

Improvement of environmental awareness through education and promotion of US-Hungarian collaboration

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My work at the Princeton University learning and teaching new approaches in environmental science effect all of my activities in my university and home country. Upon returning I developed further our curricula regarding environmental science and nature conservation, expanded my knowledge to our students and NGO's/local communities, furthermore I had the opportunity of promoting US-Hungarian environmental collaboration.

1. Introduction: environmental awareness in Hungary

The gaining ground in increasingly wider circle of the concept of sustainable development and its integration into national policies means in increasing challenge for Hungary and developing Eastern European countries in respect of providing the thoroughly grounded staff of specialists. Teaching environment protection and nature conservation in USA is looking back to a considerably greater background because of the earlier appearing of environmental awareness traced back to economic development than in Hungary.

In the USA training of environment protection and nature conservation specialists can be found to the same degree both at graduate and postgraduate levels. However in the higher education institutions of Hungary the trend of emphasis shifting toward teaching environmental technologies and environment management might be well observed. This means that while students have the opportunity to attend optional subjects too, however the package containing these subjects follow rather rigidly the specialization directions and the only difference often lies in the depth of teaching the subject.

There is a disadvantage in our educational system that only a few institutions can be found which are engaged in training environment protection and nature conservation specialists. It is common knowledge that training of environment protection specialists in Hungary began simultaneously with the evolving environment awareness, first at postgraduate level and only later – from the early '90s it became more general also at graduate level. Education of environmental protection in Hungary at present is going-on 40 per cent in postgraduate and 60 per cent in graduate framework. In on-third of higher education institutes is no environment protection teaching at all and in the rest it is present only sporadically. This type of education appears first of all in the field of training agrarian-economist and technical specialists. It is important to take into consideration that when we analyze the position of environmental protection in Hungarian higher education system, then it is reasonable to deal not only with education in faculties with environmental names and specialization, because here the number of students makes out only a few percentage of total of higher education students. At the same time if we take into consideration teaching of environment protection subjects integrated in training at other faculties, then this percentage increases considerably. The fact that in Hungary environment protection education first began at postgraduate level makes felt its impact even today. The training of engineers specialized in environment protection with secondary type diploma began first at the University of Veszprém, University of Miskolc, Technical University of Budapest and the Gödöllő University of Agriculture in the 1974-75 academic year, then continued at the University of Debrecen. Since then environment protection education is focused around these five large universities.

When talking about environmental protection and nature conservation education in Hungary, it is purposeful to set up two categories: one contains the environment protection faculties and specialization, the other specialized directions and non-faculty education. At the University of Debrecen, Centre for Agricultural Sciences we have Water and Environmental Management Department with two specializations (environmental technology, environmental management) which should develop further. From thoroughly examining the curriculum of these environmental programs it can be concluded that these educational programs concentrate only on aspects of environmental protection and those fields which have functional connection with the original profile of the university.

It might be concluded that the main disadvantage of educational policy in Hungary is that beside the extremely narrow spectrum of education of environmental protection, is the dominance of postgraduate specialized training. One certain social science fields of specialization particularly very low standard.

It is a general phenomenon that in forming environmental awareness the natural sciences are predominant in Hungary, in accordance of which the proportion of art sciences is insufficient. It means also a great challenge that in certain fields of specialization (e. g. education of environmental engineering, education primarily of technical orientation, which is widespread in Hungary) the topics of environment protection and nature conservation are not managed in an integrated way, in connection with economic-, social- and legal aspects, but either as expressly technical challenge (i. e. as issues of technology) or- in rare cases – in ecological relation.

In addition to environmental awareness and facilitating to achieve it, future environment policy efforts of Hungary are substantially determined by the Euro-Atlantic integration and development of educational system in this respect.

The objectives derived from Hungary's intention after joining the European Union even more speeded up the anyway increasingly urgent demand for training environment protection specialists. It is obvious that to attain the environment protection and nature conservation level of the Union and USA the education of an apparatus of specialists knowing and following the modern latest environment protection and nature conservation trends and technologies is of essential importance both in the public and private spheres.

