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(Prepared by the Scientific and Technical Advisory Panel)

Report of The STAP Brainstorming on Biodiversity Conservation in Production Forests

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Prepared by
The Scientific and Technical Advisory Panel (STAP)
Of the Global Environment Facility (GEF)

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PREFACE

It is with pleasure to present the final report of the Brainstorming Session on Biodiversity Conservation in Protection of Forests. The meeting was convened by the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF) to assist the GEF in the preparation of its Forestry Initiative.

This report of the Brainstorming Session provides the basis for STAP's initial finding and recommendation to the GEF on biodiversity conservation in production forests, recognizing that additional considerations of the issues raised are necessary.

This report was prepared by the STAP ad-hoc Working Group on Biodiversity and the STAP Secretariat.

Madhav Gadgil
STAP Chairman

EXECUTIVE SUMMARY

This report is the product of two activities undertaken by STAP, namely an electronic forum (SUSFOR-L) conducted between August 20 and November 15, 1999 and the STAP Brainstorming on Biodiversity Conservation in Production Forest convened from October 15-16, 1999 in Mexico City, Mexico. The objective of the electronic forum was to *generate sound scientific and technical advise on the proposed extension of the GEF funding to explicitly promote sustainable use of biodiversity, particularly forests* whereas the aims and objectives of the Brainstorming session were:

(a) to review the state of knowledge and scientifically sound good practices in biodiversity conservation (forest);
(b) The identification and assessment of approaches required to achieve the objectives of (a);
(c) The provision of advice to the GEF on possible areas of intervention;
(d) The identification of gaps in knowledge which could be addressed by targeted research.

An overview of the state of knowledge and scientifically sound practices in forest biodiversity conservation was provided, with particular emphasis on strategies for the management of forest biodiversity. Strategies considered included protection strategies; sustainable use strategies (i.e. logging and bioprospecting) and conservation strategies (i.e. plantations). In addition, a number of innovated approaches were consulted (i.e. participatory research-adaptive management approach and carbon sequestration plantation forest).

A major conclusion of the analysis is that conserving biodiversity in production forests is not substantially different to conserving it in a nature reserve. A major reason identified for loss of biodiversity in the tropics is the absence of adequate policy and institutional frameworks under which sustainable management can be implemented. An analysis of policy and institutional issues mitigating against biodiversity conservation in production forest is presented in Table 3.1. These could be used as a basis for designing the GEF Forest Initiative. Based on current scientific understanding, adaptive management was identified as an appropriate approach to promote the sustainable use of forests and other natural resources. The philosophy of adaptive management approaches embody consensus by stakeholders on management objectives; selection of management practices to achieve those objectives; and monitor mechanisms which are an integral part of management practices. As a consequence, management practices can be adjusted with increasing understanding and experience.

Finally, a number of concrete suggestions on how GEF funds could be used to mobilize a participatory, decentralised, adaptive management approach towards forests were highlighted. These included but were not limited to:

- Learning from past experiences – the need to pull together existing experiences, and based on that formulate guidelines and identifying geographical areas where the chances of success are maximum;
- Capacity building at various levels directed towards strengthening community participation in biodiversity conservation;
- The establishment of participatory monitoring systems for adaptive management.

SECTION 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

The importance and strategic nature of the issue of the sustainable use of biodiversity has been highlighted in the Global Environment Facility (GEF) Operational Strategy and programmes and in the Programme Status Review (PSR) for the Forest Operational Programme.[1] Consistent with guidance[2] provided by the Conference of the Parties (COP) of the Convention on Biological Diversity, the GEF is beginning to receive projects in the productive sectors and in modified landscapes. This represents a shift from the current GEF biodiversity portfolio which comprises largely of conservation type project that focus on protected areas.

In order for the GEF to respond effectively, it is necessary to understand the scientific and ecological basis of biodiversity conservation in the productive sectors and in modified landscapes. It is within this context that the Scientific and Technical Advisory Panel (STAP) of the GEF convened a Brainstorming on Biodiversity Conservation in Productions Forests at the University of Mexico, Mexico City from October 15-16, 1999. The Brainstorming Session build upon STAP previous Workshop on Sustainable Use of Biodiversity Components[3], but focused more specifically on biodiversity conservation in production forests.

To facilitate in-depth consideration of biodiversity conservation in production forests, the GEF Secretariat commissioned an Issue Paper entitled *"Biodiversity in Managed Forests"*.[4] In addition, STAP launched an "Electronic Forum"[5] on the subject as a means of facilitating input from a wide cross-section of the scientific community. The results of the Electronic Forum were synthesised and fed into the discussion at the brainstorming session.

1.2 Participation

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[1] Draft GEF Programme Report, OP#3 – Forest.

[2] COP III, Decision III/5, on the need for a balanced implementation of the provisions of the convention and COP IV, Decision IV/13, paragraph 4.

[3] The STAP Expert Group Workshop on Sustainable Use of Biodiversity Components was held in Kuala Lumpur, Malaysia, November 24-26, 1997. The goal of the Workshop was to provide strategic and operational advice to the GEF on sustainable use of biodiversity in various ecosystems (i.e. forest, mountain, arid and semi-arid coastal and marine) including consideration of local knowledge systems, sharing of benefits and incremental costs.

[4] The Issue Paper was prepared by the Center for International Forestry Research, (CIFOR), Jakarta, Indonesia and the International Union for Forestry Research Organisations, Seckendorff-Gudent-Weg8, A-1130 Vienna, Austria.

