

Session 14. Forest dieback and mass mortality: monitoring and mitigation of consequences

Summary report

1. Past or present impacts of climate change on forests

The world is getting warm rapidly and forest mortality is on the rise. Forest mortality in Russia has been increasing over the past 20 years, although there are large year-to-year variations. Overall annual mortality seems does not exceed 1 mha, which is less than 0.1 percent of the total forest area. Analysis in Russian North-West shows that up to 90 percent of forest dieback and mortality in the region can be attributed to the climate change. Dieback triggers forest fires, insect infestation and more severe damages from more frequent natural disasters. The problems of mortality are likely to increase in the future.

By comparison, in Canada's boreal forests, fire alone impacts 1 percent of the boreal forest on average, with peaks of nearly 4 percent in catastrophic years. Although these are mostly ground fires, they cause mass mortality of 3 to 5 year trees. Natural background mortality in forested stands is currently also increasing in forests of western US.

Current forest dieback mostly occurs in the areas where forests are already environmentally stressed. The stresses are often related to droughts and other abiotic factors such as the loss of spring snow-cover followed by soil freezing (Alaska Yellow Cedar), or increased salinity in coastal deltas in Bangladesh caused by the reduced flow of major rivers (dieback of mangroves).

2. Future impacts of climate change on forests

Forest mortality has upward trend worldwide but has strong regional aspects. Preventive and suppressive measures are based on regional approaches, which address areas of high, medium and low risk mortality. Forest dieback will likely increase in the future with the warmer and drier climate. Effects of increasing temperature on extreme climate events are non-linear, as well as response of trees to these events. There is a risk of large multiplicative effects of climate on forest dieback in the future.

3. Future impact of climate change on people and institutions

Over 10 million ha of forest land in Archangelsk region is represented by over mature forest especially fragile in the face of global warming. This may have negative implications for the regional economy in the near future. Long-term monitoring of tree mortality helps to analyze historic trends, assess future risks and develop management strategies. Climate mitigation measures in Russia are currently developed in two ways: prevention and mitigation of forest mortality and establishing carbon accumulating forests on forestless land.

4. Adaptation and potential management actions

Forest management options for limiting the scale of the forest dieback are decreasing with the increase of the scale of mortality. Thus preventive management actions should be taken based on risk analysis. Management actions, such as density regulation as a short-term measure, or species

change as a longer term action, can increase forest resistance to the negative impacts of climate change.

Remote sensing through MODIS can provide timely warning of change in canopy properties, indicating forest health conditions and need for preventive management actions. This technology is widely used in developed countries, but is not widespread in the developing world because of lack of capacities and resources. Management actions would require proper information support and feedback from the practitioners in the field.

5. Policy actions

Dieback of forests due to climate change is not a local or regional problem, but a global issue, which should be addressed globally. It is necessary to establish a global monitoring system with long term forecasting of the forest change, especially in boreal coniferous stands. There are no yet clear answers on the reasons of the mass mortality in Russia, Canada, USA and many other parts of the world. Russia will rejoin ICP to establish monitoring plots and promote international actions to address forest dieback.

The best information on risks is currently available for boreal and temperate regions. Tropical and sub-tropical regions generally do not have the capacity to perform such an analysis. It would be appropriate to pursue the implementation of forest risk assessments in developing countries.