



GEF/A.1/4
March 2, 1998

GEF Assembly
New Delhi, India
April 1-3, 1998

HIGHLIGHTS OF THE WORK OF STAP DURING GEF 1 (1995-1998)

(Prepared by The Scientific and Technical Advisory Panel [STAP])

PREFACE

It is a great pleasure to present to you this report about the activities and the main findings of STAP during GEF 1 (1995-1998).

Providing strategic advice to GEF and reviewing the quality of its work has been a challenging and rewarding experience to our eleven member committee.

With this report we reflect our accountability to GEF. Our work has been carried out in response to requests from the Council, the GEF Secretariat and the Implementing Agencies, World Bank, UNEP and UNDP.

We are happy that many of our findings have already been absorbed by the Implementing Agencies. Still there is much to be done to keep the GEF abreast of the developments on Science and Technology.

We would like to acknowledge the support of the 400 Experts of the STAP Roster and the 300 experts/workshop participants that helped us to prepare the strategic advice. The GEF Secretariat and the Implementing Agencies are acknowledged for their active support and guidance. Last but not least, the STAP Secretariat provided by UNEP and headed by Dr. Mark Griffith, is greatly acknowledged for the continuous assistance and support.

Dr. Pier Vellinga (Chair)
Dr. Helen T. Yap (Vice-chair)
Dr. Rokhayatou D. Fall
Dr. Stein Hansen
Dr. Stephen Karekezi
Dr. Jorge Soberon Mainero
Dr. Jyoti K. Parikh
Dr. Mohd Nor Salleh
Dr. Chihiro Watanabe
Dr. Robert H. Williams
Dr. John D. Woods

TABLE OF CONTENTS

INTRODUCTION	1
STRATEGIC ADVICE.....	2
BIODIVERSITY	3
Sustainable Use of Biodiversity	3
CLIMATE CHANGE.....	7
Renewable Energy Technologies (RETs)	8
Options for a GEF Programme on Transport	9
Reducing GHG Emissions in Coal Systems	11
Technology Transfer and Innovation.....	13
GEF's Role in Adaptation to Climate Change.....	14
INTERNATIONAL WATERS	16
Global International Waters Assessment	16
Emerging Technologies and Methods	17
Globality and the Regional Approach	17
LAND DEGRADATION	18
Global Benefits in Projects Combating Land Degradation	18
TARGETED RESEARCH.....	19
ROSTER OF EXPERTS	20
STAP'S ROLE IN THE PROJECT CYCLE	21
Keeping Track of Projects	21
Selective Review.....	22
MOBILIZATION OF THE WIDER SCIENTIFIC COMMUNITY	23
COOPERATION AND COORDINATION	24
Scientific and Technical Bodies of the Conventions	24
Monitoring and Evaluation	24
Interaction with Non-Governmental Organization	24
OBSERVATIONS RELEVANT FOR THE FUTURE OF STAP.....	24
ANNEX 1: PRODUCTS PRODUCED BY STAP DURING GEF 1.....	26
ANNEX 2: ACRONYMS.....	29

INTRODUCTION

1. The members of the Scientific and Technical Advisory Panel (STAP) to the Global Environment Facility (GEF) were appointed in February 1995. The Panel held its first meeting in April 1995 and operated within the guidelines as set out in its Terms of Reference¹ approved by the GEF Council in October 1995; namely:

- (a) strategic advice as a means to advance a better understanding of the issues of the global environment and how to address them;
- (b) Roster of Experts, development and maintenance;
- (c) selective review of projects;
- (d) cooperation and coordination with the Scientific and Technical bodies of the Conventions; and
- (e) providing a forum for integrating expertise on science and technology as well as providing an important conduit between the GEF and the wider scientific and technical community.