[5] An electronic forum (SUSFOR-L) based on the paper "Developing funds to conserve biodiversity: A proposal" by Madhav Gadgil, Chairman, GEF-STAP, was operated between August 20 and November 15, 1999. The objective of the forum was to generate sound scientific and technical advice on the proposed extension of the GEF funding ambit to explicitly promote sustainable use of biodiversity, particularly forests. About 280 scientists, social scientists and practitioners from all over the globe participated in the process. The complete background paper and all postings are available at http://ces.iisc.ernet.in/hpg/cesmg/susfor. These can also be obtained by sending an email to susfor-l@ces.iisc.ernet.in.

The meeting was attended by experts from various countries (Annex II); four members of STAP, representatives from the GEF Secretariat, the Implementing Agencies, Ministry of Environment, Mexico, community groups and the University of Mexico, the host institution.

1.3 Official Opening

The meeting was officially opened at 9.00 a.m., on October 15, 1999, at the University of Mexico, by Prof. José Sarukhán, STAP Member and Convenor of the STAP Ad-hoc Working Group on Biodiversity, who welcomed the participants to Mexico and the University. Mr. Neberto Fernandez, Officer-in-Charge of the UNEP Regional Office for Latin America and the Caribbean addressed the meeting. He reminded the meeting of the importance of the topic under consideration to the Latin America and Caribbean Region. He also highlighted the threats being posed to the destruction of the region's forest resources. According to recent estimates, the Latin America and Caribbean region lost over 6m ha. of forest cover per year between 1990-1995.

Her Excellency, M. en C. Julia Carabias Lillo, Minister of Environment, Natural Resources and Fisheries, Government of Mexico addressed the meeting. The Minister presented a comprehensive overview of the efforts being undertaken by the Government of Mexico in the area of forest management. Three main strategies were highlighted by the Minister, in Mexico's efforts to address forest management issues, namely, protected areas, utilization of wildlife and forest management; the combined area being targeted by the strategies are projected to about 26m ha. The long-term target over the next 10 years is for 70m ha. to be under reconversion and protected areas. Specific reference was made by the Minister, to the ongoing consultation with the GEF, for assistance to support the efforts being undertaken by the Government of Mexico with respect to forest management issues.

1.4 Aims and Objectives

The aims and objectives of the meeting were outlined by Dr. Christine Padoch, Vice Chair of STAP as:

a) To review the state of knowledge and scientifically sound good practices in biodiversity conservation (forest);
b) The identification and assessment of approaches required to achieve the objectives of (a);
c) The provision of advice to the GEF on possible areas of intervention;
d) The identification of gaps in knowledge which could be addressed by targeted research.

The outputs anticipated by STAP from the brainstorming session were highlighted as follows:

a) An overview of the state of knowledge and scientifically sound good practices of biodiversity conservation in production forests. The issue paper prepared by CIFOR and the results of the Electronic Forum provided the basis for this overview;

b) Strategic advice on:

i) Criteria/elements which should be included in GEF interventions ;
ii) Challenges and constraints for the GEF ;
iii) Guidelines/tools for GEF projects ;
iv) Ideas on possible demonstration/targeted projects.

c) Follow-up action required by STAP and the scientific and technical community.

1.5 Biodiversity Conservation in Production Forests and the GEF

1.5.1 GEF Forestry Initiative: Objectives and Outcomes

Dr. Kanta Kumari of the GEF Secretariat provided an overview of the GEF – its purpose, operational programmes and current trends in the biodiversity portfolio. The increased number of requests from recipient countries for projects addressing issues in the productive sectors and in modified landscapes was identified as a major shift in the GEF since current portfolio has a heavy concentration of projects with a focus on protected areas. In this regard, sustainable use of biological resources was identified as a priority area in the GEF with specific reference to production forests. The GEF response on the issue of production forests will be carried out within the context of the GEF Forest Initiative. The objectives of the GEF Forest Initiative were outlined as:

- To define a vision and strategic approach for integrating biodiversity in the productive landscape ;
- To influence decision making at the project, policy and programmatic levels ;
- To monitor and evaluate results at the field and policy levels ;
- To development and dissemination of good practice.

The outcomes of the Forest Initiative were summarised as:

- The preparation of guidelines/principles to secure sustainable use in the productive landscape at the policy, programmatic and project level;
- The facilitation of a healthy pipeline of projects (reflecting these principles) ;
- The financing of pilot projects to test some innovative approaches ;
- Insights on the applications of these principles to other programmes.

It was emphasised that the GEF interventions aimed at addressing sustainable use issues must be clearly defined.

SECTION 2: BIODIVERSITY CONSERVATION IN PRODUCTION FORESTS: APPROACHES, EXPERIENCES AND IMPLICATIONS

2.1 Background and Context

A number of case studies and/or experiences from different parts of the world were presented in order to get an overview of the various approaches which have been or are being used to conserve biodiversity in production forests. The case studies drew on the practical experiences of various groups including scientists and researchers, the private sector, the non-governmental sector (NGOs), community groups and the public sector.

2.2 Multiple Forest Benefits

The recognition of the multiple functions of forest was used as a starting point for the consideration of biodiversity conservation in productions forests. Figure 1 gives an overview of multiple forest functions. It was however recognised that multiple forest functions are best

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Figure 1: Multiple Forest Functions

considered at a landscape level and that state-of-the-art technologies facilitating different management emphasis should be applied to individual parcels of forest to achieve overall multiple benefits.

