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IN-DEPTH REVIEW OF THE EXPANDED PROGRAMME OF WORK ON FOREST BIOLOGICAL DIVERSITY

Note by the Executive Secretary

EXECUTIVE SUMMARY

At its eighth meeting, in decision VIII/19 C, the Conference of the Parties requested the Executive Secretary to carry out an in-depth review of the expanded programme of work on forest biological diversity. This note summarizes the findings of the in-depth review, including the findings of an Ad Hoc Technical Expert Group (AHTEG) on the subject, and outlines recommendations for improved implementation of the programme of work. This note also summarizes the collated information on the potential environmental, cultural and socio-economic impacts of genetically modified trees on the conservation and sustainable use of forest biodiversity (decision VIII/19 B, para. 3). Further information in relation to this note is made available by the Executive Secretary in a background document for the in-depth review of the expanded programme of work on forest biological diversity (UNEP/CBD/SBSTTA/13/INF/5), an information note on the potential environmental, cultural and socio-economic impacts of genetically modified trees (UNEP/CBD/SBSTTA/13/INF/6) and a compilation of views on the potential environmental, cultural and socio-economic impacts of genetically modified trees (UNEP/CBD/SBSTTA/13/INF/7).

In summary, the findings of the review are:

(a) Information available from the third national reports and from international organizations indicates that the programme of work is a valuable tool to reduce the loss of biological diversity, in synergy with other tools provided by international and regional agreements and processes;

(b) Despite many efforts to implement the programme of work, the loss of forest biodiversity continues at a highly alarming rate. Effective implementation in many countries is hampered by a range of obstacles, such as lack of forest biodiversity data, and a lack of capacity and coordination;

(c) Implementation efforts need to be strengthened considerably to meet the 2010 target, in particular through the establishment of protected areas and by reducing threats and mitigating impacts of drivers of biodiversity loss such as climate change, unsustainable use, land conversion, habitat fragmentation, forest fires, and invasive alien species (programme element 1, goal 2), and through forest biodiversity monitoring (programme element 3);

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(d) Information and knowledge about forest biological diversity and capacity to generate them are insufficient in a large number of countries despite efforts made by international organizations;

(e) Deforestation and forest degradation are the most significant causes of forest biodiversity loss. Notable progress in reducing the rate of deforestation has been made by some countries. At the global level, deforestation and conversion of primary and modified natural forests continue unabated, and have accelerated in some regions (programme element 1, goal 2 and goal 3);

(f) In many cases, implementation strategies and action plans at national and regional levels do not yet adequately reflect the need to mitigate the negative effects of climate change on forest biodiversity (programme element 1, goal 2). Analysis of the integration of climate-change impact and response activities within the programme of work reveals that there is adequate coverage within the text of the programme of work. However, only a few Parties are reporting on implementation;

(g) Response activities to climate change through avoided deforestation present new opportunities for forest biodiversity. Reports of national-level activities indicate that biodiversity co-benefits of emerging opportunities, including financial mechanisms, are not fully harnessed (programme element 1, goal 2);

(h) The coverage of forest protected areas has increased considerably in recent years. The target of conserving at least 10 per cent of all forest types by 2010 has not yet been reached in some forest biomes and types, e.g. forested wetlands, and protected areas often lack connectivity. The protection, recovery and restoration of forest biodiversity is often severely hampered by a lack of funding, particularly in developing countries (programme element 1, goal 3);

(i) Exchange of experience on the implementation of programme activities at regional and global level appears to be limited. However, a number of the programme areas are implicitly discussed and supported by various global and regional organizations, processes and networks. Successful examples include the activities of the Collaborative Partnership on Forests, and regional processes such as Conference of Ministers in Charge of Forests in Central Africa (COMIFAC), the Puembo Initiative, the Ministerial Conference for the Protection of Forests in Europe (MCPFE), and the initiatives on forest law enforcement and governance (FLEG);

(j) Bioenergy production offers potential benefits for mitigating climate change, but poses a threat to forest and other biodiversity through land conversion and water use increase for plantations and agricultural expansion (programme element 1, goal 2 and programme element 2, goal 1);

(k) Despite the importance of forest biodiversity for the economic and spiritual well-being of indigenous and local communities, forest decision-making processes often do not take their rights and concerns sufficiently into account (programme element 1, goals 3 and 4; programme element 2, goal 3; ecosystem approach principles 11 and 12);

(l) The available information on the potential impacts of genetically modified trees in the long term is largely confined to hypotheses at this stage. Considerable scientific uncertainty remains in this rapidly developing area, and some countries are recommending application of the precautionary approach 1/ (programme element 1, goal 4).

1/ Any mention of the precautionary approach in this document refers to the definition in principle 15 of the Rio Declaration.

SUGGESTED RECOMMENDATIONS

The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties adopt a decision along the following lines:

The Conference of the Parties

1. *Requests* the Executive Secretary to:

(a) Organize, in collaboration with relevant regional and international organizations, in particular the secretariat of the United Nations Forum on Forests (UNFF) and members of the Collaborative Partnership on Forests (CPF), and building on existing processes and initiatives and previous experience of the Secretariat, a series of regional workshops to support Parties in addressing obstacles related to lack of capacity, coordination and political will and to support the implementation of conclusions and recommendations of the Ad Hoc Technical Expert Group as reflected in section III of the present note;

(b) Liaise with the International Bioenergy Platform (IBEP) and other relevant institutions and forums, and assess the impacts of increasing biofuel production on forest biodiversity and prepare a report on these impacts for consideration by the Conference of the Parties at its tenth meeting, bearing in mind the decision of the Conference of the Parties on biofuels;

2. *Invites* Parties to:

(a) Enhance the implementation of the expanded programme of work on forest biological diversity, in particular in view of the 2010 target, *inter alia* by addressing the obstacles identified in section IV of the present note, and by implementing the conclusions and recommendations of the Ad Hoc Technical Expert Group as reflected section III of the present note;

(b) Enhance coordinated implementation of the work of the Convention on Biological Diversity and the United Nations Forum on Forests and promote cooperation between relevant sectors to help achieve the 2010 target as well as the four Global Objectives on Forests by 2015;

(c) Further integrate forest biodiversity aspects of climate change impacts and climate change response activities into national biodiversity strategies and action plans (NBSAPs), and into national forest programmes and other forest related strategies; and explore possibilities for establishing an international network to monitor and assess the impact of climate change on forest biodiversity;

(d) Increase efforts to monitor the status of forest biodiversity, using the framework for monitoring progress towards the 2010 target and support research to better understand the impacts of climate change on forest biodiversity;

(e) Apply the precautionary approach to the use of genetically modified trees, given the scientific uncertainty regarding their potential environmental, socio-economic and cultural impacts;

3. *Invites* Parties and international and other relevant organizations to:

(a) Ensure that benefits for forest biodiversity from possible new financing mechanisms for reducing emissions from deforestation are maximized, and that negative impacts on forest biodiversity from such mechanisms are avoided;

(b) Involve biodiversity experts, including holders of traditional forest-related knowledge, in the current discussions on reducing emissions from deforestation and other climate change response activities relevant to forest biodiversity;

(c) Address direct and indirect negative impacts that the production of biomass for energy and other causes of land conversion and forest degradation might have on forest ecosystems.

I. INTRODUCTION

1. At its seventh meeting, the Conference of the Parties adopted in decision VII/31 a multi-year programme of work for the Conference of the Parties. As part of this programme of work, an in-depth review of the implementation of the expanded programme of work on forest biological diversity has been scheduled for the ninth meeting of the Conference of the Parties. The Conference of the Parties, in the annex to decision VIII/19 C, provided guidance to the Executive Secretary on the preparation of the in-depth review. All sources of information referred to in decision VIII/19 have been used for the development of the in-depth review. Further details on the review process are provided in a background document by the Executive Secretary for the in-depth review of the expanded programme of work on forest biological diversity (UNEP/CBD/SBSTTA/13/INF/5).