2. The guidance for STAP work was provided from a number of sources, including the GEF Council, the GEF Secretariat and the Implementing Agencies as well as STAP Business Plans which were approved annually as part of the GEF Corporate Budget. In addition, to ensure that STAP strategic advice closely matched the needs, STAP convened strategic sessions with the GEF Secretariat and the Implementing Agencies to regularly discuss the "demand" for the short-, medium-, and long-term.

3. During GEF 1 (1995 - 1998) STAP provided strategic advice on:

- (a) Biodiversity;
- (b) Climate Change;
- (c) International Waters; and
- (d) Land Degradation as it relates to these focal areas.

¹ GEF Terms of Reference of the Scientific and Technical Advisory Panel (STAP), Mandate, Composition and Role, GEF/C.6/Inf.7, October 6, 1995.

4. In addition, advice was provided on:
 - (a) Targeted Research, as a means to improve the effectiveness of the GEF projects and programmes;
 - (b) development and maintenance of the STAP Roster of Experts, including the screening and selection of experts, preparation of generic guidelines for Terms of Reference for technical reviews from the Roster, advice on quality control and operational guidelines on the use and management of the Roster;
 - (c) selective reviews of projects; and
 - (d) mobilization of the wider scientific and technical community in GEF's work.

5. The main findings and conclusions of STAP regarding the issues listed above are summarized in this report and a list of products produced by STAP during GEF 1 are contained in Annex 1. Details can be found in the underlying reports.

STRATEGIC ADVICE

6. The strategic advice provided by STAP during the period under consideration helped ensure the scientific coherence of the GEF Operational Strategies and Programmes.

Review of Operational Strategy and Programmes

7. The GEF Operational Strategy built on a number of insights readily available from the previous STAP in the GEF Pilot Phase, as recorded in their Analytical Frameworks. Of particular note was the work in climate change which drove the long-term and strategic nature of the Operational Programmes in climate change. STAP's subsequent work under GEF 1 provided general confirmation for approaches that had been adopted in the Operational Strategy emphasizing the ecosystem approach in biodiversity, a learning-curves approach in climate change, and a basin-wide approach with international waters. However, STAP indicated that the International Waters Programme requires a more solid scientific basis. STAP inputs into the operational programmes were directly useful, with the theme papers² elaborated during STAP's first year of operations providing a basis for STAP inputs into the GEF Operational

2 GEF. STAP Business Plan and Budget, GEF/C.6/8 October 5, 1995, GEF Council Meeting, Washington, D.C., October 25-27, 1995.

Programmes. STAP also provided the scientific and technical basis for new Operational Programmes.

8. For example, STAP's review of the scientific and technological options in the transport sector are right in time for the preparation of the Transport Energy Operational Programme. Likewise, its advice on clean coal came at an important moment, just as the operational implications of fossil fuel projects on the objectives of the Operational Programmes were under review.

9. STAP's technical energy-related work has had a significant impact on GEF operations both at the policy and operational levels. For example, the workshops on renewable energy, by focusing on the strategically important concepts that underlie specific operational programmes (concepts such as learning curves), pushed the policy work forward as the portfolios are reviewed against the programmatic objectives set. Similarly, STAP's workshop on land degradation provided policy guidance to the GEF on this issue. Finally, STAP's work on Sustainable Use of Biodiversity has laid the basis for a more effective approach of GEF in this field.

BIODIVERSITY

10. The focus of STAP's efforts in the biodiversity focal area has been centered around the transition from conserving biodiversity through protection measures towards development of sustainable use projects. Moreover, STAP developed an overview paper on Targeted Research to support the focal area.

Sustainable Use of Biodiversity

11. In accordance with the guidance provided to STAP a report entitled "Implementing of the Biodiversity Convention: The Ecosystem Approach as a Strategy to Achieve Sustainability in the Use of Biodiversity" was prepared by STAP in collaboration with the scientific and technical body of the Biological Convention and made available to the GEF Council in 1996. This report triggered additional activities by STAP.