The role of production forests, which covers a continuum from intensively managed plantations to wilderness reserves (Figure 2) were highlighted as:

- Playing an integral role in biodiversity conservation, complementing conservation in reserves ;
- Provision of economic means to enable biodiversity conservation and social harmony in a self sustaining forest sector and in society at large ;
- Maintenance of ecosystem, social and economic sustainability. In this regard, the distribution of different forest management activities (and intensities) across a landscape is important.

Figure 2: Forest Management Continuum

Forest Management Continuum				
Intensively managed plantations	Intensively managed natural forests	Extensively managed natural forests	Protection forests	Wilderness reserves (no human impact

For the purpose of the discussion, biodiversity was defined at various levels, namely at the ecosystem diversity, species diversity and genetic diversity as attached in Figure 3.

Ecosystem Diversity

- diversity of forest types and uses as well as forest management objectives/practices
- scale and distribution of forest operations creates a mosaic across the landscape
- biodiversity in "each hectare of forest" cannot be addressed by macro/micro-level planning and monitoring systems

Species Diversity

- number of species (flora and fauna) and distribution between species
- ecosystem requirements
- changes in species composition resulting from forest management
- issue of exotics which often provide superior performance to indigenous species

Genetic Diversity

- within species genetic variation
- tree improvement focuses on best qualities of wood production
- great advances still possible through traditional tree improvement programmes (selection and cross breeding)
- industry aware of sensitivities associated with genetically modified

Figure 3: Levels of Biodiversity: Ecosystem ;Species and Genetic Diversity.

2.3 Current Business Environment of Forest Industry and Future Trends

It was also noted that global markets of forest products are growing (Figure 4) and this implies increasing raw material requirements. In this regard, environmental soundness of fibre supply was identified as one of the major trends in the forest industry and a key element for ensuring future demand (Figure 5). The growing forest products markets set a continuous challenge for

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Figure 4: Global Markets of Forest Products and Conserving Implying Increasing Raw Material Requirements.

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Figure 5: Current Business Environment of Forest Industry and Future Trends.

the industry to identify competitive fibre sources. Since continued success of the private sector is dependent on a sustainable supply of wood; long-term access and continued health of forest ecosystems are essential to the survival of the industrial sector as well as to non-industrial forest users. Responsible, informed and balanced forest management was therefore considered as providing the best opportunity for conservation of biodiversity and other forest functions. This however, implies strict preservation of unique ecosystems and habitats and environmentally sound utilization and management of other forests.

It was pointed out that a profound shift has occurred globally since the 1980s in private sector forest management from a focus on wood production to encompass broader management philosophies. Another trend which is taking root in the private forest management is certification. Certification schemes, though emerging primarily at the national and regional levels, can be used as one tool for highlighting the importance of biodiversity conservation in forests and level of forest management necessary to achieve satisfactory performance.

2.4 Strategies for the Management of Forest Biodiversity

The main types of forest management which contributes to biodiversity conservation were identified as:

2.4.1 Protection strategies: Though totally protected areas amount to less than 5 per cent of tropical forest[5,6], it is considered as probably one of the safest ways to guarantee protection of biodiversity. Total protection, however, has opportunity costs, particularly with respect to conflicts with local livelihood systems.

A number of features characteristic of protected areas were highlighted, which further underscore the need for an increased focus on sustainable use in production systems and modified landscape. For example, not all species are represented in protected areas. Furthermore, and in most instances, protected areas are often a better reflection of economic factors (sites unfavourable for agriculture) and/or strategic and political factors, than biological rational (based on an orderly assessment of biodiversity/bioquality or population genetics). It was also emphasised that irrespective of how good a protected area or a system of protected areas may be, what happens outside the protected areas(s), in managed landscapes (forests, agro-forests etc.) are equally important for conservation because of the intrinic linkages at the landscape level. Forest management and by extension forest biodiversity is just not about setting aside 'protected area(s)', but must be placed in the broader context of landscape planning and management.

2.4.2 Sustainable Use Strategies

For the purpose of the discussion, sustainable use is defined as *"the use of components of biological diversity in a way and at a rate that does not lead to long-term decline of biological*

[5] Groombridge, B. (Ed.) (1992) Global biodiversity: Status of the Earth's living resources: World Conservation Monitoring Centre. Chapmand & Hall, London

[6] Sayer, F.A and Wegge, P. 1992 Biological Conservation Issue in Forest Management In Blockhusental (eds)

diversity, thereby maintaining its potential to meet the need and aspirations of present and future generations".[7].

The principle that production forests can and should make significant contribution to the conservation of tropical biodiversity is a widely held one. However, scientific knowledge of how much biodiversity is conserved in a production forest as opposed to an undisturbed one; how different forest management interventions affect the different components of biodiversity; and of forest management techniques which may directly favour biodiversity, lags far behind that of aspects of management such as silviculture, and timber growth and yield. As a consequence, legislation[8] for the protection of biodiversity in production forests, owes more to the precautionary principle (with great emphasis on limiting the impact of harvesting) than to general principles of disturbance ecology, than to direct knowledge of the behaviour of the system.

Direct knowledge of biodiversity responses to management operations is vital in order to move forward from the precautionary legislation (which at least permits the implementation of management) towards a flexible, adaptive co-management (ACM) approach, which enables stakeholders to monitor biodiversity, adjust management plans when necessary and to evaluate trade-offs between, for example, increased timber productivity and changes on biodiversity.

