CEEweb for Biodiversity
Széher út 40, 1021 Budapest, Hungary
Phone: +36 1 398 0135
Fax: +36 1 398 0136
ceeweb@ceeweb.org
www.ceeweb.org

The necessity of ecosystem-based adaptation to climate change at national level

Recommendations to national decision makers in Central and Eastern Europe

CEEweb for Biodiversity[1], as an organization focusing primarily on biodiversity issues, has the mission of promoting the understanding on the deep interrelation between climate change and biodiversity, and facilitating coherence between the policies in these two fields. This paper contains the collected views and recommendations of nature conservation NGOs throughout Central and Eastern Europe about the synergies between nature conservation and adaptation to climate change. Our aim with this paper is to draw the attention of CEE national decision makers to the huge capacities and potential benefits offered by ecosystem-based adaptation in our region, and to influence national climate change policies and especially adaptation strategies in a way that biodiversity and sustainability aspects are given higher priority in the future.

Climate change is already unavoidable

Despite lots of international efforts during the last 20 years, global CO_2 concentration has increased in the atmosphere by 35% since 1990, and is still growing. Now we came to the point that, even if the CO_2 level could be fixed within the next several years, climate change would still unfold in the coming decades. This is underpinned by recent surface temperature observations (already about 0.8°C global warming) and elevated atmospheric concentration of the greenhouse gases. We can reach or even surpass 2 degrees Celsius warming as compared to the pre-industrial average surface temperature level if we approach 450 ppm concentration of CO_2 equivalents (including all greenhouse gases), according to IPCC. Two degrees is considered to be a threshold, above which various uncontrollable and disastrous impacts can occur.

While its future magnitude is still uncertain, climate change is already a fact. Therefore, besides enhanced efforts in mitigation, adaptation also needs to be highlighted on the political agenda, as it was also emphasized during the recent international climate negotiations.

The interrelation between climate change and biodiversity

The global climate system is determined by the atmosphere, the hydrosphere, the lithosphere and the biosphere, and is extremely complex with a lot of non-linear connections, the understanding of which requires system-thinking. In spite of that, climate policy in most cases deals solely with the atmospheric concentrations of greenhouse gases, although alteration of biogeochemical cycles through excessive use of natural resources and decrease of natural surface cover due to

[1] CEEweb for Biodiversity is a network of 64 non-governmental organizations in the Central and Eastern European region. Our mission is the conservation of biodiversity through the promotion of sustainable development.

degradation of ecosystems are, though very hard to tackle, just as determining causes of climate change.

Ecosystems are extremely important in regulating and stabilizing the climate at all levels from global to local. Half of the anthropogenic emissions are currently absorbed by marine and terrestrial ecosystems, functioning as huge buffers between emissions and the warming caused by them, and storing enormous amounts of carbon fixed in biomass, soils and the oceans. Thus natural ecosystems provide significant mitigation capacity. Besides capturing and storing carbon, ecosystems play key role in the global circulation of nitrogen and water too, both very important in the climate system. At local and regional level, healthy ecosystems offer significant resilience and adaptation capacity against meteorological and hydrometeorological extremes such as floods, droughts, windstorms and heat waves, as well as against biological challenges such as invasive alien species, emerging diseases and pest outbreaks.

These functions of ecosystems are stabilized by the huge diversity of life forms hosted by them (i.e. biodiversity), which makes ecosystems resilient to stress to a large extent: able to survive and keep or restore their functions after disturbances. Apart from biodiversity, sufficient area and spatial coherence are also necessary for the ecosystems to be able to function properly.

Despite, natural habitats are still lost or degraded with a frightening speed worldwide, forcing more and more ecosystems into irreversible change or even collapse. Since ecosystems provide very basic needs for society and economy, this may have far-reaching adverse consequences for humans, too. At a certain point of habitat loss and degradation, ecosystems might reach so-called tipping points at biogeographic scale, over which they might easily turn from carbon sinks into sources, and release greenhouse gases in a magnitude which is comparable or even bigger than anthropogenic emissions.