12. As a response to the needs identified by GEF, Implementing Agencies and Secretariat, STAP convened a workshop with international experts on Sustainable Use of Biodiversity. The aim of the workshop held in Malaysia from November 24-26,1997 was to clarify the concept and to provide strategic and operational advise to the GEF. Scientific papers on the economic, ecological and social aspects of sustainable use and case study reports provided the input for the workshop. The results of the discussions made clear that a major shift in the way conservation has been defined and practiced would be needed in order to include successfully the sustainable use component.

Indeed, the workshop made clear that for many of the institutions involved in biodiversity conservation this does require a paradigm shift. The main findings of the workshop are summarized below.

- (a) Development of sustainable use projects requires the participation of local stakeholders as full partners.

Present efforts to protect biodiversity mainly rely on external capital and management practices. However, a Sustainable Use approach requires skills, shared values and goals, incentives and institution building. It requires the involvement of local stakeholders like local communities and the private sector in all stages from the definition of the project to the final sharing of the benefits. Especially skills regarding the interaction of socio-economic and ecological systems will be needed. To address these requirements capacity building and staff training at all levels and in all organisations involved in project identification and project development is essential.

- (b) Conservation will take place in diversified ecosystems.

Biodiversity conservation will take place within a mosaic of ecologically interdependent areas, each having different functions and use intensities, ranging from intensely managed, unprotected and simplified areas to little managed, diversified and protected areas, with various shades in between. Sustainable use projects will add diversity to such complex landscapes. In the end, conservation will be possible only in sustainably managed, diversified landscapes. As the knowledge to achieve this goal is usually not available at the start of a project, implementation schemes should be flexible and adaptive as experience and knowledge of the ecological and the social systems accumulates.

- (c) Economic Analysis suggests that market mechanisms subject to safe minimum standards of conservation may constitute important conservation tools.
 - (i) Economics with safe minimum standards imposed, prescribes joint implementation of conservation and sustainable use measures while they are still affordable.
 - (ii) Economics also encourages technological progress as a means to increase the substitutability of man-made capital for natural capital. Economics can prescribe policy packages that combines such

encouragement with the system of incentives and disincentives that combine to enhance conservation and sustainable use.

- (iii) Economics applied to compare alternative use options can establish what incentives it takes (e.g. in \$/ha.) to induce the land holders to sustainable use practices; assuming that the different preferences and endowments of different actors are realistically reflected.
 - (iv) Economics has developed a menu of ways to estimate the benefits of sustainable resource uses and conservation. Benefit categories and appropriate estimation methods are available so that the total economic value of an area can be estimated for alternative management regimes.
- (d) Global benefits through replication should be the slogan of sustainable use projects.

Criteria for sustainable use projects should not be limited to the global significance of components of biodiversity. Any incremental cost and global benefit estimates should incorporate the notion of replicability and the related (potential) gains. The major challenge of sustainable use projects is to develop new ways of combining use and conservation. Often the existing incentive structure at local, national or international level does promote unsustainable use. Through experimentation and innovation new schemes can be identified that will help to remove barriers in knowledge and institutions.

- (e) Concepts identified for sustainable use projects, examples:
- (i) In the case of arid- and semi-arid ecosystems a number of specific activities were suggested for protected areas and buffer zones; rangelands, wild foods and cropping land husbandry:
 - promotion of multi land-use/multi-species production systems;
 - enhancing/protecting biodiversity by application of *ad hoc* grazing methodologies described in the literature; and
 - development of integrated management systems aiming at diversifying and enhancing the productivity in a sustainable regime.