2.4.2.1 Logging and Biodiversity

The main focus of the discussion centered on the extent to which production and biodiversity conservation are compatible. In addressing this issue it was recognized that most studies of the impact of logging have been gross scale 'comparisons of estimates' based on assessment of specific taxonomic groups. Most, even the best known studies, are severely compromised by poor experimental designs.[9] In addition, few studies have looked at genuine ecological relationships influenced by harvesting, because it has been the focus of much of the past tropical silvicultural research in mixed forest, whereas the loss of aquatic biodiversity is understudied.[10] On the other hand, much is known about the impact of various sorts of log extraction on bioquality.

A number of trend of thoughts emerged from the discussion on logging and biodiversity. Firstly, that examples of conservation of biodiversity in production forests is limited. Although in some countries there is a pre-requisite for logging operators to provide sound environmental plans prior to any form of logging, the research data provided are often sketchy, lack detailed information on the biodiversity and their protective measures. The lack of understanding of interaction of individual species within a given ecosystem often causes species disappearance and unbalance in the ecosystem to occur. Two classic examples were highlighted to illustrate this, namely, the logging of Nothofagus forest in the highlands of Papa New Guinea and the Colophyllum in the Manus Province in the same country. These forests form monostrands; are uniform in age and once destroyed are very difficult to replace.

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[7] Convention on Biological Diversity, 1995

[8] Costa Rica's National C&I for the Sustainability of Forest Management (primary, planted and secondary forest respectively) Principles 6, 10 and 11.

[9] See CIFOR and IUFRO: Biodiversity Conservation in Managed Forest for a more comprehensive cover of the various studies on logging and biodiversity.

[10] opcit

Secondly, the argument was advanced that conserving biodivesity in production forests is not substantially different to conserving it in a nature reserve or any other area of land for which specific biodiversity objectives have been established. Some of the impediments identified as mitigating against sustainable logging included unfair cost and benefits and unenforceable regulations. Thirdly, opportunities exist to enhance biodiversity in production forests. To achieve this however, requires the adoption of biodiversity enhancing practices (Box 1) and addressing a number of constraints (i.e. economic/financial; institutional and knowledge) which mitigates against biodiversity conservation (Box 2). The main elements of a strategy to enhance biodiversity conservation is outlined in Box 3.

Box 1: Biodiversity enhancing practices

- Set aside protected areas within production forests (slopes, water sources, key habitats etc.);
- Use careful harvesting techniques (reduce impact logging – proper planning – inventory detailed maps, directional felling etc.);
- Careful layout and construction of roads to reduce erosion, sedimentation ;
- Close roads after logging to reduce invasion ;
- Avoid steep slopes, buffer water courses ;
- Leave seed trees, large trees, keystone species, snags, individuals of allspecies ;
- Protection of rare threatened endangered and key species);
- Maintain seed trees carefully selected.

Box 2: Constraints Mitigating Against Biodiversity Conservation in Production Forests

A) Economic /Financial

- Costs and benefits (many lacking markets) of biodiversity-friendly forest management accrue to difference actors/stakeholders (with unequal influence);
- Forests, even stumpage, commonly undervalued;
- Most management decisions driven by maximization of short-term profit;
- High discount rates accentuate pressure for resource mining;
- Many biodiversity-friendly practices reduce timber yields.

B) Institutional

- Extra-sectoral policies, land hunger, increasing demand for agricultural products, higher returns favour conversion of forests;
- Management agencies in tropical countries lack capacity to regulate forest practices;
- High profits, low salaries favour corruption;
- Temporary concessions favour mining;
- Increasing timber demand, globalization and/or excess industrial capacity drive maximum harvest.

C) Knowledge

- Biodiversity-enhancing practices (even good harvesting) not widely known, and not included in many forestry curricula;
- Lack of capacity to develop site-specific knowledge;
- Lack of training, incentives for fellers, skidder operators.

Based upon current scientific understanding, adaptive management was identified as an appropriate approach to promote the sustainable use of forests and other natural resources. The philosophy of adaptive management approaches embody consensus by stakeholders on management objectives; selection of management practices to achieve those objectives; and monitoring mechanisms which are an integral part of management practices. As a consequence, management practices can be adjusted with increasing understanding and experience.

Box 3: Strategy to Enhance Biodiversity Conservation in Production Forest

- Research and dissemination. Collaborative research with key partners (selective);
- Modification of policies and legislation (massive);
- Establish examples of Sustainable Forest Management (SFM) related to previous one;
- Monitor and adjust (adaptive management);
- Development and implementation of standards and codes of practice that include adequate forest management planning, reduced impact logging techniques and other practices that conserve biodiversity in production forests;
- Training forest workers and supervisors to properly implement those practices;

- Development of effective mechanisms that motivate forest owners to practice sustainable forestry, such as capturing the economic benefits of the environmental services provided by sustainability managed forests (e.g. Costa Rica); and,

2.4.2.2 Bioprospecting and biodiversity

Bioprospecting[11] was identified as a possible approach to realise potential forest biodiversity values, as well as facilitating the achievements of commercial livelihood and conservation goals. However, given the potential huge impact on forest (200 tonnes of a single species might be required for testing), the complexities associated with intellectual property rights and the economics of bioprospecting, its impact is likely to be limited.

2.4.3 Conversion Strategies

2.4.3.1 Plantations and Biodiversity

Plantation forestry is projected to become increasingly important as a means to meet global demand for wood products. As a consequence, increasing attention will be directed to the role of plantation forestry in relieving pressure on primary forest as well as its ecological consequences, (biological and structural simplification and its implication for biodiversity etc.)

