere of the environment.

The National Environmental Action Plan of Estonia 2007–2013 serves as the implementation plan of the Strategy.

Estonian Research and Development and Innovation Strategy 2007-2013 "Knowledge-Based Estonia" focuses on sustainable development of the society by means of research and development, and innovation.

There are several EU grants used for environment sector (Phare, ISPA, LIFE). In agriculture sector there are subventions for organic farming, native breeds, environmental friendly farming etc. The foundation Environmnetal Investments’ Centre performs as the implementing agency for the environmental projects funded by the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF) and to lend money for the implementation of environmental projects.

Therefore, the values of the indicators "1.A" of the guidelines for Estonia are:

- ✓ Existence of specific national institutions about SD
- ✓ Existence of specific national policies about SD
- ✓ Existence of specific national legislation about SD
- ✓ Existence of specific subventions about SD

In Estonia, education for SD (ESD) is developed together and used under the name of environmental education. There is no single official body to deal with it, but ESD is part of the work duties of the officials in the Ministry of the Environment and Ministry of Education and Research, plus the Commission on Sustainable Development on the governmental level. There is Memorandum of Cooperation, signed by the Minister of the Environment and the Minister of Education and Research in 2005. In general, there is little organization of SD in higher education specifically, mainly just as part of general policies.

The framework document is **Environmental Education Concept** for the Republic of Estonia which also sets some objectives for higher education, like:

- the university curriculum should include obligatory modules on environment and sustainable development.
- future teachers acquire knowledge about sustainable development, and skills for the application of didactic principles of the education for sustainable development.

There is also **National Development Plan of Environmental Education** (from 2008), but it was not verified by the ministries. This document also states that:

- the topics of environment and sustainable development should be integrated into university curriculum;
- scientists should introduce their research fields and results from the sustainable development point of view;
- national and international cooperation in ESD is encouraged among the higher education insitututions.

The Higher Education Strategy 2006-2015 mentions preferential development of studies in the natural and exact sciences and in technology.
Other than that, there are no specific policies for SD in higher education (policies as well as legislation mainly focus on basic and high school education).

There are grants from The Environmental Investment Center's (under the Ministry of Environment) which are aimed at increasing environmental awareness. The supported activities differ somewhat, but in brief the activities can be divided as follows:

The aim of the Environmental Programme is to shape the values and behavior patterns of the residents of Estonia into environmentally sustainable ones through awareness increasing activities and the promotion of environmental education supporting national curricula.

The environmental education infrastructure grants are aimed at improving and harmonizing the availability of environmental education through the development of an appropriate infrastructure.

The environmental education development grants are aimed at improving the knowledge, skills and competences of specialists engaged in the provision of environmental education, thereby increasing their competitiveness in finding employment to meet their qualification.
The Environmental Investment Center receives applications for grants every year (generally twice a year).

Therefore, the values of the indicators "1.B" of the guidelines for Estonia are:
- ✓ No existence of specific educational national institutions about SD
- ✓ Existence of specific educational national policies about SD
- ✓ No existence of specific educational national legislation about SD
- ✓ No existence of SD criteria in the accreditation systems of the university degrees
- ✓ Existence of specific subventions about education in SD

In Estonia, there are 6 public universities, 3 private universities, 10 public professional higher education institutions, 12 private professional higher education institutions and 2 public vocational educational institutions. This paper focuses on the 4 public universities which also teach natural sciences.

Estonian University of Life Sciences has just developed a thematic strategy „Green University" in coherence with the university's development plan till 2015 (to be verified by university council in March 2011). The activity plan for the strategy will be formed in the first half of 2011.

There is no known similar activities in other universities. The strategic plan of University of Tartu simply brings out promoting environmental awareness and sustainability among students and staff as part of their organisational development. Other universities just mention in their mission statement the need to contribute to sustainable development.

There are no specific units or departments for SD in whole but for some SD areas.
Estonian University of Life Sciences:
- Department of Environmental Protection
- Research Centre of Organic Farming
- Centre of Renewable Energy

University of Tartu:
- Science Education Centre
- Frontiers in Biodiverstiy Research (FIBIR) Centre of Excellence

Tallinn University of Technology:
- Department of Environmental Engineering
- Chair of Environmental and Chemical Technology
- Chair of Environmental Economics

- Laboratory of Oil Shale and Renewables Research

Tallinn University:

- Department of Natural Sciences
- Insitute of Ecology

Therefore, the values of the indicators "1.C" of the guidelines for Estonia are:

✓ Existence of specific university policies about SD: In few universities
✓ Existence of specific units or departments about SD: In some universities

In Estonian University of Life Sciences, a new strategy is being developed for research activities which focuses on bio-economy and sustainable use of natural resources (to be verified by the university council in March 2011). There are no known similar policies in other Estonian universities.

Therefore, the value of the indicator "1.D" of the guidelines for Estonia is:

✓ Existence of specific programs about SD

2. **SD University Studies in Estonia:**

Natural sciences are taught in four national universities: Tartu University, Estonian University of Life Sciences, Tallinn University and Tallinn University of Technology. Each university has its stronger and weaker sides in specific specialities – general sciences, applied sciences, learning and teacher training. Only one university focuses on life sciences.
Higher education curricula are developed in the universities. One of the more significant innovations is the opening of doctoral schools in several specialities in 2005, among which are specialities important for environmental education.
Studies connected to SD can be found in all four bigger universities of Estonia.