The ecosystem-approach in adaptation to climate change

Adaptation includes an extremely wide variety of initiatives and measures, covering practically every sector such as health and social issues, production systems, spatial planning and the built environment as well as nature conservation, agriculture, forestry and water. Adaptation to climatic variability has a long history (e.g. adaptation to recurring drought events), however present climate change hazard enhances the need for increasing adaptation capacities. Preparation for adaptation should start with **vulnerability assessment**; and increasing of adaptation capacities should start with lessening the general vulnerability level, i.e**. strengthening the general resilience level**. In our view, strategies on adaptation to changing environmental conditions in all sectors need to be integrated in a wider framework of environment policy, in order to avoid conflicts between the different sectors as well as with climate change mitigation targets.

We emphasize that the ecosystem-based approach is essential for many areas and activities; however it is not relevant for all of them. Therefore we are dealing below only with the most relevant areas and sectors directly linked to ecosystems - as nature conservation, agriculture, forestry and water. In these sectors, technological solutions for adaptation are often conflicting with the goal of biodiversity protection or even with mitigation targets, especially measures which require large inputs in terms of energy and natural resources. On the other hand, ecosystems often offer cheap and ready-to-use solutions mutually beneficial for the challenges of climate change and biodiversity loss. These win-win solutions are safe and work locally even if the international efforts to halt climate change might fail (so-called no-regret options). In most cases they are even much cheaper than sophisticated and energy-demanding technologies. The mission of CEEweb to promote these win-win solutions is in harmony with the position of the European Commission, as stated in its White Paper on Adaptation to Climate Change:

‘*Ecosystem services such as carbon sequestration, flood protection and protection against soil erosion are directly linked to climate change and healthy ecosystems are an essential defence against some its most extreme impacts. A comprehensive and integrated approach towards the maintenance and enhancement of ecosystems and the goods and services they provide is needed.*’ The need for such coherent approach is also well reflected in the cooperation between the two relevant conventions (and their secretariats), i.e. UNFCCC and CBD.

Central and East Europe is among the regions with richest biodiversity in Europe. Therefore it has a lot to lose in terms of natural capital on one hand, but on the other hand provides great opportunities in terms of employing biodiversity for climate change mitigation and adaptation measures. Therefore, we would like to emphasize the need for a ‘biodiversity check’ for each planned adaptation measures, to ensure that biodiversity and ecosystems are not adversely affected.

CEEweb’s recommendations for some critically affected sectors

1. Agriculture

Agriculture is multifunctional: yield is just one piece of the agricultural system's outputs. There are several other direct products such as fibers and compost, but also services such as maintaining soil biodiversity, water supply and carbon sequestration, many of which are critically important for long-term sustainability. There are several possibilities in agricultural management to enhance the efficiency of these services at marginal costs, provided that the right management techniques are recognized and implemented. Yet yield receives unbalanced big priority in today's agriculture allowing intensive techniques to maximize production, while soil biodiversity is not considered to be a productive factor.

Intensive agriculture involves huge externalities in terms of its demand for energy and natural resources, which, besides its significant carbon emissions, makes farming vulnerable to future changes in supply of these resources. Beside their external costs, fertilization regimes negatively influence soil biodiversity and soil organic carbon (SOC) content, which is reflected in the soil's decreased productivity and resilience against climate change. A clear signal of soil depletion can be seen globally, yet this signal is often hidden by using even more fertilizers to balance against the loss in the soil's own organic fertility. Intensive agriculture in water stressed areas often results in unsustainable level of water extraction.

In CEEweb’s view, in order to adapt to climate change **agricultural systems need to become more sustainable** and balanced between the provision of food and many other goods and services at the same time. Techniques should be applied which enhance the soil's natural productive capacity through increasing its SOC (examples for such techniques: integrating crop residues into the soil, reduced tillage, cover crops and crop rotation, mixed cultures, smaller field size with fields edges and hedgerows, and diversity of management). **Enhanced SOC content increases carbon sequestration, water and nutrient retention and decreases the risk of erosion, therefore contributes to climate change mitigation and adaptation as well as to long-term food security.**

A sustainable agricultural system is **diverse also in terms of spatial structure as well as species and breeds** of crops and animals. Structural diversity is resulting in a mosaic-like landscape, where cultivated lands alter with grazing lands and semi-natural habitats (e.g. forest

patches, hedgerows, grassland stripes). This diversity is of key importance, making such systems - also called as integrated agricultural systems - much more **resilient to extremes than monocultures, be it weather event, invasive alien species or pest outbreak**.
Cultivating **locally adapted breeds** enhances crop diversity at regional scale, and represents the most resilient way of farming in the face of climate change, since they are the result of long-term selection and adapted to specific local circumstances, and furthermore, they can serve as basis for increasing genetic diversity, selecting resistant forms and creating new breeds. Traditional local breeds represent an invaluable part of our natural heritage.

