

# **Tasks of climate change adaptation in the Southeast European and Central Asian forest sector: an assessment of country reports**

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The range of countries represented in this volume, reaching from the coast of the Adriatic until the snow-capped peaks of the Tien Shan Mts. display a bio-geographical, socio-economical and cultural diversity which seems to have little in common. Accordingly, the problems related to predicted climatic changes are also manifold, from land use changes in the Balkans, desertification in the lowlands of Turkestan, to the melting of glaciers in the alpine zone of the Caucasus or Inner Asia.

A closer look confirms, however, that there was good reason for FAO's initiative to provide a regional platform for countries of Eastern Europe and Central Asia, aiming at identifying common problems in adaptation to climate change in forest management and potentials for future collaboration. These countries have much in common regarding the recent political past: all – with the exception of Turkey – are in an economic and social transition phase after deep political disturbances. The whole region is experiencing a rapid social and economic restructuring which has a significant impact also on land use and land cover. These changes have left their marks also on the state of forests and on the sustainability of forestry in general.

From point of view of climatic and ecological conditions, there is also a remarkable similarity: the drought (xeric) limit of closed forests towards semiarid conditions, an ecologically very sensitive zone, is present in nearly all of these countries – or if not, its appearance is predicted. According to predictions, increasing frequency of droughts and sinking groundwater levels may threaten the stability of forest ecosystems of this zone. These changes forecast specific problems not only for forestry itself, but also regarding the multitude of ecological services provided by forests for the society.

The level of awareness of climatic threats in general and the readiness to take measures on political level is surprisingly uniform and there is high motivation to take appropriate measures in all the countries of the region. Most have signed the respective international agreements and have taken steps to create the legal and administrative background for adaptation to and mitigation of climate change impacts.

Regarding forests and forestry, national reports provide detailed accounts on the current status of national initiatives, legal and policy frameworks for developing climate change adaptation and mitigation measures, including detailed lists of national publications, studies, and projects on climate change dimensions and potential impacts. The country reports describe the work carried out by national research institutions on climate change and identify areas for potential FAO technical assistance and for collaboration with partner organizations.

The nature of threats to forest ecosystems and their ecological implications in this region differ however considerably from the ones encountered in the rest of Europe (see Mátyás, in this volume). This specificity has not been recognized yet either by the respective countries or by Europe or FAO. Up to now, there has been inadequate treatment of these unique problems of the region in international negotiations on climate change and forestry and in international assistance programs on adaptation in forest management.

It is quite surprising that in spite of the general awareness of potential impacts, there is little information in the reports about *currently or recently observed effects of climatic changes on forests*. Although details of the extent of climatic change experienced in the last century are

generally mentioned, no observations are cited which would indicate that increasing aridity in the second half of the 20<sup>th</sup> century had already a concrete effect on the vitality or stability of forest ecosystems. Similarly, detailed references about changes in the *health status of forests* (appearance of insect pests and diseases) in connection with climatic extremes are seldom. The missing of such references indicates the lack of adequate monitoring or the presently low priority of analysis of changes in connection with climate and weather conditions. A detailed weather/climate database and the climatological background necessary to downscale large-scale predictions to finer, local scale is not everywhere available. The *development of regional climatic and impact models* and their critical use is however a precondition for effectively identifying climatic impacts and the tasks of adaptation and mitigation with regard to forests. The *setting up of proper monitoring networks* must get high priority for tracing concrete impacts and for benchmarking. The identification of impacts plays at the same time a fundamental role in raising awareness both in professional and public circles. In some countries institutions responsible for monitoring are still lacking.

The first step in assessing future impacts is a functional and representative forest inventory. Generally the forest information base has been sufficiently developed, although the recent economic difficulties resulted in loss of support in many countries. The level of available data on the exact distribution, area, type, structure etc. of forests, is strongly varying by country. Most of them feel that further advancement of applied methods is required.