2. The Ad Hoc Technical Expert Group (AHTEG) on Review of the Implementation of the Programme of Work on Forest Biological Diversity was established through decision VI/22. The AHTEG has met four times since its establishment: in November 2003, March 2005, July 2005, and May 2007. The final report from the fourth meeting of the Ad Hoc Technical Expert Group was incorporated into the above-mentioned background document for the in-depth review.

3. The primary source of information for this review, pursuant to paragraph 1 (a) of the annex to decision VIII/19 C, were the 122 third national reports received by Parties to the Convention as of August 2007. In paragraph 1 (b) of that annex, the Conference of the Parties requested the Secretariat to also consider information contained in previously submitted reports as part of the review of implementation of the programme of work. Therefore information from the first, second and thematic reports received by the Secretariat have also been incorporated into the review.

4. The members of the Collaborative Partnership on Forests (CPF), and in particular the Food and Agriculture Organization of the United Nations (FAO) and the UNFF Secretariat, have been consulted on the in-depth review of the forest programme of work, as requested in section A of the annex to decision VIII/19 C. A draft of this note was posted for comments from 5 to 18 October 2007 under Secretariat notification SCBD/STTM/JM/VA/59871 (2007-113) and comments were incorporated as appropriate.

5. This note is a summary of the background document for the in-depth review of the expanded programme of work on forest biological diversity (UNEP/CBD/SBSTTA/13/INF/5) and is based on the results of the consultation process described above. Section II summarizes the status and trends of forest biodiversity. Section III outlines the progress made by Parties in the implementation of the programme of work on forest biological diversity; section IV lists identified obstacles to implementation; and section V provides some general conclusions from the review.

6. In paragraph 3 of decision VIII/19 B, the Conference of the Parties requested the Executive Secretary to collect and collate existing information, including peer-reviewed published literature, in order to allow the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to consider and assess the potential environmental, cultural, and socio-economic impacts of genetically modified trees on the conservation and sustainable use of forest biological diversity, and to report to the ninth meeting of the Conference of the Parties. Section V of this note describes potential impacts of the use of genetically modified trees.

II. STATUS AND TRENDS OF FOREST BIODIVERSITY

7. **Forests are home to the majority of terrestrial species, and tropical forests are amongst the world's richest ecosystems.** The tropical biome contains 46 per cent of the world's forests and is home

to an average of 100 tree species per hectare and an estimated 50-90 per cent of all terrestrial species. Forest ecosystems, species, and genes in all forest biomes provide numerous essential services, such as water storage and purification, air filtration, food, fodder, medicines, shelter, recreation, carbon storage, and religious and spiritual value (35).*

8. **Forest biodiversity is being lost at an alarming rate.** Key publications such as the Millennium Ecosystem Assessment and the Red List of Threatened Species™ indicate that a large and increasing number of forest ecosystems, populations and species globally are threatened or being lost due to the loss and degradation of forest habitats, and that this loss of forest biodiversity will be aggravated by the effects of climate change (10, 23, 28, 35). Tropical moist forests are home to the largest number of threatened species of any biome. It is assumed that numerous, but not yet scientifically described, species are presently being lost together with their tropical forest habitats (35, 57). Globally, over half of the temperate broadleaf and mixed forest biome and nearly one quarter of the tropical rain forest biome have been fragmented or removed by humans (35).

9. **Deforestation continues at a rate of about 13 million hectares per year, mainly due to conversion of forests to agricultural land. Tropical forests account for the majority of annual deforestation.** In recent years, forest planting, restoration, and natural expansion of forests have partly compensated for the overall loss of forest area, mainly in Europe and Asia (see figure 1 on page 19 below). Between 1990 and 2000 the global net loss of forests was estimated to be 8.9 million hectares per year while between 2000 and 2005 the net loss of forest was calculated at 7.3 million hectares annually (10). An estimated 6 million hectares of forests that are lost each year are primary 2/ forests, which are exceptionally rich in biodiversity (10). About 40 per cent of remaining primary forests are increasingly threatened by anthropogenic activities such as logging and agricultural expansion (47). While the majority of the loss of primary forests occurs in the tropics, the logging of remaining old-growth forests in temperate and boreal areas is also a matter of concern (35). Some countries have made notable progress in reducing their rate of deforestation, e.g. Brazil has achieved a reduction in forest loss of close to 25 per cent between 2005 and 2006; Costa Rica has reduced and actually reversed forest loss through innovative incentive measures (56); and China's policy of forest conservation and afforestation has resulted in a large net increase of forest area. Other countries and regions have seen an increase in deforestation rates, e.g. in Africa and South-East Asia (10), and this trend is expected to intensify in some regions due to new and emerging issues such as land conversion for the production of biomass for biofuels (21, 45, 49).

10. **Forested wetlands represent a particularly vulnerable forest type.** Forested wetlands are highly biodiversity rich and provide significant ecosystem services, such as carbon sequestration, and they underpin productive fisheries. A significant proportion of Ramsar Sites include forested areas, although a lack of data constrains estimates of the extent of coverage of this forest type under existing protected-area systems. Forested wetlands are vulnerable not only to excessive direct use but also to the added threat of unsustainable water use (35).

11. **Expansion of agricultural land and pasture is one of the main causes of deforestation.** The Millennium Ecosystem Assessment reports that agricultural land is expanding in approximately 70 per cent of the countries examined. The impact of agricultural expansion has been particularly severe in tropical forest regions, where pasture and crop land is expected to continue to

* The numbers in parentheses refer to the list of references on pages 22-24 below.

2/ Forests of native species, in which ecological processes are not significantly disturbed (FAO, Global Forest Resources Assessment, 2005).

increase over the next 30 to 50 years. The establishment of forest plantations can be a main cause for loss of forest biodiversity if primary or modified natural forests 3/ are converted (12, 35, 42).

12. **Invasive species have become a major cause of biodiversity loss globally.** Numerous species of plants, insects, bacteria, fungi, birds, and mammals have become invasive in forest ecosystems throughout the world, with considerable negative consequences for biodiversity such as extinction or extirpation of indigenous species, and negative effects on soil quality and water availability (59, 60). They are causing considerable economic costs to national economies, and are in some cases threatening human health (58).

13. **Climate change is expected to aggravate problems related to forest health, and to impair key ecosystem services of forests**, such as their ability to improve and protect soil and to clean and store water. Possible benefits of accelerated forest growth due to increased carbon-dioxide concentrations and warmer temperatures are expected to be outweighed by negative impacts such as droughts and other natural disturbances. Already climate change has been linked to the earlier timing of spring events in forests, a poleward and upward shift in the range of forest plants, insects and animals, accelerated desertification, greater windfalls and other damages from extreme weather events and increased instances of diseases and forest fires. Forest ecosystems identified as being particularly vulnerable to the impacts of climate change include: mangroves, boreal forests, tropical forests, cloud forests and dry forests (23, 24, 25, 35, 43).

14. **Air and water pollution will presumably have a larger impact on forest ecosystems as their resilience is decreasing due to climate change**. Pollutants such as sulphur, nitrogen, heavy metals and ozone are particularly detrimental to forest health. Although emissions of air pollutants, such as sulphur dioxide, have decreased in many developed countries, they are increasing in several Asian, African, and Central and South American countries (23, 35).