- (ii) In coastal and marine ecosystems focus is on the development of multiple use schemes forming a mosaic, containing: (i) protected, off-limit areas, set aside for replenishment of populations of species and for aesthetic purposes and tourism, (ii) regulated areas, (iii) farmed areas (agriculture, serving the production function), (iv) open access areas. In such schemes rights and incentives must be allocated to the "stakeholders" whose responsibility it is to conserve and sustainably manage a resource.
- (iii) In forest ecosystems, the recommendations covered both extractive (timber and non-timber) and non-extractive (ecosystem services like watershed catchments, soil stabilization, tourism, etc.) uses. These include:
- removal of alien species and introduction of native species;
 - promote shift to better logging techniques; training of forest dwellers and small-scale loggers;
 - promoting wildlife management in forest areas predominantly managed for timber;
 - development of certification regimes and practices; and
 - reversing free access situations, and establishing of adequate ownership and control regimes (community property rights should not be confused with open access regimes).
- (f) Indicators development, research and monitoring should be integral parts of any sustainable use project.

Indicators are indispensable for monitoring the development of projects and should equally focus on the ecological, as on the socio-economic aspects. A hierarchical set of indicators would help to identify corrective measures and to pinpoint potential areas of conflict. Research on the dynamics of variables underlying indicators will often be required to interpret correctly their behaviour. The research may include:

- (i) development and assessment of indicators;
- (ii) multi-species modeling, risk management and monitoring systems;
- (iii) adaptive management schemes;

- (iv) review and development of appropriate policy frameworks to facilitate sustainable use;
 - (v) identification and adoption of positive incentives/cross transfers;
 - (vi) study impact of alien species;
 - (vii) identification of water resource status/constraints;
 - (viii) inclusion of biodiversity considerations in Environmental Impact Assessment (EIA);
 - (ix) analyze potential similarities in terrestrial "green revolution" that lead to diversity loss and to present fisheries techniques and the potentiality of alternative strategies and techniques;
 - (x) analysis of biosafety aspects of mari-culture;
 - (xi) economic evaluation of the functions of natural systems: for example the role of coral reefs in coastal protection and the contribution of coral reefs, see grass beds and mangroves to fisheries production; and
 - (xii) the relations between local indigenous knowledge and scientific knowledge as related to specific cases.
- (g) Time is crucial. It takes at least 5 to 10 years to implement and gain sufficient experience with a sustainable use project.

A sustainable use project usually involves the development of new practices in the use of biological resources and new ways of generating livelihoods. Institution building and the generation of trust through experience are crucial elements for sustainability. From case studies it is clear that the nature and the timing of the financial support is more crucial than the volume.

CLIMATE CHANGE

13. All of the tasks identified for STAP to undertake in the focal area of climate change during the period under consideration were successfully completed and the outputs made available to the GEF Council. As a means of ensuring the widest possible input on the issues emerging in this focal area, STAP has adopted the approach of

convening specialized workshops, drawing in every instance on the best available expertise in the private and public sectors, scientific organizations/institutions and universities. Following is an overview of the issues addressed by STAP in the climate change focal area.

Renewable Energy Technologies (RETs)

14. STAP convened a "Workshop on Stimulating Private Sector Initiatives for Accelerating the Introduction of Renewable Energy Technologies (RETs) into the Private Sectors of Developing Countries" in June, 1996, in order to assist STAP to conduct a review of the prospects for RETs, and to prepare an analysis of roles for the GEF in supporting Targeted Research and capacity building that would enhance the prospects for successfully implementing the GEF Operational Strategy relating to RETs. The results, in addition to the STAP background paper on "*International Industrial Collaboration for the Accelerated Adoption of Environmentally Sound Energy Technologies in Developing Countries*", as well as detailed technical assessments³ of the prospects for a wide range of RETs, provided the basis for STAP's strategic advice relating to portfolio development and Targeted Research for RETs.

15. The main findings and recommendations to the GEF resulting from STAP's work on RETs with respect to the roles for the GEF in advancing RETs are summarized below.