Estonian University of Life Sciences
Bachelor Studies (3 years):

- Producing of Field and Horticultural Crop Products
- Animal Production
- Foodstaff Technology
- Forestry
- Natural Resources Management
- Management of Urban and Industrial Landscapes
- Environmental Protection
- Applied Hydrobiology
- Geomatics
- Nature Tourism
- Farm Management

Master Studies (2 years):

- Horticulture
- Field Crop Husbandry

- Agricultural Production and Marketing
- Animal Science
- Aquaculture
- Meat and Dairy Technology
- Forest Management
- Forest Industry
- Natural Resources Management
- Renewable Energy Resources
- Management of Urban and Industrial Landscapes
- Landscape Protection and Preservation
- Landscape Architecture
- Applied Hydrobiology
- Land Management
- Nature Tourism
- Biodiversity and Landscape Management

Integrated studies (5 and 6 years):

- Rural Buildings
- Veterinary Medicine
- Water Management

Professional higher education (4 years):

- Biosystem Engineering

University of Tartu

Bachelor and Master studies (3+2 years):

- Biology
- Gene Technology
- Geography
- Geology
- Ecology and Biodiversity Conservation
- Environmental Technology

Tallinn University of Technology

Bachelor studies (3 years):

- Environmental Techology
- Chemistry and Environmental Protection Technology
- Geotechnology
- Food Technology and Product Development
- Gene Technology
- Applied Chemistry and Biotechnology
- Industrial Ecology

Master studies (2 years):

- Environmental Management and Cleaner Technology
- Environmental Technology
- Geotechnology

- Chemistry and Environmental Protection Technology
- Food Technology and Product Development
- Biomedicine Technology
- Gene Technology
- Applied Chemistry and Biotechnology
- Landscape Architecture
- Industrical Ecology

Tallinn University
Bachelor studies (3 years):

- Biology
- Geoecology
- Environmental Management

Master Studies (2 years):

- Biology Teacher
- Geography Teacher
- Biology (Marine Biology-Environment Specialist)
- Geoecology
- Environmental Management
- Molecular Biology

Therefore, the value of the indicator "2.A" of the guidelines for Estonia is:

✓ Existence of specific studies about SD: In the majority universities

In **Estonian University of Life Sciences** all studies have ecology and environmental protection subject in their Bachelor level. Depending on the studies there are different additional environmental and ecology subjects, few studies have even biosemiotics and environmental philosophy included in the curricula.

In **University of Tartu**, most of the life science studies include nature and environmental protection subject in their Bachelor level, and depending on the studies also other envrionmental and ecology subjects.

In **Tallinn University of Technology**, many studies (not only life sciences) include environmental protection and sustainable development subject. Also some studies out of life sciences' field have for example subjects like environmental politics or envrionmental law.

In **Tallinn University**, life sciences' studies include subjects like sustainable Baltic Sea, ecology and nature conservation. Also some studies out of life sciences' field include global ecology subject. It can be also mentioned that all teacher studies include environmental education and sustainable development subject in their Master level (also language teachers).

Therefore, the value of the indicator "2.B" of the guidelines for Estonia is:

✓ Existence of specific subjects about SD in the degrees: In the majority of the degrees

There is not much information available on SD pratical activities as the studies are managed internally in university departments and specific activities can differ from year to year.

There is some practical activities in some extent in the life science studies in all four universities. Most common are smaller course works or case studies, excursions on different institutions and organisations. Often envrionmental student organisatsions organise these excursions themselves (for example in Tallinn University of Technology and Estonian University of Life Sciences). Summer internship is compulsory part of all degrees but it is connected to SD mostly only when it's directly connected to student's study field.

Therefore, the value of the indicator "2.C" of the guidelines for Estonia is:

✓ Existence of specific practical activities about SD in the degrees: In the majority of the degrees

Life Sciences deal with the very core of SD – the natural resources. Estonia still has quite a lot undamagad nature left which offers good source for education and research activities. Education in LS can help to manage and preserve these resources in a sustainable way.

Barriers for the **integration** of the SD and problems in the teaching methods:

- Lack of cooperation between universities and also between ministries and other sectors. One of the reasos here is the decreasing number of students (due to demographic reasons) which increases the competition between universities.
- Many of the university teaching staff are from the older generation and therefore not that keen to take up newer teahcing methods or integrating newer ideas into their subjects. Often there is lack of knowledge and skills to integrate SD into specific subjects.
- Universities tend to not consider ESD as important field for development for themselves.

3. **Relevant Institutions related to SD in Estonia**

- Ministry of the Environment, Ministry of Education and Research – responsibility on national level.
- Environmental Board – governmental institution, manages the nature protection areas. They also organise educational activities which are not only aimed at children. The study programmes organised as company team training, for farmers. In order to foster environmentally friendly values, they publish booklets, produce information boards etc.
- Stockholm Environment Institute (SEI) Tallinn Centre – a foundation that links SEI know-how on the promotion of sustainable development, resilience and adaptation, environmental protection, nature conservation by analysing the

impact of environment-related policies, management practices, market-based instruments, socio-economic issues, energy efficiency measures and environmental governance studies in the region. Not so much involved in education, some surveys on environmental awareness.

- REC Estonia – non-profit organisation, part of the international REC network. Focuses on environmental awareness, NGO support (adult education), assisting in implementation of the EU legislation in Estonia. Among other things have made studies and programmes on non-formal adult education for sustainable development.
- Estonian Fund for Nature – non-profit organisation, with WWF as the main international partner. It's the leader of various wildlife conservation projects important to Estonia. One of their principles of action is also to support sustainable development through their projects, but no specific focus on education.
- Estonian Green Movement-FoE - non-governmental, non-profit environmental organisation which was becoming one of the first environmental NGOs in Estonia that started to deal with wide range of environment and development issues. Nowadays they deal with raising environmental awareness among public, pushing government for strong policy and being quite visible in national media.
- Estonian State Forest Management Centre (RMK) - manages 17 nature centres and 5 nature houses in Estonian forest areas that provide information and activities about environment for all ages and training for work-based learning.
- WinterAcademy – non-profit student organisation with the aim to inspire students to get involved in making science and innovation projects in the fields of sustainable development. They organise every year a student science article competition and conference focusing on different aspects of sustainability. This is the only known national-wide student cooperation in Estonia in the field of sustainable development.