15. **350 million hectares of land were affected by fires in 2000, a significant portion of which were forests and woodlands** (see figure 3 on page). In addition, an estimated 5.6 million hectares of forested land is affected by insects and 5.6 million hectares by disease each year (9, 10). Recent studies show that the frequency and intensity of these disturbances are increasing, *inter alia* in the Mediterranean and boreal regions. A further increase in frequency and intensity of wildfires due to the impacts of climate change is expected (23). While fire plays an important and ecologically beneficial role in many forest ecosystems, most fires today are caused by humans, to convert forests to agricultural land or for other purposes (10). A major problem in this respect occurs with tropical forested peatlands in South-East Asia (49, 51, 54).

16. **The percentage of forest area designated for the conservation of biological diversity has increased significantly** between 1990 and 2005, with an estimated 11.2 per cent of total forest area having this objective as its primary function. This positive trend was observed in all regions with the exception of Northern, Eastern and Southern Africa (10). However, assessment of the effectiveness of biodiversity conservation is usually not available, and the location of protected areas does not always reflect areas of particular importance to forest biodiversity.

Key trends of consumption and forest ecosystem services

17. **More than 1.6 billion people depend to varying degrees on forests for their livelihoods**, e.g. fuelwood, medicinal plants and forest foods. Approximately 300 million depend on forests directly for their survival, including about 60 million people of indigenous and tribal groups, who are almost wholly dependent on forests. Forests play a key role in the economy of many countries (35, 48). Urban areas

3/ Forests of naturally regenerated species in which there are clearly visible indications of human activity (FAO, Global Forest Resources Assessment, 2005).

often depend on forested areas for their water supply and benefit from the multiple environmental services of urban forests and trees (9).

18. **The consumption of main timber products (roundwood, sawnwood, pulp, paper) is expected to increase over the next 30 years.** The use of solid biofuels for electricity production could be three times larger by 2030 than current levels (9). Globally, by 2050, the demand for industrial roundwood is expected to increase by 50 to 75 per cent (42). In consequence of growing demand, tropical forest plantation area more than doubled between 1995 and 2005, to 67 million hectares, mostly in Asia. Other plantations, in boreal and temperate regions, have also increased in area. This trend is expected to continue (26). The use of relatively few tree species in plantations and modified natural forests is an issue of concern for a number of forest dependent species and for ecosystem resilience (8, 18).

19. **Non-timber forest products (NTFPs) and other forest ecosystem services are largely omitted from government development strategies** (17). In particular, medicinal plants, food plants, clean water, rattan, bushmeat and bamboo have an important yet often underrepresented (i.e. in development strategies or in national data bases and statistics) role for rural livelihoods and local and national economies (10, 31). The provision of non-timber forest products is often dependent on intact forest ecosystems with high biodiversity, for example for the use of medicinal plants or sustaining productive fisheries from forested wetlands (34).

20. **Forests play a crucial role in relation to the conservation, storage and quality of potable water.** More than three quarters of the world's accessible freshwater comes from forested catchments (35). Despite this importance 42 per cent of the world's main river basins have undergone substantial deforestation, with 75 per cent of their original forest cover lost (35). Nevertheless, the sustained provision of water for urban supply is now a major driver of the restoration of forests and establishment of forest protected areas.

21. **As forest ecosystems are important stores for carbon, their loss has serious implications for climate change.** Forests account for about 50 per cent of the total above-ground terrestrial organic carbon (35), and deforestation is estimated to have been the cause of 20 per cent of annual greenhouse gas emissions in the 1990s (24). Peatlands, much of which are forested, cover only 3-4 per cent of the world's terrestrial surface, but they store twice the carbon of all the world's forests combined (35, 43, 54). Yet, through land conversion and peatland degradation, large areas are being lost, and carbon dioxide is emitted in large quantities every year, which contribute up to 10 per cent of global annual greenhouse gas emissions (21). The loss of tropical peatlands and thus key carbon-storage facilities is currently exacerbated by agricultural expansion, in particular due to the growing demand for biofuels (45, 49, 51).

22. **The growing worldwide interest in biofuels has raised concerns about deforestation, land-use changes and the loss of major carbon sinks.** The pressure from other land uses on forests could grow tremendously over the next years. A recent study forecast that 14 to 70 per cent of the present total agricultural land could be made available for bio-energy production by 2050 (61). The OECD concludes in a recent report that "the rush to energy crops threatens to cause food shortages and damage to biodiversity with limited benefits" (51). Several studies present potential risks of energy crop plantation expansion into forest area, especially in South-East Asia and the Amazon basin (45, 49, 50, 51).

23. The potential indirect impacts of biofuel production are also raising concerns for forested areas. The need for fertile agricultural land to produce biofuels may result in land conflicts and an increase in food prices, which can affect indigenous and local communities (ILCs) and small-holder farmers. To reconcile bio-energy production objectives and forest preservation is a major challenge. **Primary and modified natural forests tend to have the greatest biological diversity and at the same time the biggest potential for carbon storage – a win-win situation if these forests are preserved** (21, 43).

Key trends in achieving sustainable forest management (SFM)

24. **Illegal logging and illegal harvesting of forest products seriously undermine national efforts to improve sustainable forest management in many countries**. Governments, mostly in developing countries, lose an estimated US$ 15 billion a year as a result of uncollected taxes and royalties. Recent estimates suggest that up to 15 per cent of internationally traded roundwood might originate from illegal sources (1, 6). Rare tree species and those with high value for timber or non-timber forest products are often in danger of becoming locally extinct (10, 28).

25. **Progress towards SFM is being made at many levels, dependent on the scale and perspective applied.** Several policy initiatives and processes at international and regional levels have yielded promising results for the conservation and sustainable use of forest biodiversity. The area of certified forests has increased in developed countries (9). Regional cooperation in the Amazon basin, the Congo basin and the Heart of Borneo has facilitated an increase in protected area coverage in these key biodiversity regions. The Forest Law Enforcement and Governance (FLEG) initiatives are further contributing to progress towards sustainable forest management. The FLEGT (Forest Law Enforcement, Governance and Trade) initiative of the European Union recognizes the joint responsibility of producer and consumer countries through their voluntary partnership agreements.

III. PROGRESS IN IMPLEMENTATION OF THE PROGRAMME OF WORK BY PARTIES AND WAYS FORWARD FOR IMPROVED IMPLEMENTATION

26. The response rate on questions related to forest biodiversity in the third national report indicates that all areas of the programme of work are being implemented by at least some Parties (see figure 2 on page 20 below). This section summarizes responses and comments provided by Parties in the national reports, and the advice provided by the AHTEG. It provides suggestions for improved implementation in programme areas that should be more fervently or differently addressed by Parties. Further rationale for the conclusions listed below is provided in the background document for the in-depth review of the expanded programme of work on forest biological diversity (UNEP/CBD/SBSTTA/13/INF/5).

27. The AHTEG report provided as an overarching recommendation for all programme elements to enhance information sharing, collaboration and targeted joint activities between the Secretariat of the Convention on Biological Diversity, the Secretariat of the United Nations Forum on Forests, other CPF members, and other relevant organizations and processes, in particular WTO. These activities will also contribute to the implementation of the non-legally binding instrument on all types of forests.

Programme element 1: Conservation, sustainable use and benefit-sharing

28. **On programme element 1, goal 1: "To apply the ecosystem approach 4/ to the management of all types of forests"**, sixty-one Parties reported that they are applying the ecosystem approach to all types of forests; 60 Parties reported that they are not currently applying the ecosystem approach to the management of forest biodiversity. In analyzing the third national reports and suggesting ways forward for improved implementation, participants in the fourth meeting of the AHTEG 5/ reiterated that the ecosystem approach is the main tool for much-needed integration of forest biodiversity issues into other sectors. In particular, agriculture and mining often have negative impacts on forest ecosystems, if the principles of the ecosystem approach are not considered. While progress has been made on clarifying the conceptual basis of the ecosystem approach in relation to sustainable forest management, information

4/ The ecosystem approach will be reviewed in depth by the Conference of the Parties at its ninth meeting.