Example: ex situ and on farm conservation of local crop breeds by the National Institute for Agrobotany, Tápiószele, Hungary

Intensification of agriculture has significantly decreased agricultural biodiversity in Hungary since the Second World War. Several species and breeds of cultivated as well as natural plants traditionally occurring in agricultural ecosystems have become rare or extinct, while large-scale farming has accelerated soil deterioration and soil compaction.
As a response to this and following the 1992 Earth Summit in Rio de Janeiro, genetic resources activities have been extended and updated according to the recommendations of Agenda 21, and a National Centre for Agrobiodiversity was organized within the framework of the already existing National Institute for Agrobotany. National Base Collection for seed-propagated crops and their wild relatives was established and the National Database for PGRFA (Plant Genetic Resources for Agriculture) was compiled. The Institute for Agrobotany also acts as a Technical Co-ordination Centre and provides secretarial support for the Hungarian Genebank Council.

Besides maintaining central base collection for seed propagated as well as vegetatively propagated cultivated plants, the Institute supports *on farm conservation* of agrobiodiversity in three pilot regions: Szarvas, Nyírség and Zselic. Their long-term objective is to widen the on farm conservation programme to national level. To achieve this goal, it is necessary to link *ex situ* and *in situ* conservation activities through providing "back up" storage services and preserving random samples from consecutive years to assist monitoring of changes in genetic composition of local varieties planted under traditional conditions.

Source: the official webpage of the National Institute for Agrobotany, http://www.rcat.hu

2. Water

One of the most important concerns in the face of climate change is that of water, as it is severely impacted and brings significant pressures for adaptation. Water is already effected in many different ways: rainfall patterns are being changed, runoff generation mechanisms modified, and extreme hydrological events (water scarcity and heavy floods) are becoming more frequent and severe with large regional variation, causing increased damages. At the same time, our water use practices are also being changed. In spite of advanced technologies, human pressure on freshwater resources is increasing, leading to overexploitation of renewable water availability in several regions, which is aggravated with additional pressures such as pollution, urbanization, deforestation, land use change and development in flood prone areas (e.g. intensive agriculture, settlements or major new users of water). These pressures result in biodiversity loss and degradation of water based ecosystems, with increased spread of invasive alien species.

Water is a sector where **system-level, integrated solutions with ecosystem-approach** are inevitable. Regional scenario development and risk analysis should underpin a carefully identified set of measures, where climate change mitigation and adaptation strategies are in synergy with each other and with other environmental and socio-economic objectives. Precaution should be the leading principle, and the so-called no regret solutions with low cost and multiple benefits should be promoted.

Flood protection and drought management should be handled together in an **integrated water resources management** plan, with multiple purposes. Instead of the reactive approach of quickly draining excess water, preventive approach should be adopted. **Development and intensive use should be avoided or limited in flood prone areas** by appropriate spatial planning. These areas should be dedicated to retain excess water for periods of droughts and scarcity, thus maximising the positive aspects of floods and effectively use flood water. Natural water retention areas (water bodies, floodplains and water related ecosystems) have huge water retention capacities, therefore should be prioritized against structural solutions (e.g. constructed reservoir space). Besides water retention, natural areas provide a number of further **ecosystem services**, since they provide clean water and food, treat pollutants, control floods and erosion, ensure habitats, increase biodiversity and sequester carbon. These services **underpin human wellbeing**, thus it is very important to **restore damaged water based ecosystems and prevent their further damages**. Besides floodplains, water resources management should be integrated also in the wider landscape, promoting natural solutions such as reforestation, ecosystem restoration and soil protection. Besides climate change mitigation and adaptation, these solutions bring multiple benefits, are cost-effective and harmonize water management with land use, agriculture and nature conservation.
(Source: Conclusions of the Future of European Waters Conference)