The use of the landscape approach to conserving biodiversity of which plantation management is an integral part is considered to provide opportunities for the minimization of the negative aspects of plantation forestry. Examples of intensively managed plantation designed on the basis of the landscape approach were used to illustrate this point (Box 4). An example of an intensively managed natural forest designed on the basis of a landscape approach is highlighted in Box 5. Decline in bioquality caused by plantation development can often be mitigated by[12]:

- Restricting plantation establishment to degraded lands and areas of low starting bioquality while maintaining remnant areas of moderate or high bioquality vegetation within plantation schemes;
- Taking care to maintain the landscape scale matrix of natural forest, agroforests and more intensively managed plantations;
- Using species mixture and complex uneven-aged silviculture systems which avoid clearfelling;
- Minimizing weeding and encouraging undergrowth.

[11] Bioprospecting refers to the exploration of biodiversity for commercially valuable genetic and biochemical resources including crop genes, medicines, insecticides, enzymes, microorganisms, fragrances and fungicides.

[12] See Bass, S; Hawthrone, W and Hughes, C. (1998) Forest Biodiversity and Livelihoods: Linking Policy and Practice. An Issue Paper for DFID.

Box 4: Intensively Managed Plantation: An Example Aracruz-Brazil

- Total land area 214 000 ha, plantations 138 000 ha, Native forest reserves 62 000 ha ;
- Plantation interspersed with rehabilitated natural forest reserves (reserves occupy 29% of total company land area) ;
- Reserves mostly located along watercourses and steep slopes ;
- Aracruz has an active enrichment planting programme aiming to expand the size and number of species in reserves to enhance their biological and functional stability ;
- Shelter provided by plantations helps to link reserves and provides additional habitat for some fauna ;
- The close proximity of reserves to plantations promotes biological control of plantation pests by natural enemies (e.g. birds, insects, micro-organisms) ;
- Economic return from high yielding plantations funds the reserve programme.

Box 5: Intensively Managed Natural Forest

AssiDoman – Sweden

- Productive forest land area 2.4 million ha. Permanent reserves 1%, unutilisable 3%, reservation due to site specific conditions 8%, long rotations 3%. Total "reserves" 15% of sub-montane area ;
- Equal weight given to environmental and production goals in forest management ;
- Operations adapted to local site conditions with respect to wood yield, site productivity and biological diversity ;
- Sensitive areas exempt from harvesting or modified practices used ;
- Site-adapted management results in a varied landscape with a mosaic of different forest types ;
- Ecological landscape planning is used to provide a framework for site-adapted forest management, ensuring that biodiversity conservation in reserves is complemented by productive forest management ;
- AssiDoman forests were certified according to the Swedish FSC Standard in 1998.

2.5 Innovative Approaches

In addition, to the strategies for the management of forest biodiversity addressed above a number of innovative experiments were presented for consideration.

2.5.1 Experimental Sustainable Forestry Development Programme

This experiment is concentrated in the Rio Bravo Conservation and Management Area of Belize. Its main objective is to develop a sustainable extraction regime for hardwoods in the area. Timber is extracted from a 18000 ha in a prescribed Timber Extraction Zone base in a 40 year cutting cycle.

The basic processes of the programme include; Timber Cruise - a swift assessment of the current species composition, volume and value, followed by a more detailed survey; a stock survey based on the standard protocol developed by the Forestry Department, (identifying, enumerating and mapping all trees of dbh> 30cm and all Mahogany and Cedar of dbh> 20cm); the development of GIS consisting of compartment extraction map(s); timber markup which includes the selection of seed trees for each harvestable species as well as the selection of routing of skidder trails to avoid damage to reserve trees; strictly supervised logging in adherence with guidelines; certification; marketing and financial analysis –operation costs are analyzed.

2.5.2 Participative Research – Linking Modern Scientific Approaches and Ethno-Knowledge

The Participative Research experiment is based on a collaborative effort between university research and the local communities of "Comunidad Indigena de Nuevo San Jan Paragaricutiro" (CINSP). The community hold 18000 ha of land, of which 12000 ha are forested. On the basis of interaction between the two groups based upon an adaptive management approach, a model for resource use was developed for the community. The project illustrated that land use and conservation is feasible if sound scientific knowledge is implemented by the manager-research.

2.5.3 Carbon Sequestration Plantation Forests

An emerging area which was highlighted is the notion of Carbon Sequestration Plantation. The potential for the forest industry to play a significant role in carbon trading was highlighted, particularly by the private sector representations. This could be achieved by the establishment of carbon-sequestration plantation forests. This will however, depend on the rules of trading which are yet to be defined.

Though uncertainty exists about how forests will be treated under the Kyoto Protocol, if the rules facilitate management of "Kyoto forests" for wood production there could be an increase in plantation wood supply. This in turn may alleviate some pressure on natural forests, permitting grater designation of forest reserves for biodiversity conservation. Already a number of countries are exploring the practicality of the application of carbon sequestration as a means of funding forest conservation. The examples used to illustrate this is the Rio Bravo Carbon Sequestration Pilot Project in Belize and the proposed Crownwell Forest in Papua New Guinea.

2.5.4 General Conclusions

On the basis of the presentations and discussions which followed it was generally recognised, that sustainability of forest management including biodiversity conservation in managed forests, mostly depends on creating favourable social, economic, political and institutional conditions.

In addition, it was concluded that:

- Given the complexity of natural systems and the reality that different biodiversity components evolved differently under management and are relevant to different stakeholders, the need exists for the identification of "components of biodiversity". This was considered as a critical element in the identification of areas of interest to various stakeholder groups.