Taking into consideration above listed reasons it became obvious that it is indispensable to develop a staff of-both professionally and integrated approach-properly thoroughly grounded specialists, the first step of which process is based on professional training at adequate level.

2. Importance of biodiversity

According to the Convention on Biological Diversity, the definition of *biodiversity* is “the variability among living organisms from all sources, [including] diversity within species, between species, and of ecosystems”. Biodiversity is measured by the number of species, which is currently estimated between 5 to 30 million. The distribution of biodiversity depends on a lot of factors, such as climate, altitude and soil. Diversity is higher in tropical regions and lower approaching the polar ones; higher on land than in the oceans (the most species rich animal class, insects live on land).

The preservation of biodiversity is an increasingly important public policy issue, since the variation in organisms is severely threatened. The rate of species extinction has increased rapidly in recent years to over one hundred times the historic average (Duffy, 2007), which gives reasons for pessimism. Biodiversity is crucial for the survival of mankind: a wide variety of species for food production and medical research are needed. In the United States, almost half of the pharmaceuticals derive from natural compounds. Ecosystems also need biodiversity for their normal functions; they take part in the regulation of climate that provides air, water or oxygen (Encarta).

Globally, there are great efforts on reversing this trend:

- 1992: Convention on Biological Diversity in Rio de Janeiro (189 countries): halting biodiversity loss by 2010 (the United States is not an official party to the Rio agreement),

- Kiev Resolution on Biodiversity (pan-European level),
- Malahide Declaration of the Environment Council (European Union level),
- Endangered Species Act.

Human activities threatening biodiversity today:

- Habitat destruction from urbanization,
- Agricultural intensification: cultivation of special species in large amounts can lead to the development of “large scale monocultures”,
- Resort building,
- Gas and oil pipeline construction.

These activities decrease the natural habitats of ecosystems.

There are also global processes resulting from human activities that mean threats to diversity:

- Desertification (land degradation resulting from unsustainable land use and climatic factors): danger for species living on non-desert environments,

- Acidification and eutrophication (excessive nitrogen and sulfur emissions): species hardly survive in affected areas.

- Radioactive contamination,
- Invasive alien species (introduced to a new area accidentally or on purpose): destroying endemic plants, animals.

- Global warming: adaptation problems can occur leading to extinction of species (Fourth Assessment).

3. Biodiversity policy in the United States

The Endangered Species Act or ESA is the central law of the biodiversity policy of the United States. Very important definitions cited from ESA:

- Endangered species: “any species which is in danger of extinction throughout all or a significant portion of its range” and

- Threatened species: “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”

As of 2006, 1,879 species of animals and plants had been listed as endangered or threatened.

The Act is administrated by the Fish and Wildlife Service and the National Marine Fisheries Service. It works on protecting endangered and threatened species with the protection of their habitats as well. Plans are worked out for the recovery and of endangered and threatened species and against their extinction. As results, almost half of the listed species have improved or stabilized their population levels (SAUNDRY, 2007).

A Recovery Plan outlines the goals, required tasks, likely costs and estimated timeline to recover endangered species (i.e. increase their numbers and improve their management to the point where they can be removed from the endangered list), but it is not specified when a plan must be completed. The average time to completion is approximately six years (GREENWALD ET AL., 2006).

The Endangered Species Act also describes the violations and penalties that may be enforced under law. The most punishable offence is importing, exporting, taking (harming, wounding, or killing), possessing, selling, delivering, carrying, transporting, or shipping endangered species without permission. Punishment can be fines, imprisonment, revocation, suspension, or modification of a license, permit, or other agreement issued by a Federal Agency that authorized a person to import or export fish, wildlife, or plants (SECTION 11 OF THE ENDANGERED SPECIES ACT).