Example: restoration of the river Camenca, Moldova

Camenca is left tributary of the Prut river, and its lover part partially forms protected area "Padurea Domneasca". The river was streamlined in the seventies, resulting in substantial changes in the surrounding wetlands: decrease in their water level (by 2,5-3 m) as well as in their primary production (by 20-30%) and degradation of natural habitats.
Restoration started in 2000, with the following aims: nature conservation (establishing a new biosphere reserve), water purification (nutrient control) and adaptation to climate change (introducing integrated floodplain management). Within 3-5 years approximately 50% of the floodplain, 60 hectares of wetland was restored.
Integrated River Management Plan (see as Plan) was prepared for the period of 2010-2015, largely supported by local authorities, NGOs and public institutions. The following activities were started: fundraising for implementing the Plan, capacity building and training for local authorities and institutions, harmonization of local development plans and strategies (infrastructure, economic development, social, etc) with the provisions of the Plan, development of educational program, and designation of the area for Biosphere Reserve.

Source:
National Strategy for Sustainable Development in Moldova, UNDP, Chisinau, 2001
Parliament Decision on adoption of National concept of water management policy, Official Monitor of the Republic of Moldova, Nr 191-195 from 5 09.2003
Action Plan Moldova – EU, Chisinau, 2005

3. Forestry

European forests will also be seriously challenged by climate change. Maintaining healthy, well managed forests are essential not only in tropical countries but in Europe too: they are home to thousands of species, and protect soils and watersheds from erosion. They act as carbon stores, absorbing greenhouse gases and preventing their release into the atmosphere.
The natural area of several European tree species will be likely to shift as a response to climate change, and therefore there will probably be changes in species composition of many forests. Migration of species will be enhanced; however it is often difficult due to intensive forest management as well as natural and anthropogenic barriers. The resilience and adaptation capacity of forests against climate change largely depends on their natural dynamics as well as biological (i.e. diversity of micro-habitats, species and genetic variables within species) and structural diversity (i.e. age distribution of trees as well as mosaic-structures with large trees, openings, young groups, deadwood and in certain habitat types, patches of grasslands and wetlands).

Currently there are two different approaches in European forestry when facing climate change. The '**technocratic approach**' prefers intensification of forest use, using arguments for both climate change mitigation and adaptation. According to the mitigation arguments, intensive growth and short rotation period is supposed to result in higher carbon sequestration. However, recent scientific studies have shown that C sequestration and storage is, in the long-term, significantly higher in non-managed forests or forests under sustainable management than those with intensive use, especially if we calculate with dead biomass and soil carbon, too. Arguments for adaptation aim to control natural shift in species composition by artificial replacement of species. However, this requires intensive forest management, leading to decreased biological and structural diversity and consequently lower natural resilience to disturbances. Irreversible and long-term artificial changes in species composition alter the structure and dynamics of forests in an unpredictable way, thus this approach involves high risks and should be clearly distinguished and restricted to plantations.

On the other hand, the approach of '**sustainable forest management**' **enables long-term carbon sequestration and storage in old-growth forests, considering also the significant capacities of dead biomass and soil**. In fact, close-to nature forests already store huge amounts of carbon in Europe. Avoiding the emission of this stored carbon by maintaining the natural state of forests should be priority. **When it comes to adaptation to climate change, natural systems enable gradual changes in species composition during a natural process**. Sustainable or close-to-nature forest management systems (e.g. shelterwood) serve as integrated solution, increasing structural diversity, enabling natural processes and strengthening the forests' natural resilience and adaptation capacity. **Close-to-nature forests host a variety of micro-habitats, among which especially wetlands make forests effective in buffering extreme hydrological events** as functioning as a natural sponge, retaining water in periods of excessive precipitation and gradually releasing it in periods of water scarcity, thus effectively working against both floods and droughts at landscape level.
Therefore, in protected areas and in special environments (e.g. riparian forests, dry forests), close-to-nature adaptive management should be the only acceptable method. As a general rule, the ratio between forested areas with non-use, sustainable use and intensive use should be changed in the future to a growing proportion of non-use and sustainable use, and intensive use should be only allowed in plantations, clearly distinguished from natural forests.