5/ Conclusions and recommendations from the fourth AHTEG meeting are presented in document UNEP/CBD/SBSTTA/13/INF/1.

from the third national reports suggests that the concept is not yet widely known in the forest sector. Information-sharing and exchange of experiences from different pilot projects and best-practice examples would be useful at this stage.

29. **On programme element 1, goal 2: "To reduce the threats and mitigate the impacts of threatening processes on forest biological diversity"**, many Parties emphasized the need to address anthropogenic pressures, such as uncontrolled/unwanted wild-land fires, expansion of agricultural land, overgrazing, and illegal logging more clearly in the implementation of the programme of work on forest biological diversity. Land-use planning, forest law enforcement and governance, and other appropriate implementing tools and mechanisms should be strengthened. Conservation strategies and management plans may need to be revised to consider climate change as a major driver of forest biodiversity loss. Furthermore:

(a) Of the 121 Parties that reported on progress in addressing the threat of invasive alien species, only eight Parties reported having a strategy that specifically addresses this major threat to forest biodiversity;

(b) Climate change and the conservation of forest biodiversity are interlinked:

(i) Thirty-four Parties reported on the implementation of at least one of the climate change related activities within the forest biodiversity programme of work. No Parties reported on assessing how the conservation and sustainable use of forest biodiversity can contribute to international work on climate change. Furthermore, only two Parties reported on exploring possibilities for establishing an international network to monitor and assess the impact of climate change on forest biodiversity;

(ii) The fourth AHTEG report concluded that emerging initiatives and mechanisms for the reduction of emissions from deforestation could have positive effects both for combating climate change and for preserving forest biodiversity (43). The development of new financial mechanisms in this regard could be supported, if they aim to maximize biodiversity co-benefits. Negative impacts on forest biodiversity from possible new financing mechanisms for reducing emissions from deforestation should be avoided;

(iii) The AHTEG considered it as very urgent to improve implementation in particular in the following objectives under goals 1.2 and 1.3: *Mitigate the negative impacts of climate change on forest biodiversity* (goal 1.2. objective 3); *To prevent and mitigate losses due to fragmentation and conversion to other land uses* (goal 1.2, objective 6); and *Ensure adequate and effective protected forest area networks* (goal 1.3, objective 3).

30. **On programme element 1, goal 3: "To protect, recover and restore forest biological diversity"**, 113 Parties reported on measures under this goal, including e.g. reforestation projects, restoration measures, and the establishment of protected areas. It was noted that many activities are being implemented under the programme of work on protected areas, which are relevant to the programme of work on forest biodiversity as well. The fourth AHTEG report concluded that:

(a) Forest ecosystems are being restored in many countries to stop and reverse forest degradation, but current efforts are not sufficient given present rates of deforestation and forest degradation. Necessary funds and technologies for forest restoration are often not available, particularly in developing countries. Demonstration areas, using the ecosystem approach, can be a useful tool to accelerate restoration efforts;

(b) Several international NGOs reported that participation and prior informed consent of indigenous and local communities (ILCs) and other stakeholders are often not adequately considered in the establishment of forest plantations in areas (previously) managed by ILCs. Traditional knowledge is useful for the establishment and management of forest protected areas, but is often not being considered;

(c) Despite some national and regional success stories, the establishment of forest protected area networks remains insufficient and underfunded. Reported examples of transboundary protected areas indicated that they can be successful building blocks for the establishment of forest protected area networks. The establishment of these networks should correspond to spatial scales of targeted species, populations and ecosystems.

31. **On programme element 1, goal 4: "To promote the sustainable use of forest biological diversity",** 120 Parties reported measures under this goal, such as actions to address illegal activities; the formation or revision of laws and regulations; and the establishment of protected areas as a means of preventing the unsustainable use of forest resources. In suggesting ways forward for improved implementation, the AHTEG found that:

(a) Demonstration and learning sites for sustainable forest management (SFM) should be used more frequently to increase the area under SFM, e.g. by demonstrating the economic advantages of SFM in the medium and long term;

(b) Few links between water resources and the sustainable use of forest biodiversity were mentioned in the national reports. However, this area is crucial given expected water shortages in many regions. In this context, synergies in implementation of the programme of work on inland water biological diversity and the programme of work on forest biological diversity biodiversity under the Convention on Biological Diversity should be strengthened at national level;

(c) Forest certification schemes when appropriately designed, agreed, and implemented, were seen as useful instruments in achieving biodiversity conservation. Several Parties refer to increases in the areas under various forest certification schemes, while it was reported by NGOs that some certification schemes do not take into account the rights and concerns of indigenous and local communities, in particular for recently established plantations. A compilation of information on the criteria in forest certification schemes relating to the participation and prior informed consent of indigenous and local communities, and forest biodiversity, would be a useful tool to improve forest management;

(d) Few Parties reported on the sustainable use of non-timber forest products. The AHTEG recommended the promotion of sustainable use of non-timber forest products as a useful way to combat unsustainable forest management and unsustainable harvesting;

(e) Limited information on efforts to strengthen forest governance is available from national reports, however, other information e.g. from international organizations and NGOs indicates that more efforts are needed in many countries to improve forest governance and law enforcement, as a precondition for sustainable forest management;

(f) Information from international organizations indicates that unresolved or unclear land tenure issues are a major obstacle for the implementation of the programme of work, and that lack of land rights and disputes over land rights are major obstacles for land management by indigenous and local communities. However, few Parties reported directly on land tenure and land rights issues in this context. Some success stories for the support of indigenous and local communities in relation to natural-resource management exist. However, adequate financial resources for capacity-building and organizational structures for the management of natural resources by indigenous peoples are mostly not available and are urgently required. There is a need for close cooperation on these matters between the UNFF

Secretariat, the Permanent Forum on Indigenous Issues (UNPFII) and the Secretariat of the Convention on Biological Diversity;

(g) The precautionary approach is seen as an adequate tool to avoid potential negative environmental, cultural and socio-economic impacts of the use of genetically modified trees.

32. **On programme element 1, goal 5: "Access and benefit-sharing (ABS) of forest genetic resources"**, sixty-seven Parties reported on measures taken, while 49 Parties reported that no measures had been taken. The low response rate can partially be ascribed to the facts that there are few domestic regimes that are operational and those that exist are at varying stages of development, and that an international regime on access and benefit-sharing is currently under negotiation. Reported activities include the promotion of community-based resource and revenue management; strengthening systems for the control of bio-prospecting; and *ex situ* conservation and sharing experiences and information from gene banks. The fourth AHTEG report concluded that genetic engineering is developing rapidly and is creating new challenges for access and benefit-sharing. These developments should be monitored carefully.

Programme element 2: Institutional and socio-economic enabling environment

(a) **On programme element 2, goal 1: "Enhance the institutional enabling environment"**, ninety-six Parties reported that measures were undertaken, mainly focusing on the establishment of scientific programmes and institutions, and the strengthening of forest institutions, laws and forest law enforcement. Examples include regional Forest Law Enforcement and Governance (FLEG) initiatives and the European Union's FLEGT initiative, and the introduction of taxation to promote forest law enforcement. In addition, the AHTEG found that multi-sectoral approaches, especially inter-ministerial, and the integration of forest biodiversity management aspects into other sectors, are seen as key tools to promote the conservation and sustainable use of biodiversity.