4. **International cooperation in ESD (Education in SD) Estonia:**

The Ministry of Education and Research have supported several years the representatives of formal education, higher education, and non-formal education in participation of working groups of **Agenda 21 for Education in the Baltic Sea Region – Baltic 21E** which is coordinated by Baltic 21.

Baltic 21 is an open and transparent network for cooperation that links together a wide range of stakeholders in a common endeavour for regional sustainable development. The members are various government ministries and agencies from the 11 Baltic Sea states, the European Commission, numerous intergovernmental and non-governmental organisations, academic and financial institutions, as well as local, city and business networks. There are several projects coordinated by this network about different fields of sustainable development.

There is also collaboration under the **Baltic University Programme**

(http://www.balticuniv.uu.se/). The Baltic University Programme (BUP) is a network of about 225 universities and other institutes of higher learning throughout the Baltic Sea region. Sub-project - Education for Change (EduC) is a project aiming at enhancing the competence of teachers, both school and university teachers, on how to implement the concept of sustainable development in their education. Under this collaboration have published the handbook for teaching and learning sustainable development.
Estonia has participated also in: Baltic Sea Project (BSP) (http://www.bspinfo.lt/), Foundation for Environmental Education (FEE) (www.fee.org) and The World Environmental Education Congress (WEEC) (takes place every two years).

5. **Good practices and relevant experiences in the Higher Education Institutions in Estonia**

- Centre of Renewable Energy of Estonian University of Life Sciences organises annually conference „Investigation and Usage of Renewable Energy Sources" which is nationally known for gathering renewable energy experts.
- Estonian University of Life Sciences has been working on green university idea in last two years mainly in the field of environmental awareness. There are regular movie nights, seminars and other activities about sustainable lifestyle. Also university has released the list of good practices for environmental friendly events' organization.

6. **Possible future actions in Estonia:**

There is need for more cooperation between universities, joint projects both in education and science. ESD could be improved with interdisciplinary programmes and projects within different departments and universities.
Also currently there is no concrete activity plan for universities to integrate SD into their curriculas which should be developed.
Teaching staff probably needs some extra training on how to link different topics with the idea of SD. Also more course works and thesises could be connected to SD topics.
One of the starting ideas is to create more interdiciplinary subject about SD in Estonian Universtiy of Life Sciences, which is optional for students.

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT (SD) IN GERMANY

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Summary

The German government published in 2002 its National Sustainability Strategy defining 35 key indicators. In some areas progress was achieved as planned (CO_2 emissions), in others not (obesity, eco-farming). A main idea of the university's policy for SD is to promote the combination of specialized sciences. It is also proposed (but not yet agreed upon) to offer courses in SD to all German students. Some universities have developed explicit SD university policies and related activities. A survey from 2007 [1] based on a self-validation of the universities identifies 325 specific studies in SD (of 15.000 studies existing in Germany) of which 81 are Life Sciences (LS).More than 82% of the SD programs in LS belong to Agriculture, Ecology, Biology and Forestry. SD is included in many subjects in a narrow sense as one necessary success factor, but probably only in a rather restricted number of cases in the sense of preserving "ecological, economical and social sustainability" for future generations. Regarding the whole LS scenery beyond education there are very few labels certifying the full range of SD. One example is the German Agricultural Society's (DLG) sustainability index for farmers - however struggling for acceptance. Also the probably existing good practices at the university level need more dissemination and evaluation by the scientific community. University networks were recently created in this respect.

0. Introduction

The present paper outlines the state of the art of sustainable development in Germany, especially regarding higher education (HE) in Life Sciences (LS). The paper is a contribution to the "Innovation in the Teaching of Sustainable Development in Life Sciences in Europe" (ISLE). It is executed within the ISLE Erasmus network consisting of institutions active in HE from 25 EU member countries, Belarus, Iceland, Norway and Turkey (Terms of Reference see Annex 1).

1. Sustainable Development (SD) policies in Germany

Germany is a federal republic where the federal government, all the 15 state governments and many local governments have developed their own SD strategies in the course of the Rio process.

[1] For the updated online survey data see http://www.leitfaden-nachhaltigkeit.de/

1.A. Planning, investment and management strategies of the State and local governments to promote SD

SD in the sense of protecting natural livelihood and animals is one of the principles of the German constitution (Art 20a)[2]. The German Government created in 2001 the German Council for Sustainable Development and published in 2002 its National Sustainability Strategy (Bundesregierung, 2002). 35 key indicators in 21 areas were defined and since then updated yearly. In some areas progress was achieved as planned (CO2 emissions, renewable energy), in others e.g. budget deficit, eco-farming[3], nitrogen surplus and the obesity rate the actual figures are far away from the objectives defined in 2002 or are even developing into the wrong direction (obesity) (Statistisches Bundesamt, 2010)[4].

