RESOLUTION H4
Strategies for a Process of Long-term Adaptation of Forests in Europe to Climate Change

The Signatory States and the European Community,

A. Recognising that human activities are substantially increasing the atmospheric concentrations of greenhouse gases, and thus altering the composition of the atmosphere,

B. Recognising that the increase in concentrations of greenhouse gases in the atmosphere enhances the natural greenhouse effect, which in turn will result, on average, in an additional warming of the Earth's surface and lower atmosphere, and that the emissions of chlorofluorocarbons (CFCs) and other ozone depleting compounds in the atmosphere are causing a considerable decrease in the concentration of ozone in the stratosphere, and also tropospheric ozone is inducing phytotoxic effects,

C. Appreciating that natural forest ecosystems of Europe have adapted, during long periods of evolutionary development, to the climatic conditions now prevailing,

D. Appreciating that rotations of forest stands in Europe can be considerably longer than the likely time in which anthropogenic climate change will have an effect on forest ecosystems,

E. Whereas these changes in the composition of the Earth's atmosphere and consequent changes in climate are likely to have, within the time span of one rotation of a forest stand, both favourable and adverse effects on forest ecosystems in Europe, which may include:

E.1. Reduced vitality, stability and regeneration of trees and forests, more favourable conditions for harmful insects and pathogens, and increased risks of forest fires and storms,

E.2. Increased mineralisation of organic matter, which will release carbon dioxide, increase soil leaching, affect soil processes, and lead to eutrophication of waters,

E.3. Altered ground water tables and soil moisture regimes, due to shifts in the balance of precipitation and evapotranspiration or due to sea level rise, which may cause stress and reduced vitality and pest and disease resistance in trees, and

E.4. Increased growth of forest vegetation which is likely to occur, for a certain time and provided no soil changes adversely affect this, as a result of increases in CO_2 in the atmosphere leading to sequestration of carbon,

F. Recognising the complexity of interactions between climate and ecosystems, including feedback processes, and the present limited understanding of the ranges, flexibility of adaptation and acclimatisation mechanisms of these ecosystems,

G. Recognising the present limited ability to predict and assess the net outcome of favourable and adverse effects,

H. Recognising that changes in the atmosphere may also affect human activities, such as the management of watersheds and coastal zones, agriculture, etc., and that any large-scale change in these activities will also affect the forestry sector,

I. Recognising that altered water use caused by changing and adapting forest ecosystems in hydrological catchments may have an impact on water resource planning,

J. Recognising that measures taken within the forestry sector can contribute to the mitigation of climate change only if the existence and health of forest ecosystems is assisted of by a sufficient reduction in emissions of harmful substances such as acidifying compounds, nitrogen compounds, and release of greenhouse gases,

K. Considering it necessary to initiate a process of long-term adaptation and adjustment of forests and the forestry sector in Europe to climate change by means of research and other actions that are compatible with the aims and objectives of the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, as well as other relevant international legal instruments,

L. Noting the activities of large international programmes such as IGBP[1] and WCP, and recognising the task of IPCC within WMO and UNEP and other relevant international and regional/sub-regional organisations to assess the impact of climate change;

[1] IGBP: International Geosphere-Biosphere Programme
WCP: World Climate Programme
IPCC: Intergovernmental Panel on Climate Change
WMO: World Meteorological Organization
UNEP: United Nations Environment Programme

commit themselves to support appropriate measures for the mitigation of climate change and the limitation of greenhouse gas emissions, as provided for in the United Nations Framework Convention on Climate Change, and further

to support national and international research into, and to enhance international cooperation on, the following subjects:

- *the impact of possible climate change on forest ecosystems and forestry*
- *the possible adaptation of forest ecosystems and forestry to climate change*
- *the mitigation of the adverse effects of climate change by forest ecosystems and forestry in Europe,*

and for that purpose identify the following specific areas for research and future action.

PART I: AREAS FOR RESEARCH

1. Greater understanding through research of the linkages between climate change and forest ecosystems, including feedbacks from the ecosystem to the climate system.

2. Studies on the role of forests, forest soils, and peatlands in Europe as reservoirs, sinks and sources of carbon, in order to understand the role of European forests in global fluxes, especially in the global carbon cycle. Research in this field may include the development of common methodologies for research and for national and regional inventories and the development and maintenance of databases on a European scale on reservoirs, sinks and sources of carbon in terrestrial ecosystems.

3. Studies on genetic variability of regionally important tree species in response to changes in climate and increased concentration of carbon dioxide, and on the degree and rate of evolutionary processes and adaptation, by means of genetic changes.

4. Studies on the dynamic equilibrium of host-parasite relationships in new climatic environments.

5. Studies on soil formation processes, including the mineralisation of organic matter and leaching, in response to climate change.

6. Development of process-based predictive ecosystem models applicable to the European scale, and which may be used in comprehensive ways to integrate anticipated changes in the climate and their interaction with air pollution, with their effects on forest ecosystems and the fluxes of greenhouse gases and with their effects on different forest management systems.

7. Studies on the adjustment of European forest management systems in order to optimise adaptation to climate change, to ensure the health and multiple functions of existing forests, and to optimise the sequesteration and storage of carbon.

PART II: FUTURE ACTION

8. The Signatory States and the European Community will intensify research and international cooperation carried out by existing organisations and working groups dealing with the research areas mentioned above.
9. The Signatory States and the European Community will review, develop and coordinate the present monitoring schemes to assess more effectively those large-scale patterns and dynamics of alterations that may be due to climate change in European forest ecosystems. These tasks should be carried out in coordination with existing European networks of permanent sample plots.

10. The Signatory States and the European Community will promote the utilisation, with low emission technology, of wood as a renewable energy source, and, in so doing, contribute to the sustainable development of forests by protecting the environment and mitigating the greenhouse effect.