33. **On programme element 2, goal 2: "Address socio-economic failures and distortions"**, seventy-eight Parties indicated undertaking measures, and 44 Parties identified priority actions and described measures to address these priorities. Reported activities can be divided into three categories: tax and fee systems; the development or improvement of forest management programmes; and awareness raising and capacity-building activities. Actions reported include the creation or use of forest certification programmes, and reforestation programmes on farmland or supplying subsidies to agricultural organizations that discourage further forest conversion. The fourth AHTEG report concluded that:

(a) Socio-economic distortion, market failures and perverse incentives are driving deforestation and unsustainable forest management at many levels. Governments should address these issues, especially in relation to biofuel production. Governments should develop a system of valuation of (forest) biodiversity as part of national accounting, including its role for sustainable development;

(b) Governments should be encouraged to address underlying causes of forest biodiversity loss, including those related to forest law enforcement;

(c) Timely cost-benefit analysis could allow the negative impacts of certain development projects to be mitigated.

34. **On programme element 2, goal 3: "Increase public education, participation and awareness"**, 104 Parties indicated that they had implemented measures, while 13 Parties reported that they had not undertaken any measures. Some of the activities specifically targeted resource managers and policy makers, while other activities focused on educating children and the general public. Examples include the use of museums in raising awareness of forest biological diversity; the establishment of a

forest academy to raise awareness amongst students; and the designation of specific days to promote biodiversity issues, such as National Arbor Day in Japan. The AHTEG concluded that the important relationship between human health and forest health is at present not well understood by the public and by policy makers, and that further research and awareness-raising efforts are needed.

Programme element 3: Knowledge, assessment and monitoring

35. **On programme element 3, goal 1: "To develop general classification of forests on various scales"**, ninety-one Parties reported that they had undertaken activities relating to this goal, while 28 Parties indicated that they were not undertaking activities. Less than half of the Parties who submitted thematic reports had classification systems in place, while the remaining countries were in early or advanced stages of development. National and regional assessments and classifications have generally been conducted at three scales: the ecosystem and/or habitat level, the species level, and the genetic level. One Party remarked that the review and adaptation of harmonized global or regional forest classification system requires international collaboration. The AHTEG report, *inter alia,* concluded that:

(a) A number of Parties do not yet have the technological resources needed to develop baseline information for assessing levels of deforestation and its impact on biodiversity. Such technology is critical, *inter alia,* in facilitating the linkage between climate change and biodiversity issues;

(b) A harmonized system of forest classification compatible with current observational technology is needed with priority given to forest ecosystem surveys of areas of high biodiversity value which undergo rapid environmental change. The results of these surveys should be combined with the results of the analysis on the direct and underlying causes of forest biodiversity loss (programme element 2, goal 1), including causes related to specific sectors like biofuel production.

36. **On programme element 3, goal 2: "Improve knowledge on, and methods for, the assessment of the status and trends of forest biological diversity"**, ninety-nine Parties reported measures, such as the development and improvement of methods for the assessment of forest biological diversity. Biodiversity-related criteria and indicators for sustainable forest management (SFM) were further developed. Many Parties made notable progress in the development of national and regional criteria and indicators, e.g. in Europe. The Ministerial Conference on the Protection of Forests in Europe (MCPFE) and the Montréal Process were frequently mentioned as two useful processes for the development of national criteria and indicators. Two Parties in the tropics developed their frameworks in collaboration with the Center for International Forestry Research (CIFOR) and the International Tropical Timber Organization (ITTO). The concept of criteria and indicators for SFM is also integrated in the Global Forest Resources Assessment. The fourth AHTEG report recommended that future research programmes and technology transfer should be aimed at, *inter alia,* improving the understanding of the role of forest biodiversity and ecosystem functioning, and on improving the decision-making basis for sustainable forest management.

37. **On programme element 3, goal 3: "Improve understanding of the role of forest biodiversity and ecosystems functioning"**, ninety-nine Parties reported activities, such as assessments of the general status of forest ecosystems and biodiversity, and research on forest genetics, taxonomy and ecological functioning. Several Parties pointed out the importance of official development assistance and technical cooperation for the achievement of this goal. The fourth AHTEG report concluded that more emphasis in future research on forest ecosystem should be given to the importance of ecosystem functions for women, in particular indigenous women, taking into account the work done under Article 8(j).

38. **On programme element 3, goal 4: "Improve the infrastructure for data and information management for accurate assessment and monitoring of global forest biological diversity",** eighty-eight Parties reported activities such as the establishment of national databases and networks; facilitating the involvement of stakeholders at the national level; and participation in international

processes. There is a positive trend to use interactive and participative databases to improve information management. As with previous goals, the role of international organizations was found essential, particularly with CPF members such as FAO and the International Union of Forest Research Organizations (IUFRO).

IV. OBSTACLES TO IMPLEMENTATION

39. In the third national reports, several Parties reported on constraints and obstacles to the further implementation of the programme of work, which can be grouped broadly into: (a) information gaps for the assessment and monitoring of forest biodiversity; and (b) other obstacles, mostly connected to lack of resources, political leverage, and coordination.

40. The information gaps which need to be addressed by the Secretariat and its partner organizations include:

(a) The lack of harmonization of information (and reporting requirements) from relevant regional and international processes;

(b) The lack of information on results and outcomes of implemented activities.

41. The information gaps and obstacles which need to be addressed by Parties and the scientific community include:

(a) Inadequate national monitoring systems and the lack of relevant information, for both international and domestic needs (in particular in developing countries where the availability of data is often limited due to lack of capacity and funds);

(b) The lack of a global baseline for forest biodiversity makes it problematic to interpret or respond to observed changes or trends;

(c) No global forest fire classification system distinguishes between fires which are ecologically beneficial and fires which are ecologically harmful;

(d) Lack of current information for the identification of a general group of deforestation drivers. It is difficult to isolate the impacts and contributions that these drivers have at the regional or global scale. This is especially true for tropical regions;

(e) Lack of internationally accepted methodology for extrapolating information on forest genetic diversity from data related to changes in forest ecosystems;

(f) Lack of adequate information relating to the forest area damaged by disturbances such as diseases, insect pests, weather and forest fires, in most countries;

(g) The problematic and often contradictory and highly variable quality of data relating to forest plantations;

(h) Lack of information readily available for the global level relating to areas of particular importance to forest biological diversity;

(i) Unclear definitions of key terms for which Parties in their third national reports used varying interpretations, such as the ecosystem approach;

(j) The lack of knowledge on methods to allow for greater involvement of non forest related sectors and in particular the private sector in the conservation and sustainable use of forest biodiversity.

42. In the third national reports, countries identified a number of obstacles related to lack of resources and capacity, coordination, and political will. In particular, the following obstacles were identified:

(a) Insufficient collaboration between the members of CPF and other international organizations and processes in supporting Parties in their progress towards sustainable forest management;

(b) The lack of cross-sectoral integration between internal (national) ministries and departments;

(c) Inadequate financial resources committed to implementation;

(d) Inadequate capacity including lack of equipment, facilities and expertise;

(e) Continued pressure to expand other land-uses, in particular agriculture;

(f) Continued causes of deforestation and forest degradation, including urban development, road construction, mining, building of hydroelectric facilities (construction of dams), extraction of oil, gas and other mineral resources, land conversion (e.g. for cattle grazing and cropland), soil erosion, fires, pest and forest disease, and the effects of atmospheric deposition;

(g) Inadequate awareness of forest biodiversity issues among the public, and policy and law-makers;

(h) Poverty, in particular in indigenous and local communities;

(i) A lack of understanding of forest ecosystem functions and value of services, in particular with regard to non-timber forest products.

V. GENERAL CONCLUSIONS OF THE REVIEW

43. Information from Parties in the third national reports suggests that the programme of work on forest biological diversity is one of several useful tools providing guidance in forest management and forest policy development. Directly measuring its impacts is not possible, as it interacts with other international and regional agreements and processes. The programme of work is being implemented by many Parties, but considerable work remains to be done to significantly reduce the loss of forest biodiversity. Targeted support from the Secretariat and from international organizations should be provided to Parties, to facilitate implementation and exchange of information and experience. There is, in particular, a need to provide and develop capacity to overcome identified obstacles (see section IV above), and to increase cooperation at regional level.