The responsibility of the German Council for Sustainable Development is to advise the government in implementing the SD strategy, to serve as a forum for discussion and to publish guidelines and recommendations for SD related activities. The Council published a guide for sustainable consumption and currently works on a revised set of indicators. The Council proposes also a SD certificate for improving financial market stability (Rat für Nachhaltige Entwicklung, 2010)

In 2009 the German Government decided that all future legislation has to pass a SD check prior presentation to the parliament (Bundesregierung, 2009). The implementation of SD policies is subsidized in many fields by the German government and the governments of the states from renewable energy to eco farming.

1.B. Higher Education policies related to SD

The German SD education policies are guided by the National Action Plan (NAP) "Education for Sustainable Development" 2005 – 2014 (Deutsche UNESCO Kommission, 2004) complemented by state action plans in most of the German states. In some states the legislation governing higher education contains explicit provisions regarding SD (e.g. Hamburg and Berlin) (HRK, 2010). A national committee (30 experts), a round table (100 experts) and working groups for different educational levels (including one for higher education, see below) were instigated for implementing the NAP (Deutscher Bundestag, 2009). A central website (www.bne.de) and an internet newspaper (www.bne-journal.de) were created. Each issue of the newspaper is dedicated to a special topic such as e.g.

[2] Der Staat schützt auch in Verantwortung für die künftigen Generationen die natürlichen Lebensgrundlagen und die Tiere im Rahmen der verfassungsmäßigen Ordnung durch die Gesetzgebung und nach Maßgabe von Gesetz und Recht durch die vollziehende Gewalt und die Rechtsprechung.

[3] The actual part of Eco-farming equals 5.4% of the agriculturally used surface, in 2002 it was planned to reach 20% by 2010, in 2008 the government skipped the time limit without changing the objective.

[4] Further information can be found in following links in reference list.

Corporate Social Responsibility, climate change, financial crisis or biological diversity. The idea is to analyze how education can contribute to progress in the respective areas.
The German Conference of university presidents (Hochschulrektorenkonferenz, HRK) together with the UNESCO committee for higher education voted in 2010 a declaration titled "universities for SD" (HRK, 2010). The main idea is to promote the combination of specialized sciences and overarching and interdisciplinary perspectives for taking into account the complex interactions between men and environment [5]Networks for promoting SD in higher education were created at first between the universities of Baden Württemberg (HNE Netzwerk Hochschulen für Nachhaltige Entwicklung, 2010)[6] followed by a network between 49 UAS in Germany (FHD NE Netzwerk, 2010). The ESD working group regarding higher education organizes regular meetings of interested key persons of the universities; it serves as a forum for exchanging experiences, transfers good practices, discusses and prepares common SD activities including public relations and international cooperation (AG Hochschule und Nachhaltigkeit, 2011). The overall objective to be realized by the universities is to offer courses in SD to all German students during at least one study year (approximately 400.000 students).The working group asks for appropriate legislation in the federal states, capacity building and tool development (AG Hochschule und Nachhaltigkeit, 2011).
It seems that the term SD is not explicitly mentioned in the procedures governing the accreditation process in Germany. However it may be concluded form the standardized documents provided by the accreditation agencies and the checklists[7] used that SD is taken into account implicitly (AQAS, 2010).

1.C. University policies and experiences

The forerunners of SD at the university level seem to be especially the universities of Bayreuth, Bremen, Eberswalde, Eichstätt, Hamburg, Lüneburg and Oldenburg. The universities have developed explicit SD university policies, specific SD reports (Universität

[5] In Forschung und Wissenstransfer sollten, wo immer angezeigt, fachliche Spezialisierung mit fächerübergreifenden und interdisziplinären Perspektiven verbunden werden, um den komplexen Wechselwirkungen zwischen Mensch und Umwelt Rechnung zu tragen. Individuell und in gesellschaftlichen Handlungsfeldern sind die globalen Probleme des menschlichen Zusammenlebens nur sinnvoll zu erforschen, wenn sich Erkenntnisse und Expertise in Geistes-, Wirtschafts-, Sozial- und Verhaltenswissenschaften sowie Natur- und Technikwissenschaften stärker verbinden.
[666] This network also offers state wide lectures and seminars on SD for students and university teachers
[7] Art. 1.3: Bachelor- und Master-Studiengänge sollen die Studierenden zu zivilgesellschaftlichem Engagement befähigen und zu deren Persönlichkeitsentwicklung beitragen
Art1.4: Hat sich die Leitidee des Studiengangs als tragfähig erwiesen oder sind unter diesem Aspekt Veränderungen vorgenommen worden?

Bayreuth, 2011)[8] or Elearning activities. Some have created special research centers focused on SD (e.g. University of Bremen[9], University of Eichstätt (Katholische Universität Eichstätt, 2011), University of Oldenburg (Universität Oldenburg, 2010)) or reoriented their whole study concepts and resource consumption towards SD (Leuphana Univiersität Lüneburg, 2010). The UAS[10] Eberswalde has changed its name 2010 into "UAS for SD" and claims to be the "greenest university" in Germany focusing their study offer on forestry and related areas (see below) (HNE Eberswalde, 2011). The University of Lüneburg received in 2010 the International Sustainable Campus Excellence Award n the category leadership. (Leuphana Universität Lüneburg, 2010).
It seems that all German universities have adapted their study programs in line with the Bologna process, exceptions can be found in medicine where the Bachelor / Master system has not yet been introduced. However, discussions are underway to establish Bachelor / Master Studies on a pilot scheme (aerzteblatt.de, 2008) .