- (a) Technological and institutional demonstration projects relating to Renewable Energy Technologies warrant high priority within the GEF Portfolio. Such projects could be very helpful in launching new RETs-based energy industries, if bolstered by ancillary supporting measures. The GEF should leverage its very limited resources available for promoting RETs as low greenhouse-gas (GHG) emitting energy technologies to bring about a commitment of potentially large private-sector resources to the wide-scale deployment of RETs in the power sector of the developing world. This objective could be accomplished by complementing GEF support for technologies and institutional demonstration projects with the following:
 - (i) Assistance for RET policy development in developing countries;
 - (ii) Support for Targeted Research aimed at clarifying potential markets for renewables, societal impacts of renewable energy

³ "The Outlook for Renewable Energy Technologies, Public Policy Issues and Roles for the Global Environment Facility", "Executive Summary", and "The Outlook for Renewable Energy Technologies, Strategic Considerations Relating to the GEF Portfolio, and Priorities for Targeted Research".

development, potential constraints on RETs development, and the institutional issues relating to the exploitation of potential markets; and

- (iii) Support for training aimed at strengthening the indigenous technological capacity relating to renewables.
- (b) Assistance to developing countries in RET policy development by monitoring and evaluating the strengths and weaknesses of various programmes around the world aimed at promoting RETs and widely disseminating this information by supporting RET policy analytic capacity-building in developing countries, and by encouraging dialogue in developing countries between policy leaders and representatives of the industrial sectors of the developing and industrialized countries interested in marketing RETs in the developing world.
- (c) Assist with the establishment of regional training institutes relating to renewable technologies with the view of: (i) helping developing countries acquire a strong indigenous capacity for assessing the prospects for RETs, their potential societal impacts, and the institutional issues relating to their dissemination, and (ii) promoting a base level of indigenous technological capability that would enhance the likelihood that the technology transfer process carried out in international industrial collaborations would be effective and efficient.

Options for a GEF Programme on Transport

16. In an effort to draw on the widest possible expertise in transport sectors as a means of providing strategic advice on the scientific and technological issues and options in the transport sector, STAP organized a specialized workshop and prepared a report on "*Options for Mitigating Greenhouse Gas Emissions in the Transport Sector*" in March 1997.

17. The major themes that emerged from the workshop were the following:

- (a) There was consensus on general agreement of the need for the GEF to establish an Operational Programme focusing on the Transport Sector to address GHG emissions from this sector with the initial emphasis placed on the urban transport sub-sector.
- (b) Three priority initiatives were identified which could be the focus of GEF's work in the Transport Sector; namely:

- (i) **Integrated transport planning and associated information/data** needs including more realistic quantitative regional analysis and projections that describe the unsustainability of Business-As-Usual energy transport features; pilot initiatives for: the development of sustainable transport plans that deal simultaneously with GHG and local concerns as well as the formulation of approaches and policies that would be effective in overcoming barriers to the implementation of sustainable transport plans; the establishment of integrated transport energy planning systems within existing and planned urban planning initiatives; and the development of reliable empirical information and analytical tools.
- (ii) **Institutional innovation that engenders long-term commitment and consensus.** Consideration should be given to assisting pilot initiatives for formulation of innovative institutional approaches and policies that would be effective in overcoming barriers to the implementation of sustainable transport plans. This includes the development and pilot implementation of low-cost and innovative public awareness programmes. Such pilot schemes should provide a model for replication in developing countries. Finally, assistance should be extended to the development and wide-scale dissemination of model strategies and policy options that can influence critical decision points and institutions moving existing transport systems towards a more sustainable and climate-friendly growth path.
- (iii) **Technological assessment/absorption capability and demonstration initiatives,** including sustainable transport technology scoping and assessment programmes; transport management projects, particularly those that ensure available technologies and policy options are adapted first, before resorting to more advanced or complex measures; the establishment of appropriate adaptive national and regional research agencies and technology institutions that can adapt and modify GHGs mitigation transport response options; model training and capacity building programmes; innovative pilot financing schemes that would provide less onerous terms; and demonstration projects and market development support for small vehicles (two- and three-wheeled) and buses with electric drive trains (both battery and fuel cell powered), the widespread use of which could lead to significant reductions in GHG emissions.