44. The most commonly mentioned obstacle for developing countries was lack of capacity (financial and human). In addition, reports on activities of international organizations suggest that a lack of good governance in general, and of law enforcement in particular, is a key obstacle to the implementation of many goals and objectives of the programme of work. Corruption, illegal logging, and unresolved land tenure issues are amongst the most commonly mentioned obstacles (1, 6, 47).

45. While the third national reports provided ample information on the activities being implemented by Parties, they did not provide sufficient information to assess the status and trends of forest biodiversity. The collection and collation of information on the status and trends of forest biodiversity need to be improved in view of the 2010 target and beyond, according to agreed global level criteria and indicators, and based on the identified information gaps and other obstacles such as lack of capacity (cf. section IV). At the national level, biodiversity issues need to be further integrated in national forest assessments and inventories. At the global level, progress is being made to include biodiversity aspects increasingly into the global Forest Resources Assessment (FRA).

46. The Ad Hoc Technical Expert Group recommend that the expanded programme of work on forest biological diversity be continued in its present form, as adopted in the annex of decision VI/22. However, it is strongly recommended that the implementation of certain activities be adapted to changing conditions, in particular climate change, and that implementation of certain activities be strengthened and

accelerated in view of the 2010 target, in particular in the following fields: *Mitigate the negative impacts of climate change on forest biodiversity* (goal 1.2. objective 3); *Prevent and mitigate losses due to fragmentation and conversion to other land uses* (goal 1.2, objective 6); and *Ensure adequate and effective protected forest area networks* (goal 1.3, objective 3).

VI. IMPACTS OF THE USE OF GENETICALLY MODIFIED TREES

47. The Secretariat compiled available information on potential impacts of genetically modified trees, based on peer reviewed publications; on information submitted by Parties and relevant organizations; and on input from the Task Force on Forests and Genetically Modified Trees of the International Union of Forest Research Organizations (IUFRO). This section is a summary of the information presented in an information document on the potential environmental, cultural and socio-economic impacts of genetically modified trees (UNEP/CBD/SBSTTA/13/INF/6) and a compilation of views on the potential environmental, cultural and socio-economic impacts of genetically modified trees (UNEP/CBD/SBSTTA/13/INF/7). 6/

48. In order to facilitate the collation of information on genetically modified trees, the Secretariat distributed a questionnaire on 4 May 2006 to Parties and relevant organizations inviting them to provide information. Nine of 35 Parties which had responded by September 2007 indicated having plantations of genetically modified trees, mostly for experimental purposes. Twenty-three Parties reported having platforms, committees or other fora to address genetically modified trees, generally taking the form of advisory and/or regulatory boards and/or committees. However, most of these platforms have been developed to deal with genetically modified organisms broadly rather than genetically modified trees specifically. Thirty of the responding Parties indicated that they had implemented guidelines or regulations to minimize the impacts of genetically modified organisms. Though there were few references to the specific environmental, cultural or socio-economic impacts of genetically modified trees, some countries indicated that these potential impacts could be considered under existing guidelines or regulations. As the majority of responses received originated from European countries, the guidelines of the European Union were mentioned as being an influencing factor in the shaping of domestic guidelines and policies.

49. To date the majority of work on genetically modified trees has focused on tree development methods and to answer basic biological questions. On the application side, research tends to concentrate on the development of trees with altered lignin content, stress tolerance and insect, disease and herbicide resistance (7, 11). It is these later areas of research which have generated most of the concern on genetically modified trees as they have both potentially positive and negative impacts (62; cf. Table 1).

50. Many of the issues associated with genetically modified crops can also apply to genetically modified trees, as the modifications developed for crop species are similar to those being developed in trees. However the practicalities and constraints of conducting research on genetically modified trees do differ from those related to agriculture, e.g. with regard to the longevity of trees, their relatively late age at which they reach reproductive maturity, and the wide spread of their pollen and seed (37).

51. The body of research on genetically modified crop developments is currently larger than the amount of research examining the potential impacts of such technologies (13). Much of the needed data usually comes from resource intensive, medium to large field releases with monitoring occurring over one full rotation (46). Many commercially important species, such as poplar, have long juvenile phases and only flower after relatively long periods of time (15). Further as the pollen of some species can travel

6/ "The potential environmental, cultural and socio economic impacts of genetically modified trees" and "Compilation of views on the potential environmental, cultural and socio economic impacts of genetically modified trees".

large distances, the monitoring used in studies must cover large distances (13, 15). To date such studies have not occurred and in many countries they are not permitted (46).

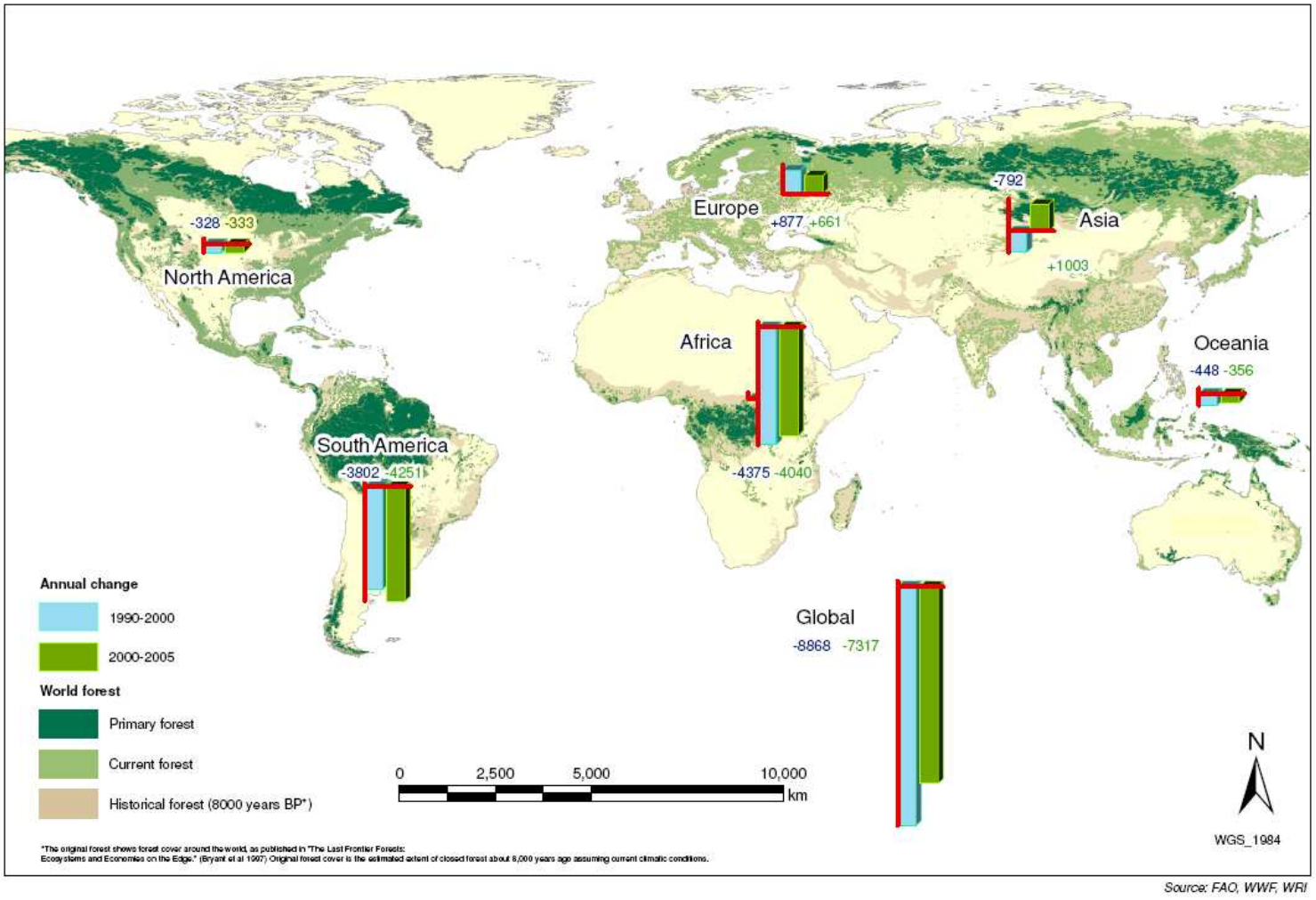
52. Much uncertainty on the use of genetically modified trees exists and the scientific data needed to assess the potential impacts of these trees is not currently available. To date the information regarding the long-term impacts of genetically modified trees is largely confined to hypotheses (3, 13, 14).