*Carbon sequestration* of forest cover is among the most important potential factors affecting the climatic forcing of the atmosphere. This issue is treated by all reports as an effective measure of mitigation. In most countries the calculation of the carbon balance of forests has become an integral part of the national inventory of greenhouse gas emission and carbon sequestration. The basis for calculations is the database of forest inventories, using default conversion rates of carbon content. These data may contain diverse sources of assessment bias at various levels. The *assessment of the applied methods and of the precision of national carbon balances*, and consequently the judgement about the present and future role of forests (sink or source) requires in many cases expert support. Two facts should be pointed out, however:

- The role of forest cover as a growing carbon sink is effective only if forests are not only protected but sustainably used, i.e. timber is harvested and converted into lasting products such as construction timber or furniture. This underlines the importance of silvicultural measures in order to *increase the ratio of industrial timber* from the harvest. The reports do not indicate clearly that on the long run, *static protection of forests may affect the carbon balance negatively*.
- Considering the fact that roughly half (or more) of the carbon stored in forests rests below the surface in forest soils, more attention has to be paid to its future role. The *change of decomposition rates* of dead organic material is not identified as a knowledge gap. Similarly, little attention is paid to strategies of soil protective measures in order to slow down carbon emissions in the course of forest operations.

Dwindling water resources and growing economic activity cause serious constraints in water supply especially in Central Asian countries. Little information is however available how groundwater level changes will affect forest ecosystems dependent on surplus water. None of the reports addressed the fact that although forests are essential to regulate water regime, but at the same time they are *heavy consumers of water resources*. Especially in areas at the aridity (xeric) limit of forest zones, the question of allocating available water resources in a watershed for certain priority uses may (and most probably will) arise with declining rainfall and increasing temperatures. Forest strategies of countries at the xeric limit have to deal with this issue. Aridification of forest sites lead to increasing frequency of *forest fire* events. This

topic is mentioned in some of the reports but should be addressed and investigated in connection with climate change in all countries of the region.

All countries reported in detail on laws and regulations regarding forestry, on the development of national forest strategies, policy documents etc. Reference to climate change and adaptation measures are not always appearing in these documents. If mentioned, the approach usually stays quite conservative and is confined to maintaining the sustainable management of forests (e.g. increase of forest area, nature-close silviculture, introduction of certification etc.). The identification of *specific silvicultural measures* (“best practice”) to increase stability of ecosystems and to improve their role as carbon sinks lends itself as a possible theme for future collaboration or workshops. Thus, there is a need for adjustment of national forestry policies and legislation and develop strategies in line with international obligations, taking in account the potentially important role of forests in mitigating impacts of climate change.

Although legal documents regulate the sustainable use of forest resources, illegal harvesting and law enforcement problems, *unsustainable forest and agricultural land use*, for instance overgrazing of forest lands are reported and contribute to forest ecosystem degradation in a number of countries. Reasons have to be resolved and legal framework strengthened to return to the principles of sustainability.

Forestry plays an important role in the *socio-economical conditions of rural areas*. Some of the reports mention this aspect but further information is needed with regard to the future status of forestry in rural societies under changed conditions or how forest policy can be integrated in rural development. The ecological, economical and social role of forests and forestry in a changed environment is presently seldom addressed in *cross-sectorial strategic analyses*. Such studies would also uncover the limitations to ecological services of forests, notably their role as carbon sinks and stabilisers of water supply.

A specific issue of adaptation to climatic changes is the adjustment of policies regarding *nature conservation*. The reports indicate a high level of protection of resources of biodiversity in the region. Although the selection and maintenance of protected areas, national parks etc. is a positive development, but it can be assumed that neither the selection of protected areas, nor the principles for future management take into account the expected impacts of climate change and their consequences for protected ecosystems.

The predicted impacts and necessary adaptation measures are expected to be similar in neighbouring countries, therefore the potential for cross boundary collaboration is significant. It is therefore surprising that practically no *bilateral or regional cooperation* was initiated yet in the region. Such interactions and cooperation may help to overcome the shortage in financing, in sufficient research facilities, experts and institutions in individual countries. Regional networks should be developed to facilitate the sharing of information and experiences on forests and climate change among countries in the region.