- In designing interventions, it should be recognized that all countries are not at the same level with respect to sustainable forest management. As a consequence, a range of approaches will be required. One approach could be to group countries, identify variables for classification and use this as a basis for determining the various approaches.

- Biodiversity conservation efforts should not be based solely on external funding sources (i.e. GEF) as these types of interventions are unlikely to sustainable.

- Interventions should not narrowly focus on biodiversity conservation ignoring other forest functions. Biodiversity needs to be sustainability managed with specific management objectives addressing the needs of all major stakeholder.

SECTION 3: CONDITIONS FAVOURING BIODIVERSITY IN PRODUCTION FOREST: ISSUES, CONSTRAINTS AND RECOMMENDED ACTIONS INCLUDING TARGETED RESEARCH

3.1 The Challenge

An analysis of the policy and institutional factors favouring biodiversity conservation in production forest revealed that the historical approach to forest policy has alienated most people's and in particular, local stakeholder's biodiversity concerns. The multitude of forest policy and market failures have undervalued biodiversity, (biodiversity has "no" cash value in a commodity priced markets), the goals and services provided by it and overvalue the benefits of conversion e.g. agriculture.

Central to this issue is the question: *Is there any hope for biodiversity conservation in a globalised market*? To address this concern requires a set of policies and institutional mechanisms to facilitate the internalization of biodiversity conservation into markets. In so doing, it should be recognized that the policy solution does not lie solely in the forest (biodiversity) sector, but beyond (e.g. agriculture). The analysis of institutional factors favouring biodiversity conservation also revealed that the traditional approach to biodiversity conservation has not effectively integrated livelihood concerns. Emphasis has been placed in 'protection strategies' based on the assumption that people are the "destroyers" of biodiversity. The policy and institutional response requires a framework that allows stakeholders to make decisions that reconcile livelihoods, biodiversity and commercial forestry and the conflicts inherent in these objectives.

3.2 Policy and Institutional Options/Consideration

3.2.1 Recognising that the sustainability of forest management including biodiversity conservation in production forest, most depend on creating favourable social, economic, political and institutional conditions; an analysis was undertaken of the requirements needed at the local, national and international levels. Table 3.1 gives an overview of some of the main policy and institutional arrangements necessary to favour biodiversity conservation in production forests. Issues and constraints as well as recommended actions are highlighted. These it was felt could form a basis for determining various types of interventions.

3.2.1.1 Local Level

The main issue identified at the local level is community empowerment and involvement, since it is recognised that local stakeholders have an important role to play in protection and sustainable utilisation of biodiversity. This objection could be achieved by establishing participatory policies and mechanisms which could facilitate the participation of local stakeholders in the decision-making process in the use of the resources. Such a framework should also make provisions for deciding on trade-off between biodiversity conservation and livelihood considerations. The building and supporting of local capacity for biodiversity conservation is a *sine qua non* for facilitating community empowerment and involvement. Organization at the community level was identified as a critical element in any strategy aimed at biodiversity conservation. Incentives were identified as central to the sociological and anthropogical demonstrations of sustainable use of biodiversity/forests.

3.2.1.2 National Level

At the national level policy and institutional identified included a wide cross section of issues, namely: land and resource tenure issues; valuation of biodiversity resources; their ecosystem functions; internalization of cost relating to biodiversity conservation and the correction of market failures and the weak enforcement institutional structures.

Land tenure reform with the objective of securing the rights and responsibilities of stakeholder and integrating forest and biodiversity objects executed within an overall land use framework was considered as very important. Securing the rights (i.e. territorial; ownership of resources; rights of access; intellectual property rights (IPR) etc.) and responsibilities of local stakeholders are necessary to provide an incentive for biodiversity conservation. The landscape approach; one which seeks to promote geographical, ecological and socio-economic elements is considered as an appropriate framework within which land tenure reform could take place.

The need for mechanisms designed to facilitate the internalization of environmental cost was identified as an important pre-requisite in securing biodiversity benefits. In this regard, specific reference was made to laws currently being developed and/or implemented by Costa Rica, namely, the National Forestry Fund which compensates stakeholders for environmental services and the Environmental Services Law.

3.2.1.3 International Level

There is full recognition that biodiversity conservation in production forests in developing countries cannot ignore the international policy and institutional environment. Beneficiaries of biodiversity conservation usually extends beyond national boarders. In this regard, specific reference was made to international trade agreements, which sometimes conflict with international environmental agreements i.e. Convention on Biological Diversity (CBD) and Convention on International Trade on Endangered Species (CITES); structural adjustment programmes, and intellectual property.

Table 3.1: Policy and Institutional Arrangements to favour Biodiversity Conservation in Production Forests

	Issues	Constraint	Recommendations (actions/research)
Local	Community empowerment – community must be involved for it to have an effect in biodiversity conservation	Lack of organization of local communities	Policies that encourage local participation
			Concessions to local communities
			Access to local communities to the resource under circumstances that favour biodiversity conservation
			Building and supporting local capacity for biodiversity conservation
	Local people have a significant role in the conservation or destruction of the resources	Ownership of the resource benefits from resources not accruing to local communities	
National	Land and resource tenure system –(ownership of land and the resources is not always clear – e.g. owning land does not necessarily imply ownership of the trees)	Unclear land tenure Divided allocation of tenure	Land tenure reform
		Perverse policies/incentives, inadequate or outdated legislation	Develop polices that are biodiversity friendly (e.g. RIL)
		Lack of capacity to carry out biodiversity friendly activities	• Training foresters and logging crews on low impact techniques for timber harvesting ; • Establish/strengthen training institutions
	Domestic consumption	Not governed by international market standards like certification	Encourage governments and corporations to use certified domestic produce
	Unsustainable forest management	Short-term timber concession	Lengthen concession periods Research ;What timber access regimes favour biodiversity conservation over the long haul
	Competition for forest land	Policies favouring deforestation (agricultural policies)	Land use planning and definition of permanent forest estate