National parks are well organized places for nature conservation. The National Park Service (NPS) is the United States Federal Agency that manages all National Parks, many National Monuments, and other conservation and historical properties with various title designations. It is a bureau of the Department of the Interior. Directly overseeing its operation is the Dept.’s Assistant Secretary for Fish and Wildlife and Parks. The National Park System comprises 391 areas covering more than 84 million acres in every state (except Delaware), the District of Columbia, American Samoa, Guam, Puerto Rico, and the Virgin Islands. These areas include not only national parks, but monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, recreation areas, scenic rivers and trails, and also the White House (NPS WEBSITE).

4. Biodiversity policy in Europe

The problems causing biodiversity decline listed above are present in Europe also. European authorities (international and national level) are aware of the problems and try to do against them with full blast.

Some special problems in Europe threatening biodiversity and nature:

- *Urbanization and infrastructure:* the densely populated lowland areas and coastal zones are affected by urbanization and transport with the greatest extent, mainly in Western and Central Europe (WCE). In the Caucasian regions, there are several gas and oil pipeline constructions leading to habitat fragmentation and degradation. Steppes in Turkey are particularly threatened by road and dam constructions as well.

- *Agricultural intensification:* Large-scale fertilizer inputs and specialization have negative impacts on biodiversity. In WCE, intensive farming lead to highly productive monocultures with very low biodiversity (species rich traditional farming systems, predominantly found in southern and eastern regions).

- *Desertification:* Drainage, overgrazing and irrigation may all lead to soil erosion, salinization, lowered productivity and vegetation loss. This process is characteristic to arid, semi-arid and dry semi-humid areas, mainly in eastern and south-eastern Europe: Bulgaria, Turkey and especially Romania.

- *Acidification and eutrophication:* In 2004 more than 23% of trees assessed in 31 countries were damaged by

acidification. Serious pressures on forest and freshwater ecosystems are also reported from Ukraine, Croatia and Albania. Excessive fertilizer use made 56% of Bulgaria's soils acidified. In Western and Central Europe, eutrophication means a great problem: more than 70% (in area) is affected.

- *Radioactive contamination:* Due to the Chernobyl accident in 1986, radioactive contamination can be still measured in forests of Ukraine and Belarus (about 6 million hectares).

- *Invasive alien species:* For the pan-European region, 121 species are now listed as 'worst invasive'. For a tendency of the spread of alien species in Nordic and Baltic countries see Figures 1 and 2.

In 2003, European environment ministers endorsed the Kiev Resolution on Biodiversity which is a framework on pan-European level. The main aim is the halting of biodiversity loss by 2010. Key targets were adopted regarding ecological networks, agriculture and biodiversity, forests and biodiversity, invasive alien species, financing, monitoring and indicators, and public participation and awareness (THE FOURTH ASSESSMENT, CHAPTER 4).

The four main elements of the European ecological networks are:

- *Core areas:* Their primary function is *biodiversity conservation*. These areas are legally protected under national or European legislation. They should provide a substantial representation of key natural or semi-natural ecosystems and contain viable populations of important or threatened

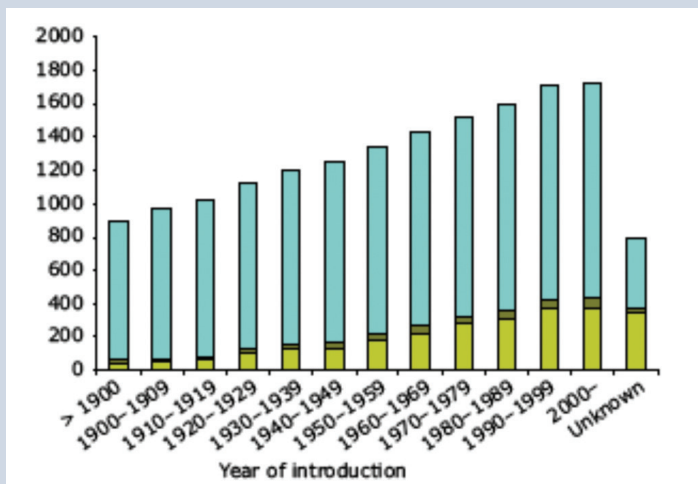


Figure 1. Cumulative number of alien species established in Nordic and Baltic countries, terrestrial environments. Upper columns represent primary producers and fungi, middle columns represent vertebrates, lower ones represent invertebrates