1.D. Research policies related to SD

There are many specific programs and grants to promote research activities in the realm of SD. Many federal and also many state ministries have developed their own programs and contests awarding achievements in SD (Deutscher Bundestag, 2009). One of the most prominent examples is the FONA[11] program developed by the federal Ministry of Education and Research (BMBF, 2011). The BMBF[12] plans to invest about 2 Billion Euro in SD research until 2015 (BMBF, 2010)[13]

2. SD University Studies in Germany

SD University Studies evolved in Germany as an integral part of Environmental and Ecological Sciences (de Haan, Donning, & Schulte, 1999) (de Haan, 2007)**.** Environmental and Ecological Sciences itself originated quite often as an offspring of Agricultural Sciences (e.g. at the UAS

[8] The report is structured in conformity with the global reporting initiative (GRI) and contains information on the economic situation (relevance for the region), resource consumption, origin, mobility and health aspects of the students and basic information on specific SD courses.
[9] Das Forschungszentrum Nachhaltigkeit ist eine Zentrale Wissenschaftliche Einrichtung der Universität Bremen. Es wurde 1989 zunächst als Forschungszentrum Arbeit und Technik (artec) gegründet. Die wissenschaftliche Einheit ist ein Zusammenschluss von Professoren und Professorinnen aus unterschiedlichen Fachbereichen. Zweck ist die disziplinübergreifende Forschung. Im Rahmen von Forschung und Lehre wird die Nachhaltigkeitsthematik unter sozialen, ökonomischen und ökologischen Perspektiven untersucht. Die wissenschaftliche Beratungstätigkeit ist darauf ausgerichtet, nachhaltige Entwicklungen in relevanten Handlungsfeldern zu unterstütze
[10] University of Apllied Sciences
[11] Forschung und Nachhaltigkeit – Research and Sustainability
[12] Bundesministerium für Bildung und Forschung – Ministry for Education and Research
[13] Insgesamt wird das BMBF in den nächsten Jahren ca. 2 Mrd. Euro in die Forschung für Nachhaltigkeit investieren

Bingen). Sustainability in the sense of sustainability of food production has always been an essential part of Agriculture.

A survey completed by de Haan in 2007 identifies 325 specific university studies in SD including LS (Annex 1)[14]. The authors have classified these studies into Engineering (48%), Natural Sciences (9%), Life Sciences (8%), Socioeconomic Studies (8%) and Interdisciplinary Studies (27%) (de Haan, 2007). A closer look to the different categories reveals that 7 studies being classified into Engineering are in fact belonging to LS according to the definition applied in this analysis[15] and 12 should be reclassified from Natural Sciences into LS. It results that 81 studies from 325 are belonging directly to LS (25%). 31% of the interdisciplinary studies are linked with Life Sciences, however nearly all interdisciplinary studies are linked with Natural Sciences (94%) and 59% with Engineering.

2.A. Specific university studies in Life Sciences

The full list of the 81 different study programs offered by German universities and UAS is listed in Annex 1. There are 38 Bachelor, 41 Master, one Diploma and one PhD program (Table 1)[16]. Approximately ¾ are offered by universities ¼ by UAS.

Level	University of Applied Sciences	University	Total
Bachelor	14	24	38
Dipl		1	1
Master	6	35	41
PhD		1	1
Total	20	61	81

Tabelle 1: LS Study Programs of Universities and UAS

There are 43 study programs focused fully on SD and 36 where SD is offered as one area of concentration (Table 2). According to the survey there are two study programs where single

[14] The total number of studies is estimated at approximately 15.000 (Studiengänge in Deutschland, 2011)
[15] It has to be noted that the classification into the different named categories isn't always plausible For example agricultural studies are classified into engineering and natural sciences. The interdisciplinary Master study program "Agriculture and Environment of the FH Bingen is only categorized under Natural Sciences and Engineering, but not under Life Sciences.
[16] There are very probably many more „PhD programs" with a focus on SD, but they are not formally organized as programs but connected to research institutions or university faculties (see below).

modules are offered. It has to be noted that there are - at least actually - more study programs (beyond SD study programs) where single modules focused on SD are offered.

Level	SD study programme	SD area of concentration	SD as modules	Total
Bachelor	19	18	1	38
Dipl	1			1
Master	23	17	1	41
PhD		1		1
Total	43	36	2	81

Tabelle 2: Type of SD studies according to level

More than 82% of the SD programs in LS belong to Agriculture (including Agrotechnology and Organic Farming), Ecology, Biology (including Biotechnology) and Forestry (Table 3).

LS Category	Number of places estimated	Percentage	Percentage cumulative
Agronomy and Agrotechnology	822	17,7%	17,7%
Ecology	734	15,8%	33,5%
Biology and Biotechnology	701	15,1%	48,5%
Forestry	681	14,6%	63,2%
Agriculture and Environment	635	13,7%	76,8%
Organic Farming	284	6,1%	82,9%
Renewable Ressources and Bioenergy	240	5,2%	88,1%
Bio-Geo-Sciences and Soil Science	180	3,9%	92,0%
Nutritional Sciences and Home Economics (Ökotrophologie)	142	3,1%	95,0%
Others	100	2,2%	97,2%
Health Sciences	85	1,8%	99,0%
Sustainable Tourism	47	1,0%	100,0%
Total	4.651	100,0%	

Tabelle 3: Number of university study places available per LS category

It is estimated[17] that about 3000 Bachelor university study places are available in SD programs in LS (including SD as an area of concentration and single SD modules) and 1600 Master places (Table 4).