Table 1. Potential positive and negative impacts of the use of genetically modified trees (CBD Secretariat, 2007)

1. Potential environmental impacts	
Positive	(a) Reduced lignin content might reduce the need for chemicals and the amount of energy required for processing cellulose (19, 30, 32 46) (b) Pollution originating from pulp mills might be decreased and fewer trees would need to be harvested to meet consumption needs (30) (c) The need to apply broad spectrum pesticides in forested areas might be decreased because of insect resistant traits (3, 13, 20, 29, 32) (d) Exposure of non-pest insects to pesticides might be reduced as the insecticidal agent would be targeted specifically to pests feeding on tree tissues (29, 32) (e) Herbicide resistance would allow for the application of relatively benign broad spectrum herbicides in plantations, thus reducing the need to apply multiple herbicide treatments in a forested area (32, 46) (f) Trees with increased stress tolerance could be used in the phytoremediation of contaminated soils (32, 37, 46) (g) Modifying trees for increased productivity might reduce the need for old growth logging as high yield plantations could be used to fulfil timber needs (20, 46) (h) If economically valuable tree species could be engineered such that they could be grown in various locations outside their traditional home range, it might allow for greater production, reducing pressure on natural forests (32)
Negative	(a) As lignin makes it difficult for insects to digest plant materials, reduced lignin content may decrease the fitness of trees (29, 46) (b) Decreased lignin might render trees more vulnerable to viral diseases (46) (c) Trees with lower lignin levels may potentially affect soil structure and chemistry by allowing for accelerated rates of decomposition (3, 13, 46) (d) Insect resistant traits may lead to the increased development of pesticide resistant species (3, 13,32, 37, 46) (e) Insect resistance might reduce the number of phytophagous and pollen-feeding insects present in a forest (30) (f) Non-target herbivores (minor pest species) might be affected by insect resistant traits (40) (g) There is a potential for insectivores to acquire toxins through the ingestion of herbivores which have fed on insect resistant species (40) (h) While insect resistance traits may suppress one insect pest, these traits may result in secondary pests increasing in numbers (30) (i) If detrital plant materials retain their insect toxicity it might have adverse effects on soil structure and decomposition as insects play crucial roles in these processes (30) (j) The leaching of toxic materials from insect resistant trees into forest soils through root systems might affect soil communities (36) (k) By promoting the use of specific herbicides, herbicide-resistant trees may lead to increased selection pressure for resistant weed biotypes as well as reinforce the use of broad spectrum herbicides (13, 29, 30, 44, 46) (l) Traits increasing resilience may lead to some trees becoming invasive, potentially resulting in a loss of biodiversity (29) (m) If transgenes, conferring increased resiliency were to escape into wild species, these species might become invasive as a result of augmented resiliency (3, 32, 46) (n) The potential for novel genetic materials escaping into wild gene pools carries unforeseeable risk (3, 29, 30, 32, 33, 46) (o) There is a possibility that the new genetic traits entering the ecosystem might affect the bio-trophic processes of their host ecosystem (32)
2.Potential socio-economic impacts	
Positive	(a) By reducing the lignin content in wood, its pulping efficiency might be increased as fewer chemicals and less energy would be required for its processing (3, 19, 29, 46) (b) Increasing the lignin content of trees would lead to a higher lumber density and consequently a better quality of timber and a higher value product (32) (c) Trees with increased lignin content would have higher caloric value and might therefore serve as more efficient fuel sources, and would theoretically increase timber strength allowing for the development of stronger construction materials (15, 32) (d) Increased timber uniformity might increase the overall market value of genetically modified timber (32) (e) Trees could be modified to suit different management regimes (30) (f) Aside from increasing the viability of trees and reducing losses to folivores, fungi and bacteria, pesticide resistant trees might also decrease the need for pesticides and consequently

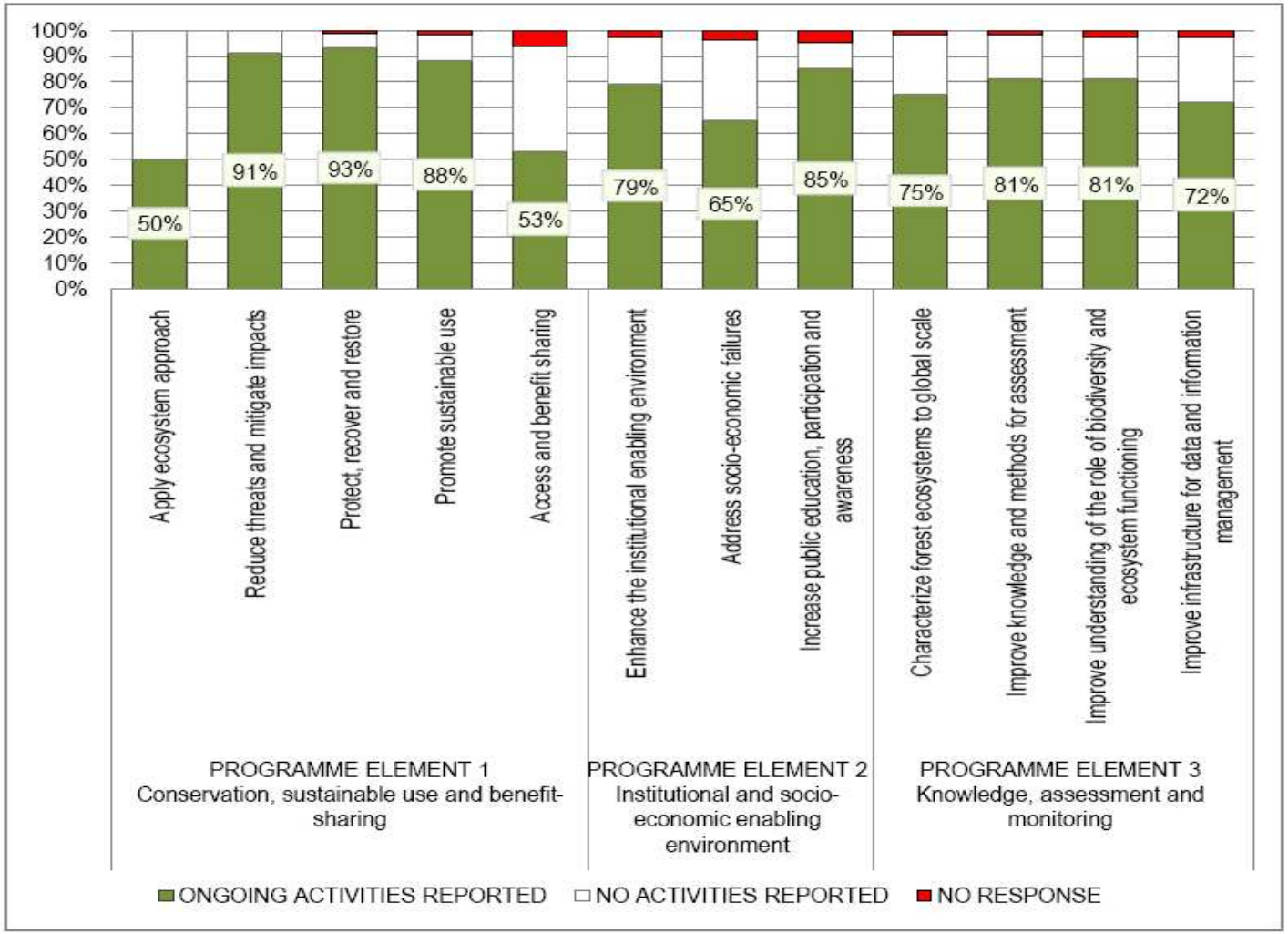
	reduce the input costs associated with tree production (32) (g) The use of herbicide resistant trees will allow tree producers to apply broad spectrum herbicides to control weeds thus reducing the need for more traditional and costly methods of weed control such as multiple herbicide applications and tilling (32) (h) With fewer weeds present in plantations, as a result of being able to apply herbicides, there might be less competition for resources and trees will be able to grow more efficiently (30) (i) Trees modified to express disease resistant traits might also result in increased productivity and the development of safer and or more nutritious foods with longer shelf lives (44) (j) The increased resilience of trees would mean that they would be able to grow with greater efficiency consequently improving productivity (30) (k) Trees modified to be more resilient to adverse growing conditions could be planted on soils where they have not traditionally been able to survive allowing trees to be used in the phytoremidiation of contaminated soils, creating a cost effective means of restoring land that otherwise could not be used (13, 37) (l) If economically valuable species could be engineered such that they could be grown in various locations outside their traditional home range, it might allow for greater production (32) (m) The amount of time required to develop improved phenotypes could be reduced (32)
Negative	(a) Trees with altered levels of lignin may be less viable than their non-modified counterparts and therefore might have adverse economic impacts as a result of higher tree mortality (32, 46) (b) The use of high productivity plantations might lead to a decrease in the perceived social and economic value of non-modified or natural forest as the economic gains from these types of forests would not be as large as those received from genetically modified forest plantations (20) (c) Poor producers of wood resources will not be able to have access to genetically modified trees given their relatively high cost (44) (d) Should pest species become resistant to currently effective chemical and biological control methods the cost of controlling pest outbreaks would increase (32) (e) The long time period between the commencements of research projects on genetically modified trees and when benefits begin to accrue makes tree engineering a risky economic proposition (46)
3. Potential cultural impacts	
Positive	(a) Genetic modification might contribute to the protection and conservation of culturally important tree species which have been in decline as a result of disease (13, 20, 33)
Negative	(a) The unintentional development of insect and herbicide resistant species as a result of transgene escape might alter species compositions and reduce the number of species present in a given location thus forcing cultures to adapt to changing biodiversity conditions (38) (b) Genetic modification might reduce the effectiveness of context specific adaptations in l agricultural methods, make local systems less adaptable and make some societies dependant on outside inputs (38)