(After THE FOURTH ASSESSMENT, CHAPTER 4)

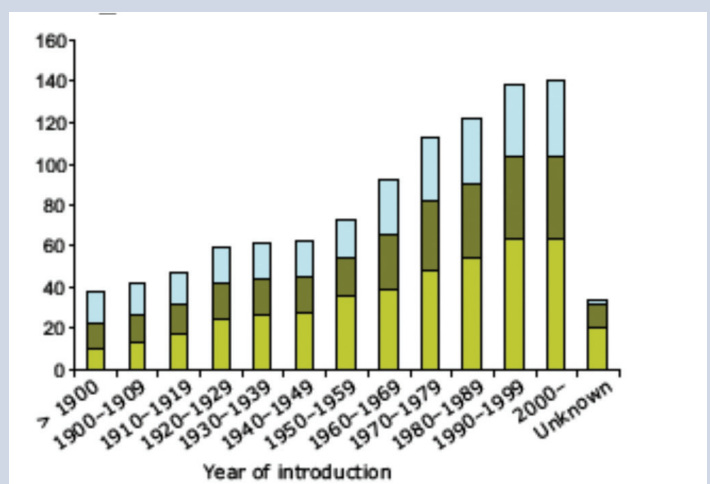


Figure 2. Cumulative number of alien species established in Nordic and Baltic countries, marine environments. Upper columns represent primary producers and fungi, middle columns represent vertebrates, lower ones represent invertebrates

(After THE FOURTH ASSESSMENT, CHAPTER 4)

species. Land use within these areas is managed to give priority to biodiversity conservation.

- *Corridors*: Functional linkages between core areas (e.g. species migration between areas). Their usage is very important against the fragmentation of many European habitats (improvement of ecological coherence).
- *Buffer zones*: Protected areas are not safe from negative external effects (e.g. resource use outside them, air/water pollution from industrial activities around a protected area). These effects can have serious impacts on species and habitats within. Buffer zones allow a smoother transition between core areas and surrounding land use.
- *Sustainable use areas*: Remaining areas that can come under more intensive land use. But they should still take full account of the successful provision of ecosystem goods and services.

“The Pan-European Ecological Network (PEEN) is one of the most important implementation tools of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). PEEN aims to link the different European and national protected areas and ecological networks with goal of ensuring the favorable conservation status of Europe’s key ecosystems, habitats, species and landscapes” (COUNTDOWN 2010 WEBSITE).

The Pan-European Biological and Landscape Diversity Strategy (PEBLDS) is a European response to support implementation of the Convention on Biological Diversity. The Strategy was proposed in the Maastricht Declaration Conserving Europe’s Natural Heritage (1993), and builds on

the Bern Convention, the European Conservation Strategy (1990), the Dobris and Lucerne Ministerial Conferences (1991, 1993), UNCED (1992), and other existing initiatives and programs. The Strategy aims to strengthen the application of the Bern Convention in relation to the Convention on Biological Diversity, following the Monaco Declaration.

The Strategy introduces a coordinating and unifying framework for strengthening and building on existing initiatives. It does not aim to introduce new legislation or programs, but to fill gaps where initiatives are not implemented to their full potential or fail to achieve desired objectives. Furthermore, the Strategy seeks to more effectively integrate ecological considerations into all relevant socio-economic sectors, and will increase public participation in, and awareness and acceptance of, conservation interests (PEBLDS GUIDE).

Natura 2000 is the most important network of the European Union for nature and biodiversity conservation. It consists of nature protection areas in the EU, established under the 1992 Habitats Directive. The aim is to assure the long-term survival of Europe’s most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs, Figure 3.) which they designate under the 1979 Birds Directive and fulfils a Community obligation under the UN Convention on Biological Diversity (NATURA 2000 WEBSITE).