Category of Lie Sciences	Bachelor	Master	Diplom	PhD	Total
Agriculture and Environment	520	115			635
Agronomy and Agrotechnology	467	355			822
Bio-Geo-Sciences and Soil Science	135	45			180
Biology and Biotechnology	574	127			701
Ecology	312	387	30	5	734
Forestry	497	184			681
Health Sciences		85			85
Nutritional Sciences and Home Economics (Ökotrophologie)	142				142
Organic Farming	144	140			284
Others	100				100
Renewable Ressources and Bioenergy	135	105			240
Sustainable Tourism		47			47
Total	**3.026**	**1.590**	**30**	**5**	**4.651**

Tabelle 4: Number of study places in LS according to level

Nearly all Bachelor programs have a duration of 6 semesters, a few a duration of 7 semesters. Most of the Master courses have a duration of 4 semesters, some of 3 semesters.

2.B. SD specific subjects in Life Sciences university studies

There is only little information available on SD specific subjects in LS studies (see above). However, it may be assumed that SD is included in many subjects as one necessary component for success in the respective subjects (e.g. sustainable food production) but probably only in a rather restricted number of cases in the sense of “ecological, economical

[17] As 9 Bachelor programs and 9 Master programs have not defined the number of available places it is assumed in the framework of this analysis that 100 places per Bachelor course and 50 places per Master course are available (PhD: 5 places).

and social sustainability" as this might be the case in organic farming courses. On contrary there are for example many traditional agricultural studies included in the survey where content and study concept do not vary very much from other agricultural studies not included in the survey. The reasons for these variations are due to the methodology applied in the survey allowing each German university to evaluate their SD programs themselves

2.C. SD practical activities

Many German universities, but especially the UAS require from their students internships in enterprises as a precondition for beginning the studies at the university. Additional practical activities are often demanded during studies. It is not known but at least unlikely that the universities apply a SD criterion for selecting places.

2.D. Contributions of education in LS to SD in Germany

The numbers of available SD related places in German universities cover the fact that there is - as far as known - no explicit and reliable evaluation or certification process (for example in the form of a SWOT analysis) that detects the State of the Art of SD in LS except the survey quoted in this analysis. Very probably the real numbers of places in "real" SD deserving this title are smaller than quoted. The objective of offering courses in SD to 400,000 German students as envisaged by the German UNESCO commission seems to be very optimistic. (Deutsche UNESCO Kommission, 2004)

2.E. Barriers for the integration of the SD and problems in the teaching methods

As the concept of SD requires by definition interdisciplinary in a very broad sense (economic, ecologic and social aspects), there are probably few studies reflecting all areas with an integrated approach.

One possibility to overcome these shortcomings would be to break up even more the boundaries of the disciplines. In LS such links were established with Engineering and Natural Sciences, sometimes including also Economics. Probably up to now only few universities have overlapping teaching and research activities integrating Social Sciences. However on the other hand Social Sciences are very strong in the education of school-teachers with some overlapping to the other areas.

3. Relevant Institutions related to SD in Germany

A survey from 2008 identifies 194 research centers and governmental institutions focused on SD from which 64 do LS related research. Many, especially big companies have even

made SD part of their official mission statement and regularly publish SD reports. BASF, a LS companies, received in 2009 the biannual award for the best German SD report by the German government (BASF, 2009).
Also many national and international NGO's contribute to the various topics related to SD in LS. The state governments try to establish networks where all actors come together and build up synergies.
Within Germany the German Agricultural Society (DLG) developed a sustainability index combined with an award for high performing farms for motivating farmers to consider and implement SD principles. However, the participation is low. According to orally received information only 30 farmers are actually certified respectively undergo the certification process. One reason may be the associated high certification cost; another reason is the confusing big number of labels coexisting in Germany especially in the food sector. Thus it is not very attractive for the farmers to qualify for an additional label unknown by the public. Some German universities have received „Eco Management and Audit Scheme" (EMAS) certificates (Bremen, Lüneburg, Cologne), others envisage to pass the certification process soon (Universität Bayreuth, 2011)

4. International cooperation in ESD (Education in SD) of Germany

The ministries of Foreign Affairs, Research and Development and the Ministry of Cooperation and Development all have their specific policies. The programs are realized by special institutions as the German Academic Exchange Service (DAAD), executing agencies being responsible for the cooperation with partners in developing countries (GIZ, KfW) often in cooperation with universities.

4.A. Policies of the federal and state governments and the universities

The policies foresee to continue the internationalization process intensifying cooperation with other countries (BMBF, 2011).

4.B. Experiences in ESD in Life Sciences

The DAAD promotes the sustainable institutional development of universities in developing countries via the cooperation with German universities (DAAD, 2011). It is also sponsoring specific ESD related activities like for example conferences, summer schools and seminars (DAAD, Alumni-Sonderprojekt ''Bildung für nachhaltige Entwicklung'' (BNE) im Rahmen der UNESCO-Weltkonferenz, 2009).
In the field of international cooperation and development the German Agriculture Information Network (Sustainet) was founded by the German Government in 2003 for showing what contribution sustainable smallholder agriculture promoted by German NGO's

and GO's can make for reducing hunger and poverty in developing countries (Sustainet, 2010). So basically the idea of Sustainet is the promotion of SD in agriculture worldwide.

5. Good practices, relevant experiences in the Higher Education Institutions and possible future actions

There seem to be many good practices in Germany, may be also some interesting bad ones, but it is very difficult to find concise descriptions or even independent evaluations of these experiences. Thus one of the objectives of the UNESCO working group is to make those examples available to a bigger audience in documenting good practices (AG Hochschule und Nachhaltigkeit, 2011). Also it is envisaged to continue developing the existing networks of the national actors (yearly conferences on SD, training programs in SD for academic staff, instruction materials of SD etc.), to improve public relations and to strengthen international cooperation.