*Figure 1: Net annual change in forest area**



* Colour versions of this map are available electronically at www.cbd.int. A limited number of colour copies can be obtained from the CBD Secretariat.

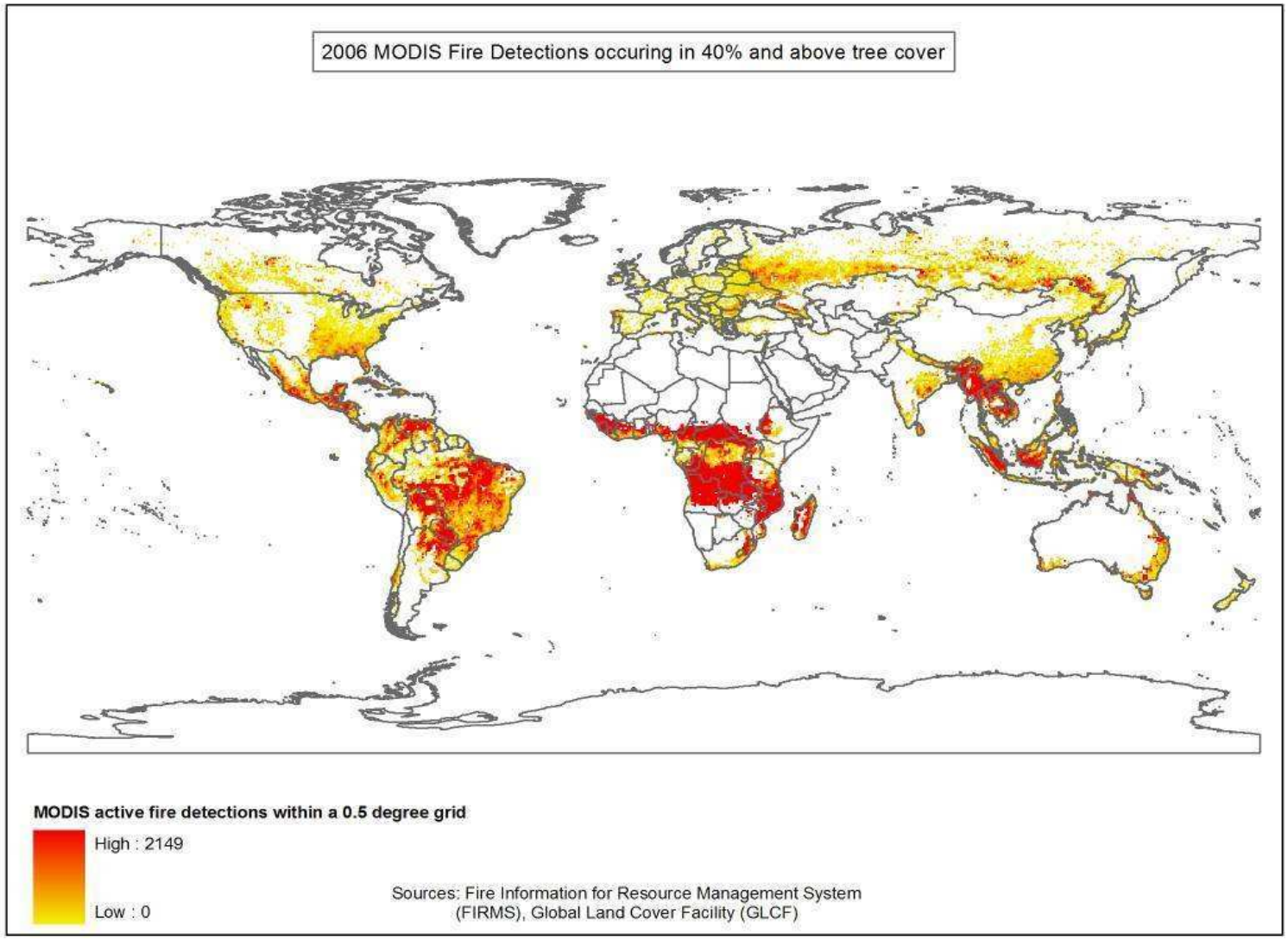
Figure 2: Percentage of countries that responded to the questionnaire of the third national report on forest biological diversity, based on 122 responses[7]



Source: CBD Secretariat 2007

7/ "Ongoing activities reported" represents the percentage of those countries that reported activities under a given goal; "No activities reported" represents the percentage of countries that reported no activities under a given goal; "No response" represents the percentage of countries that did not respond to a given question.

*Figure 3: Forest fire events in 2006 (image produced for the CBD Secretariat by the Geography Department of the University of Maryland)***



** Colour versions of this map are available electronically at www.cbd.int. A limited number of colour copies can be obtained from the CBD Secretariat.

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