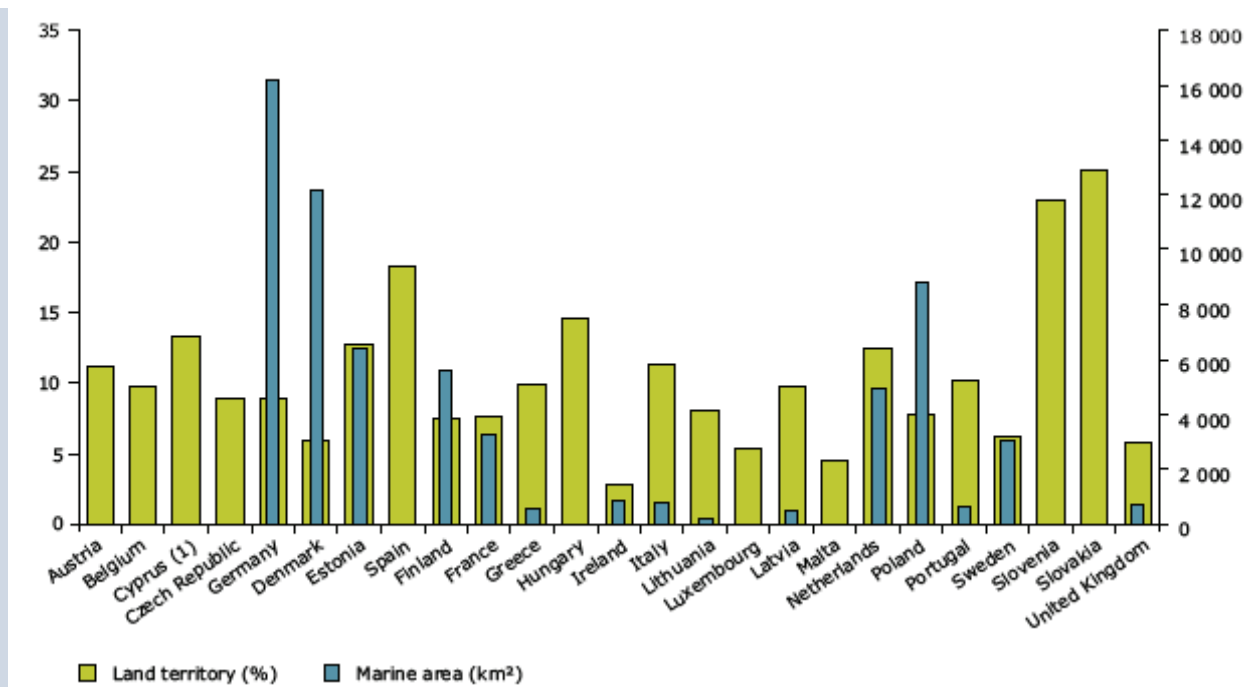


Figure 3. Special Protection Areas under the Birds Directive (From THE FOURTH ASSESSMENT, CHAPTER 4)

European governments and policy makers are also desperate in broadening public environmental awareness and public participation, e.g.

- The Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (AARHUS CONVENTION, 1998).

- Communication, Education and Public Awareness (CEPA) Program by the Convention on Biological Diversity (CBD WEBSITE).

5. Biodiversity policy in Hungary

Hungary, as a Member State, has to follow the guidelines and restrictions of laws made by the European Union.

The Hungarian Parliament also declared that nature protection is an important aim and has to be regulated. From Article 53 (1) of the Act of 1996 LIII on nature conservation:

“As a part of the National Environmental Program, a National Nature Conservation Master Plan must be projected, in order to

- adopt the government’s objectives and policy on conservation of nature and biodiversity,

- to ensure the survey, assessment, preservation and recovery of natural and landscape assets, habitats, wild species of plants and animals as well as other representatives of natural assets, and

to co-ordinate the related activities.”

The National Nature Conservation Master Plan is not only a part of the National Environmental Program, but is also organically connected to other national plans and

strategies, and determines the related sectoral policies that are completed in this planning period, such as

- the National Agri-Environmental Program,
- the National Forestry Strategy (being elaborated),
- the new Vásárhelyi Plan,
- the National Regional Planning and
- the National Development Program.