As was shown above several Life Sciences Studies have integrated SD in their teaching concepts. However an independent evaluation of those concepts does not exist. Therefore one objective should be to define necessary elements and a framework strategy to promote SD in LS,

6. Acronyms

BMBF
Bundesministerium für Bildung und Forschung 4
DAAD
Deutscher Akademischer Austauschdienst 9
DLG
Deutsche Landwirtschafts Gesellscaft 8
EMAS
Eco MAnagement and Auditing Scheme 9
ESD
Education in SD 3, 9
FONA
Forschung für nachhaltige Entwicklungen 4
GIZ
Gesellschaft für Internationale Zusammenarbeit 9
HRK
Hochschulrektorenkonferenz 3
KfW
Kreditanstalt für Wiederaufbau 9
LS
Life Sciences 1, 5, 6, 7, 8
NAP
National Action Plan 2
SD
Sustainable Development 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
UAS
University of Aplied Sciences 3, 4, 5, 7
UNESCO
United Nations Educational, Scientific and Cultural Organization 3

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STATE OF THE ART IN THE FIELD OF SUSTAINABLE DEVELOPMENT IN IRELAND

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This paper describes the principal organisations and educational establishments involved research, education and support of sustainable development in Ireland. The information given is drawn from the websites of the organisations mentioned.

1. **Sustainable Development (SD) policies in Ireland :**

1.A. Planning, investment and management strategies of the State and local governments to promote (SD)

In 1997 the Irish Government issued the document *Sustainable Development A Strategy for Ireland*. This proposed the following initiatives, support structures for sustainable development, positive impact on enterprise and employment, integrating environment into agriculture, forestry, transport, marine, industry tourism and energy. Progress was described in the 2002 Government report *Making Ireland's Development Sustainable Review, Assessment and Future Action* which was presented as the national report for the world summit on sustainable development. Under the terms of Towards 2016 the current Partnership Agreement the Strategy was due to be reviewed by 2008 but this has been extended to 2011. This review is being coordinated by the Sustainable Development Unit of the Dept. of Environment, Heritage and Local Government.
The Irish Government issued Agenda 21 guidelines in 1995 and these were updated in 2001. These guidelines relate to economic, social and cultural development in local communities.

In 2002, the Dept of Trade, Enterprise and Employment issued a Sustainable Development Strategy whose objectives were to address within the remit of the Department, Climate Change, Competitive Sustainability, Corporate Social Responsibility and Departmental Sustainability.

The national institutions with specific responsibility for sustainable development are the

1. Sustainable Development Unit
   Department of the Environment, Heritage and Local Government, Custom House, Dublin 1

2. Comhar Sustainable Development Council, which was established by the Minister for the Environment, Heritage and Local Government in 1999 is the forum for national consultation and dialogue on all issues surrounding Ireland's pursuit of

sustainable development. It plays an important part in the development and implementation of policy in this regard. Comhar SDC's terms of reference, as agreed by Government, give it a broad and flexible remit. In summary, they are:

- to advance the national agenda for sustainable development
- to evaluate progress on achieving sustainable development in Ireland
- to assist in developing tools and models that can progress Ireland towards sustainable development
- to advice the relevant individual(s) and/or organisation(s) on how to implement the tools and models
- to contribute to the formation of a national consensus on sustainable development

3. The Environmental Protection Agency (EPA) was established under legislation in 1993. The Agency is responsible for

- Licensing and control of large scale waste and industrial activities to ensure that they do not endanger human health or harm the environment
- National environmental policing
- Monitoring, analysing and reporting on the environment
- Regulating Ireland's greenhouse gas emissions
- Environmental research and development
- Strategic environmental assessment
- Environmental planning, education and guidance
- Proactive waste management.

- National policies are described in 1.a above
- Existence of specific national legislation about SD Legislation on sustainable development is implicit rather than explicit in legislation in Ireland. See the appendix *Making Ireland's Development Sustainable Review, Assessment and Future Action* for a list of legislation, reports and policy statements issued until 2002.
- Specific subventions about SD are at a national level the EU LIFE+ Programme 2007-2013 In 2010 the funding was some 4 million euro across four broad categories LIFE+ Nature & Biodiversity; LIFE+ Environment Policy & Governance; and LIFE+ Information & Communication. Applicants for these funds had to provide co-funding of 25- 50%.
- At a local level funding is available for Local Agenda 21 projects. These awards are made as a result of applications to local authorities in the area where the project is to be undertaken. See funding awards for 2010 Local Agenda 21 Environment Partnership Awards in conjunction with the Dept of the Environment and local authorities. The list shows the range of projects and the funds granted.

1.B. No particular policies in relation to Higher Education policies related to SD were located.

- No specific educational national institutions, specific educational national policies or specific educational national legislation about SD were identified.
- There are no SD criteria in the accreditation systems of the university degrees
- No specific subventions about education in SD were identified however some funding would available under similar subheads in local authority, Heritage Council and Agenda 21 schemes.
- Existence of specific university policies about SD. One university policy was located. At University College Dublin, Dublin the UNIVERSITY SUSTAINABILITY POLICY is an integral part of the UCD Strategic Plan to 2014. A core objective of the Campus Development Plan is the development of a modern, sustainable, healthy and living campus. This will be achieved through a number of approaches.
- Existence of specific units or departments about SD One specific unit was identified. In Trinity College Dublin the research centre on Biodiversity and Sustainable Development was established in the School of Natural Sciences in 2008.