### *The way ahead*

Any progress in adaptation to climate change requires first of all a stable legal background and an effective system to monitor developments. Respective *laws and regulations* need to be checked for conformity with mitigation of climate change impacts. “National Climate Strategy” and “National Forest Strategy” documents are of **special** importance. In many cases these documents do not contain yet specific references to adaptation tasks in the forestry sector. Initiatives to formulate management guidelines and concrete silvicultural measures (“best practice”) for adapting to climate change are needed. Criteria and indicators of progress in adaptation should be specified.

Permanent and reliable *monitoring of climatic impacts* has to be improved, taking in account the specific threats to forest ecosystems at the xeric limits, to survey changes of site potential,

forest fire frequency, insect and disease outbreaks and other disturbances in forest ecosystems (e.g. growth decline, diversity loss, soil carbon degradation etc.). Forest damage statistics and health monitoring data have to be incorporated in the national forest information system. The realistic assessment of future climatic risks needs locally available weather and climate data as well as downscaled, regional climatic and impact models. This is essential for effectively formulating tasks of adaptation and mitigation.

*Capacities* in the forestry sector to identify concrete threats and implement appropriate measures are a crucial issue. There is experience in some countries of the region with climate change vulnerability and impact assessments as well as with development of forest carbon projects and opportunities exist for exchange of experiences. Still, in nearly all countries the organisations responsible for forest data collection (inventory), monitoring and supervision need strengthening and updating of methods such as applying *GIS-based inventories and digital forest mapping*. A basic precondition for proper planning and supervision in forestry, this problem, however important, is not a specific issue related exclusively to adapting to climate change and should be solved preferably by other cooperative efforts.

Similarly, some new climate change-related tasks, such as carbon accounting, the preparation and practical implementation of adaptation projects and the distribution of benefits require assistance. Professional education and postgraduate training has to be upgraded as well to meet the specific challenges of climate change.

For the development of strategies and technologies to minimise effects of climate change, specific *research and development* has to be intensified. Some areas with significant knowledge gaps in all countries are e.g. the effect of climate factors on ecological stability, productivity and vulnerability of forest ecosystems, the climate tolerance and adaptability of main tree species or the dynamics of carbon balance of forest ecosystems. Methods of terrestrial and remote-sensing inventory and monitoring in order to identify effects, to specify measures and to forecast future impacts, need also development. The potential of supporting research through existing forest research networks has to be explored.

Adaptation to predicted changes means new, unconventional approaches and new tasks, which cannot be accomplished without further raising the awareness of professionals (through training, pilot projects, publications). To win public and political support, active involvement of the media and of educational institutions is necessary.

FAO's task is to provide support for the solution of the described regional problems and to assist countries through initiating collaboration, generating knowledge and raising awareness about forests and climate change in the region. Respective conclusions and recommendations for action have been formulated by the country representatives during the meeting in Sopron, Hungary, in April 2010 (see workshop report, in this volume).

#### *Summary: a shortlist of priorities*

Participants of the workshop have evaluated the presented assessment during the sessions and identified a few main priorities for three areas: policy, forest management, research and training. The priority topics for adapting to climate change impacts in forestry, as judged by the participants, were as follows:

##### *Policy:*

- Updating of forest and environmental laws, development of administration and governance;
- Development of strategies and policies in forestry to prepare for climate change;
- Development of international collaboration and of exchange of experiences;

##### *Forest management:*

- Development of "good practice" for climate change in forestry;
- Development forest inventory methods;

Improvement of field and satellite monitoring of impacts;  
Support in forest reconstruction, afforestation, shelterbelt planting etc.

*Research, development and education:*

Research in forest vulnerability to climate change impacts;  
Development of carbon inventory, accounting and economics;  
Capacity building in research, e.g. in modeling techniques;  
Capacity building of professional staff in climate change adaptation (graduate and postgraduate);  
Improvement of methods to advance public awareness.