Table 3.1: Policy and Institutional Arrangements to Favour Biodiversity Conservation in Forests Producing Timber

		Lack of policy implementation	Develop and/or implement legislation and their regulations
		Undervaluation of timber from natural forests (subsidies)	Research: Evaluate subsidies, taxes, royalties for enabling biodiversity friendly (good) management
		Lack of control	Support third party certification schemes including national schemes
	Biodiversity Valuation		Biodiversity training to decision-makers
			Policy development should be guided by good science and analysis
	Forest ecosystems have multiple functions, including water production, carbon sequestration and soil protection	Policies ignore these values and not given a fiscal value	Policies that recognize these ecosystem values
	Weak institutional arrangements – failing to learn from past lessons	Weak Institutional capacity for implementation of policies	
International	Beneficiaries of biodiversity conservation extend beyond national level	Local opportunity costs not compensated	Mechanisms to compensate for loss of opportunity
	Market imperfections	Limited market access results is depressed pricing	Removal of trade barriers
	International trade agreements	Conflicts with CBD and other conventions, like CITES	Resolve conflicts in favour of biodiversity conservation
	Structural adjustment programmes	Cutbacks in government staff and programmes	Consider effects of structural adjustment of biodiversity management
	Intellectual property rights	Lack of capacity at the national level to exploit genetic wealth	Benefit sharing with owners of biodiversity

Table 3.1: Policy and Institutional Arrangements to Favour Biodiversity Conservation of Forests Producing

	Issues	Constraints	Recommendations (actions/research)
All Levels	Different perceptions of biodiversity by stakeholders		
	If Local people do not benefit from biodiversity with national or global value (e.g. endemical plant) biodiversity conservation will not necessarily result (how can this be conserved)		Provide benefits for biodiversity conservation to local people
			Monitoring impact of projects in biodiversity conservation (w/ local participation
			Rapid evaluation of circumstances under which local communities participate in biodiversity conservation
			Policies that enable communities to manage forests for multiple products
	Increasing demand for forest produce resulting in unsustainable harvests	Inverse relationship between harvest intensity levels and biodiversity	Promote plantations, farming, growing ex-situ
	Biodiversity friendly timber harvesting is most costly	Profits to timber harvesters are reduced	Mechanisms to compensate for reduced levels of profits
	Biodiversity-friendly harvesting has lower yields	Lower capacity to meet timber demand from a given area	Improve utilization efficiency, commercialize lesser-known species, rehabilitate degraded forest areas and expand plantations

3.3 Gaps in Knowledge which could be Addressed by Targeted Research

3.3.1 A number of gaps in knowledge were identified which could be addressed within the context of the GEF targeted research policy.

- Scaling-up Best Practices: Sources of small scale production at the community level exists which are good examples of sustainable use of forest resources. Consideration should be given to scaling-up these good practices to a large scale. Targeted research will be required to assist with the identification of such good practice on a region by region basis (if this is considered as a desirable approach); the identification of barriers and/or constraints which might mitigate scaling-up and replication.

  To ensure sustainable emphasis would also need to be placed on enhancing the level of basic sciences at the community level and linking the basic science information with local knowledge (i.e. ethno-science).

- Biodiversity and ecosystem functioning: Targeted Research is needed to explore the interaction between biodiversity ecosystem function and productivity. This would enable one to define more precisely whether there are components of biodiversity which may be regarded as redundant, the degree at which these may be afforded to disappear from the ecosystem without affecting it, the way which components may be substituted by other species which fulfil the same function, on the basis of their economic interest, etc.

3.4 Reorienting GEF Funding Priorities for Biodiversity: Some Suggestions:

A broad consensus in favour of a participatory, decentralized, adaptive management approach towards forests emerged from both the electronic forum discussion and the brainstorming session. Several concrete suggestions on how GEF funds could be mobilised towards this end are highlighted.

- ***Learning from past experience:***

GEF needs to crystallise its own experience as well as draw from various categories of projects and processes based on participatory management approaches in order to develop its strategic thinking. In this regard, GEF needs to pull together existing experiences, and based on that, formulate guidelines and identify geographical areas where chances for success are maximum. GEF might initially want to focus on areas where institutional constraints can be overcome, where different stakeholders can participate according to the extent of stake held, and where there is long-term commitment to the general goal beyond the project period.

such attributes have been identified, it should be possible to develop a general framework for future projects (along specific locations on the continuum). As new projects get planned and implemented along the guidelines of such a framework, continuos monitoring and evaluation should help in adapting future efforts to obtain better results.

After decades of experience with ICDPs, social forestry, CBNRM, etc. serious assessments of these experiences remain few. If GEF is considering to diversify its conservation strategy with adaptive management based on participatory approaches a good investment would be to first investigate with which nuances, and under what conditions, these approaches have proven successful in the past.

- ***Capacity building at various levels:***

The need to enhance capacities of various levels of actors was identified as a critical issue. Drawing on experiences with tribals in Orissa and Tamil Nadu States of India, the need to earmark a segment of GEF resources for developing educative/informative literature in local languages was felt, based on experiences in Bhutan, "the provision of GIS systems and operator training, purchase of satellite imagery and aerial photographs, preparation of forest function maps and forest management plans at the FMU (regional) scale, preparation of Guidelines and Codes of Practice", was emphasized.