2. **SD University Studies in Ireland**

2.A. Specific university studies in Life Sciences

- Existence of specific studies about SD:

Ph.D Programme in Sustainable Development

Run by the Urban Institute, UCD, The degree is offered in collaboration with TrinityHaus in Trinity College Dublin (TCD). The four year programme incorporates taught modules, a research internship and original research leading to an award of Doctoral (or Masters) degrees by research. The principal areas of study are Biodiversity and Climate Change., Environmental Policy Analysis, Planning and Land Use, Sustainable Water Management and Transport and Infrastructure Energy and Efficient Build and District.

Masters Degrees in Sustainable Development

1. Dublin Institute of Technology (DIT) Masters in Sustainable Development

The course is a one year full-time course based on a structure of individual course modules and a work placement. The course is divided into four clusters of modules:

Foundation modules (economics, sociology, data collection; analysis, public administration & law, sustainable resource management 1).

Understanding environmental sustainability (ecology, rural environment, marine environment).

Understanding social and economic sustainability (urban sustainability, transport, communications, society sustainability, sustainable development economics, EU policy, environmental law).

Applying sustainability (sustainable building design, computer modelling, systems analysis, environmental management, environmental design, sustainable resource management 2).

2. TCD-UCD Master in Development Practice is offered by Trinity College Dublin (TCD) and University College Dublin (UCD).

The joint TCD-UCD Masters degree in Development Practice (MDP) is a two-year programme that offers a world class training and education in development practice at graduate level. The four pillars of the MDP are Natural Sciences, Social Sciences and Economics, Management and Health Sciences. Particular emphasis will be laid upon the interconnectedness between politics, governance, civil society, health, environmental conflict and climate change, amongst others.

3. M.Sc Sustainable and Rural Development

The MSc Programme in Sustainable Agriculture and Rural Development is offered by UCD in response to the new agenda for agriculture and rural area development. This agenda states 'Sustainable Agriculture and Rural Development involves education, use of economic incentives and the development of new technologies to ensure stable supplies of nutritionally adequate food. It also involves employment and income generation as well as natural resource management and environmental protection' (United Nations, Agenda 21).

A Sustainable Agriculture module within the programme introduces students to the concepts of sustainability and sustainable agriculture. It will examine the key animal and crop production practices associated with sustainable agriculture as well as systems of natural resource management, including water, soil, forestry and biodiversity which underpin sustainable agricultural systems. It will also examine the institutional environment affecting sustainable agriculture including the role of policy measures and extension as drivers or obstacles to achieving the goals of sustainable agriculture.

At the Cork Institute of Technology a primary B.Sc degree in Environmental Science and Sustainable Technology focuses on the engineering aspects of sustainable development. The four year programme includes an obligatory work placement in the 3rd year of studies.

2.B. SD specific subjects in Life Sciences university studies

Sustainable Development is a component part of several Masters degrees at University College Dublin including,

M.Sc in World Heritage Management

MSc Sustainable Energy and Green Technologies

Masters in Environmental Resource Management
Masters in Regional and Urban Planning
Masters in Rural Environmental Conservation & Management

3. **Relevant Institutions related to SD in Ireland :**

Comhar commissioned ECO-UNESCO to undertake a study of education at non formal and formal primary, secondary and higher levels in Ireland and the report was published as Education for Sustainable Development in Ireland [i] The Report found that most education was in the non formal area and undertaken by non governmental organisations.

3.A. Research centers,
The Government Agencies associated with SD include the Sustainable Development Unit, Dept. of the Environment, Heritage and Local Government, the Environmental Protection Agency, and Comhar, all described above. Non governmental organisations and associations include, An Taisce, and ECO_UNESCO. An Taisce runs several environmental awards schemes, including Blue Flag award for clean beaches and Green Flag awards for schools.

ECO-UNESCO's aims are:

- to raise environmental awareness, understanding and knowledge of the environment among young people
- to promote the protection and conservation of the environment
- to promote the personal development of young people through practical environmental projects and activities.
- to promote the ideals of UNESCO

The organisation runs workshops and training courses and Sustainable Development is a major theme in their work. In Spring 2011 ECO_UNESCO is running a course accredited by FETAC entitled An Introduction to Sustainable Development. It is aimed at those involved in already involved in sustainable, young people and members of the public.

4. **International cooperation in ESD (Education in SD) in Ireland:**

4.A. Policies (State and local governments, university...) The Government has established a National Committee on Education for Sustainable Development. This Committee has commissioned ECO_UNESCO to prepare a national strategy on Education for Sustainable Development.

4.B. Experiences in ESD in Life Sciences No particular examples of international co-operation were located, however, many international students participate in the postgraduate programmes described above and all postgraduate and undergraduate students can apply to participate in exchange programmes, where they exist.

5. **Good practices and relevant experiences in the Higher Education Institutions in Ireland:**

5.A. Activities to implement or promote the SD
In January 2011 Comhar SDC held a workshop on Sustainability Impact Assessment (SIA) which will feed into developing guidelines on how Sustainability Impact Assessment might be carried out in Ireland.

In June 2010, the Environmental Protection Agency (EPA) on future priorities for Ireland to develop in line with sustainable development principles. The speakers were Prof. Frank Convery of Comhar and Prof John FitzGerald of the Economic and Social Research Institute and their lectures are available on line at www.epa.ie/downloads/videos/sustfut/

6. **Possible future actions in Ireland:**

6.A. Inclusion of the ethos and applications of sustainable development in the curricula of primary schools, in second level schools. Development of SD policies in the management of universities and state research institutes.
6.B. How could the concept be integrated of SD in the Life Science Studies? Encourage staff and students to see the benefits of SD in their daily lives and the implications for future generations.

7. **References**

Nevin, E. (2007) Education for Sustainable Development in Ireland , ECO-UNESCO Dublin
www. ecounesco.ie ESD_strategy.aspx