Example: state forestry in Poland

1. Network of areas with non-intervention management in Polish state forests

About 80% of Polish forests are state owned, managed by 17 Regional Directorates. Some years ago, Polish Directorate of State Forests decided to apply for FCS certificate (www.fcs.org). It was decided that certification would be implemented on the Regional Directorate level. Now, 15 out of the 17 Regional Directorates have FCS certificate of good forest management.
One of the FCS standards is: "6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources". According to the interpretation of "representative samples" in the detailed Polish FCS standards, as well as in practice of the certification, this should be not less than 5%. Additionally, the FCS Principle 9 requires "to designate High Conservation Value Forests" and to manage them in a way conserving high conservation values - for some forests this should be achieved by non-intervention management.
To meet the above criteria, most of the Regional Directorates have designated 5% of their territory as unmanaged forests (either already subject of non-intervention or newly established). Internal regulations for this were adopted in each Regional Directorates (they are slightly different in details).

Source: http://www.lasy.gov.pl/

2. Small scale water retention in lowland forests of Poland

The seasonal climate variation including higher spring precipitation and summer dry periods combined with a long lasting drainage have led to excessive drought occurring in lowland forest ecosystems in Poland. In response to

water management needs, the State Forests since the mid-90's have been undertaking small scale water retention works.
In the year 2006 decision was made to aggregate individual initiatives taken by particular Forest Districts into a single project. The main goals of the project are: to counteract negative changes in hydrological conditions in lowland forest ecosystems, to prevent drought and floods and to restore wetland habitats in forested areas. The project 'Enhancing Water Storage Capacity and Preventing Floods and Drought in Lowland Forest Ecosystems' implemented by the General Directorate of the State Forests is the first one to be conducted on such a large scale, covering 191 forest districts.
The main idea of the project is to promote environmentally sound methods of water storage in the forests. The project activities consist of constructing small scale water retention infrastructure (e.g. sluices, dikes, stopbanks) and also restoration of moor, marshes and other types of wetlands. Planned capacity of water storage reached ca. 45 mln m^3.

Source: http://ckps.pl/ccep,projects/small,scale,water,retention/langID~0.html

4. Nature conservation

As shown by previous examples, biodiversity and ecosystems are important allies for our adaptation to climate change in several sectors. Yet species and ecosystems themselves are also challenged by climate change. Effects of climate change have already been observed, such as:

- enhanced biodiversity loss, especially in fragmented habitats
- shifts in geographic ranges of species and vegetation zones towards northern and higher altitudes, which results in altering species composition of communities
- shifts in timing of seasonal events, with consequences in food web interactions
- enhanced spread of invasive alien species

Extreme climate change is now well within the bounds of possibility, which, cumulating with other pressures (pollution, land use change and fragmentation, overexploitation, invasive alien species), urgently calls for **new, flexible and integrated conservation strategies**. Framing such strategies it is not an easy task, as there are many questions to be clarified, such as:

- What to maintain: species / structure and function of habitats / ecological processes at large scale? At which level should we manage for resilience?
- Is current conservation enough to create resilience and enable natural adaptation (including migrations)?
- To what extent existing permeability of the landscape (including ecological networks) enables species' migrations? How can it be improved?
- Should we revise our ideas about what is native and non-native species?
- How should we judge success of conservation efforts or assess the conservation value of a particular place in this new situation?
- How our efforts will interact with other sectors, including climate change adaptation and mitigation?

In CEEweb's view, the most important goal of conservation strategies should be to **maintain and if possible, strengthen the natural adaptation capacity of ecosystems**. To achieve that, **all kinds of anthropogenic pressures on biodiversity loss need to be decreased by targeting their common drivers**. If the drivers remain untouched, we do nothing more than eliminate one pressure but at the same time enhance another one, leaving the challenge of biodiversity loss unsolved. This was exactly the case with the European Union's efforts to halt biodiversity loss by 2010, which failed because its numerous measures were no more than end-of-pipe solutions.