- ***Monitoring and Evaluation***

The significance of participatory monitoring systems for an adaptive management system to operate was recognised as an integral part of any biodiversity conservation strategy. Unless local people have strong and long term stake in a programme and are involved in designing and implementing the monitoring systems, monitoring can become oriented towards meeting donor reporting requirements rather than towards adaptive management at the local level. Monitoring should encompass both biological/ecological data as well as process indicators of sustainability and participation. This should be an ongoing process that should be periodically evaluated and used to modify management goals and project implementation. In addition, GEF could help develop sub-national criteria and indicators of sustainable forest management and derive monitoring and evaluation procedures and standards.

- *Newer management options:*

On the issue of newer management options, particularly re-institution of traditional practices, 'it was felt that the GEF could help in resurrecting the concept of decentralised nature reserves, the modern equivalent of natural sacred sites (including sacred waters). By providing buffer areas and corridors wherever applicable a network of such sites can still be of great conservation value. The society at large, whether urban or rural. Can have the sense of

at marginalized groups. Consideration should also be given to the establishment of biodiversity trust funds and/or revolving funds at national/regional levels.

The use of the People's Biodiversity Register (PBR)[13] as an instrument for enabling adaptive management of forests with effective involvement of local people was also advocated. The GEF could focus on encouraging (that is, changing funding priorities to encourage) the development and implementation of such instruments that enable adaptive management of forests (to begin with) with the effective involvement of local communities, the scientific community, industry and government agencies. PBR can be an excellent way to stimulate discussion over the state of local environments and can help people to take note of what is in and out of the scope of their ability to respond to issues they raise, themselves. By providing financial assistance (for PBRs), the GEF can certainly help to encourage the implementation of such initiatives/management options as they emerge out of ground-level discussions.

PBRs can result in better articulation of (power differential) issues, generating a feedback loop. For example, collectors of minor forest produce, when provided information on final prices and used of their collection during the PBR interaction process can be motivated to develop enterprises for local value-addition which may have a major impact on sustainability.PBRs can further serve as an effective M&E tool for GEF projects. Local communities as well as local school and college students who go through a PBR process can better monitor biodiversity changes and efficacy of management practices. GEF could greatly benefit from the in situ capacity building element ofPBRs.

Annex I

STAP Brainstorming on Biodiversity
Conservation in Production Forests
October 15-16, 1999
Mexico City
Mexico

Programme

Day 1: Friday, 15 October, 1999

09:00 a.m. –9:45 a.m.	Introduction: Chair – Prof. José Sarukhán, STAP Member
	Welcome by UNEP Mr. Norberto Fernández, Programme Officer
	Presentation by M. en C. Julia Carabias Lillo, Minister of Environment, Natural Resources and Fisheries
09:45 a.m. –10:00 a.m.	Coffee Breaks
10:00 a.m. –10:45 a.m.	Presentation: Background and Purpose of the Workshop by Dr. Christine Padoch, Vice-Chair of STAP
	Presentation: The Importance and strategic nature of the sustainable use issue in the GEF Forest Operational Programme and potential role of the GEF in this area by GEF Secretariat and Implementing Agencies
10:45 a.m. –11:45 a.m.	**SECTION I: Perspective on Sustainable Forest Management** Chair: Dr. Christine Padoch, STAP Vice-Chair
	Presentation: The state of knowledge on scientifically sound best practice biodiversity conservation in managed forests by Dr. Laura Snook, Programme Leader, Sustainable Forest Management CIFOR
	Discussion

12:45 p.m. –13:15 p.m.	Panel: Experiences on Sustainable Forestry in Mexico. Alejandro Velázquez, San Juan Nuevo, Michoacán. Chávez, Santa Catarina Ixtepeji, Oaxaca
14:00 p.m. –15:00 p.m.	Lunch
15:15 p.m. –15:45 p.m.	Panel: Impact of logging on biodiversity: Dr. Jose J. Campos, Associate Professor, Latin America Chair of Diversified Management of Tropical Forests, Costa Rica and Dr. S. Appanah, Forest Research Institute of Malaysia, Malaysia
15:45 p.m. –16:45 p.m.	**SECTION II: Good practices of biodiversity conservation in production forests** Chair: Dr. Mark Griffith Panel: Review of best practices for biodiversity conservation in production forests by Mr. Francis Kahembwe, Forestry Research Institute, Uganda and Mr. Alberto Salas, Forest Conservation and Protected Areas Programme Officer, IUCN Discussion
16:45 p.m. –17:00 p.m.	Coffee breaks
17:00 p.m. –19:00 p.m.	Discussion: Synthesis of Technical Presentations
19:00 p.m.	Formation of Discussion Groups (STAP Secretariat) Theme: Possible interventions by the GEF in management forests including the identification of targeted research needs • Discussion Group I i. Strategies for the Management of Biodiversity in Production Forests • Discussion Group II ii. Policy and Institutional Issues Conducive to the Management of Biodiversity in Production Forests

SECTION V: Conclusion and Recommendation
Chairs: Prof. José Sarukhán and Dr. Mark Griffith

14:00 p.m. –16:00 p.m.	Report of break-out group 1 followed by discussion
	Report of break-out group 2 followed by discussion
	Formulation of Recommendation and Conclusions

STAP Brainstorming on Biodiversity Conservation in Production Forests, 15-16 October, 1999, Mexico City

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