The implementation of these plans greatly influences the status of nature, thus they must represent the interests of nature conservation in an integrative way, constituting an organic system.

Hungary’s flora and fauna are very rich and have significant biodiversity. This uniqueness resulted in the formation of a special Hungarian biogeographic region, the Pannonicum, with various types of rocks, formed in different geological eras under different formation conditions, karst areas stand out among the geological and geomorphological resources. There is wide variety of habitats and wildlife with “protective forests”, lowland and hilly area grasslands, nature-like floodplains along our large rivers, traditionally used meadows, vineyards and orchards in hilly and mountainous regions, traditionally cultivated rotation farming areas, and peculiar natural landscapes of unique beauty. Unfortunately, and as a familiar global trend, agricultural practice destroyed several wetland habitats like moorlands, fern woods, gallery forests, etc.

9.2% of Hungary’s territory is protected by separate decrees. Table 1 shows numbers of protected natural areas.

The most important habitats in terms of nature conservation in Hungary are forests, grasslands, water bodies and wetlands. The problems to be solved are:

Nature conservation category	Number (pc)			Area (ha)			From this strictly protected (ha)		
	1997	1999	2002	1997	1999	2002	1997	1999	2002
National parks	9	9	10	407 445	440 800	484 883	67 489	76 700	79 821
Nature reserve zones	35	38	36	319 830	349 200	309 817	30 396	31 500	28 608
Nature conservation areas of national significance	138	140	142	25 403	25 800	25 927	1 338	1 300	1 317
Natural monuments of national significance	1	1	1	-	-	-	-	-	-
Natural areas of national significance, protected by individual statute in total	183	188	189	752 678	815 800	820 627	99 223	109 500	109 746
Protected natural areas of local significance	1 067	1 210	1 225	35 800	33 900	36 700	-	-	-
Protected natural areas in total *	1 250	1 398	1 414	788 478	849 700	857 327	99 223	109 500	109 746

Table 1.
Protected natural areas in Hungary
(From the NATIONAL ENVIRONMENTAL PROGRAMME)

- *Forests*: Before wide spreading of human activities, 70% of the country' territory was covered by forest, which is 18% in recent years.
- *Grasslands*: decrease of wet meadows, desertification on dry grasslands, disappearance of grasslands
- *Water bodies, wetlands*: pollution, drying out, decreasing groundwater level

The main authority is the State Secretariat for Nature and Environment Protection (SSNEP), which is part of the Ministry for Environment and Water. Among conservation activities is the *Hungarian Biodiversity Monitoring System* that deals with the monitoring of endangered and protected natural values, studies the direct and indirect effects of human-induced and environmental changes.

There is ten *National Park Directorates* in Hungary as regional authorities of nature protection. They elaborate conservation management plans of their protected natural areas, take official measures in case of offence against the regulations; they operate the *Ranger Service* and further professional state responsibilities in the interest of the nature conservation (SSNEP WEBSITE).

A *Nature Conservation Information System* is working that helps national parks and conservation authorities by providing a country-wide database and an application developed specifically for the needs of nature conservation professionals. General public - both domestic and foreigners - can also use several pieces of information and many maps are produced within the system. People can find data on nationally significant conservation areas and can contact National Park Directorates in case of e.g. pollution. A very important usage is education. Nature awareness programs can also be found altogether with excursion plans, field trips to find the national park demonstration site, exhibitions, study trails of interest, find out whether it is open, who to contact, etc. (TIR)

6. Discussion

The concept of biodiversity preservation and natural protection is very important in global levels, because with the increasing material needs, habitats of several species are constantly shrinking and destroyed, and this leads to the decline in numbers of both species and their different habitats. Strict international and national laws exist with fines or penalties for anyone act against them. Activities without borders can be observed - and their number is increasing - all over the world to protect threatened and endangered plants and animals. Governments and non-governmental organizations feel the need of education to develop right attitude toward nature conservation.

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