Adaptive management of protected areas and Natura 2000 sites is necessary (including, among others the restoration of water retention capacity, enhancing the heterogeneity of sites so that it hosts habitats from all range of succession stages and restoring connectivity between fragmented sites), but not enough; we also have to work at the landscape level. It is **absolute necessary to limit further degradation of green areas, and to stand for the largest possible reconstruction of natural cover. The overall natural status and permeability of landscapes needs to be enhanced** by maintaining or restoring natural corridors as well as shifting more and more areas from intensive use towards sustainable use or non-use. This can only be achieved if ecosystem-based adaptation is integrated in all relevant sectoral policies.

5. National Climate Change Strategies should target the roots of the problem

It is impossible to mitigate climate change or to effectively adapt to it at any level solely by separate climate policies. Climate change is, just as a range of other environmental and social crises, **symptom of a systemic problem, which calls for systemic solutions**. Our current socio-economic structure - building upon the growth paradigm – has lead to **ecological overshoot,** natural resources and areas with natural vegetation being utilized far above their renewable capacities. The real challenge of climate change policy is whether it will be able to preclude making a new separate sector with no more than end-of-pipe solutions.

It is crucial to **harmonize climate policy with key national policies** – such as sustainable development, energy, transport, agriculture and rural development, forestry, biodiversity, water and spatial planning – and so creating a strong, coherent and holistic environmental policy framework, which is able to identify and effectively tackle the drivers behind systemic problems. In order to really target the drivers, an **economic paradigm shift is needed, resulting in new socio-economic macro-structure with lower demand for natural resources and space**. This cannot be achieved solely by regulating the environmental pressures (i.e. the outputs of the system) separately, as it is done today. As long as the system is in overshoot, the burden will always be shifted in another element of the environment, causing crises elsewhere. Thus it is essential to regulate the inputs too, namely, to limit and gradually decrease our use of natural resources and natural space. Such regulation can automatically result in less environmental pressure while accelerating sustainable solutions, especially if coupled with incentives for investments in energy efficiency and sustainable land use.

Example: the Hungarian Climate Bill proposal

There is already an officially adopted National Climate Strategy in Hungary. As an addition to that, by January 2010 the Hungarian National Council for Sustainable Development prepared a proposal for a more holistic framework law called the Hungarian Climate Bill, which was submitted to the Hungarian Parliament. The proposal received an exceptionally wide support, including more than 500 green and social NGOs, all parties of the Parliament and the former Ministry of Environment and Water. Scheduled for the very last parliamentary session day before the parliamentary election, the voting was eventually called off due to a submitted amendment. Now the whole procedure has started again, and the Bill will likely to be on the agenda again in autumn 2011.

One of the leading principles behind the Climate Bill is sustainable development. In line with this, it aims to find the system-level solution for the challenge of climate change. It calls for a broad set of measures, which is able to treat not only the symptoms of climate change, but also its ecological, social and environmental root causes at the same time. Besides controlling emissions, it emphasizes the need for input-side regulation. Regulation of resource inputs means the gradual decrease of Hungary's fossil fuel use, and, on the long term, even more: less use of further natural resources, and less use of land surface. To achieve this, production and consumption patterns must be basically changed. The law aims to achieve this change primarily by economic incentives. It aims to establish the National Revolving Fund, a 100% repayable, interest-free loan for investments on energy-saving and renewable energy.

The proposal insists to pay much higher attention to adaptation measures. It aims to protect the vegetation cover of Hungary from further decreasing, and provisions a national restoration plan for rehabilitating degraded habitats. It

also ringfences a substantial part of the national research and innovation budget for climate protection (adaptation and mitigation) targets.
Friends of the Earth Hungary has been campaigning for the Climate Bill for almost 3 years now.

More information: www.klimatorveny.hu

Contact: Ildikó Arany, programme coordinator
E-mail: arany@ceeweb.org
Address: Széher út 40, 1021 Budapest, Hungary
Phone: +36 1 398 0135
Fax: +36 1 398 0136
Website: www.ceeweb.org

CEEweb for Biodiversity is a network of non-governmental organizations in the Central and Eastern European region. Our mission is the conservation of biodiversity through the promotion of sustainable development.