Reducing GHG Emissions in Coal Systems

18. In order to assist STAP in providing advice on "advanced clean coal" technologies and what the GEF can do to stimulate the introduction of such technologies, STAP convened a workshop on "*Prospects for Reducing GHG Emissions in Coal Systems*". The outputs of the workshop formed the basis of STAP's advice to the GEF in the report "*Prospects for Reducing GHG Emissions in Coal Systems*".

19. The STAP found because of the large and rapidly growing demand for coal, particularly in Asia, that the GEF should consider pursuing activities that could steer coal onto a more climate-friendly path, if this could be done in ways that do not detract from GEF activities aimed at helping launch various renewable energy technologies in the global energy market. The STAP also recommended that it may well be feasible and desirable to launch important new activities relating to coal in the context of existing GEF Operational Programmes. Getting experience with coal activities this way would help ensure a proper balance between coal and renewable projects as the GEF evolves a coal strategy and understands better what its comparative advantage is in helping steer coal along a more climate-friendly path.

20. Should the GEF decide to launch a Programme relating to coal, STAP advised that it should be in the context of a strategic plan in which near-term actions are consistent with and supportive of long-term objectives. Moreover, a systems approach to coal should be taken with the new aim to exploit the many potential synergisms that offer multiple benefits in addition to reduced GHG emissions.

21. STAP identified an exemplary set of near-term (next 1-5 years), medium-term (5-15 years) and long-term (15+ years) actions that might make up such a strategy, namely:

- (a) Near-Term Measures
 - (i) Enact strict local air pollution regulatory measures in ways that would encourage the adoption of clean-coal technologies, of which modern gasification technologies are especially promising.
 - (ii) Discourage the use of those coal technologies that exacerbate GHG emissions, as a means of encouraging gasification-based technologies.
 - (iii) Introduce gas price reforms that would facilitate the expanded use of town gas derived from coal as an alternative to home use of direct coal combustion in countries where coal is so used today.

- (iv) Enact policies that would facilitate the use of reciprocating engines for Combined Heat and Power (CHP) applications of this town gas at apartment buildings, commercial buildings, and factories - including policies that make it possible for these power producers to sell electricity to the electric grid at market prices.
 - (v) Encourage the introduction of modern coal gasification technology for town gas production (e.g., as a coproduct at plants that produce ammonia using modern coal gasification technology).
 - (vi) Introduce integrated gasification/combined cycle (IGCC) technology in applications where it is cost-competitive today (e.g., using low-cost residual refinery fuels), as a means of gaining experience with this technology and facilitating a transition to the use of IGCC technology with coal.
 - (vii) Carry out pilot investigations of methane recovery from deep (unminable) coal beds via CO₂ injections. This should be done in collaboration with ongoing and planned investigations in North America for using CO₂ injection for recovery of methane from deep coal beds. One possible source of CO₂ might be at an existing plant that produces ammonia from coal (in China some 25-35 million tonnes of coal are gasified annually to produce ammonia).
 - (viii) Carry out small-scale demonstration projects involving the use of hydrogen fuel cells in transportation (for buses and two- and three-wheel vehicles) and for distributed CHP applications in apartment and commercial buildings.
- (b) Mid-Term Measures
- (i) Introduce IGCC technology for CHP applications in the energy-intensive basic materials processing industries.
 - (ii) Launch major projects involving methane recovery from deep (unminable) coal beds via CO₂ injection and sequestration. The recovered methane could be used in a wide range of natural gas applications, including combined cycle power generation.
 - (iii) Carry out demonstration projects involving the use of fuel cells for "heavy-duty" transportation applications, including locomotives. For these applications consideration should be given to both

hydrogen and methanol derived from coal as energy carriers delivered to vehicles.

- (c) Long-Term Measures
 - (i) Commercialize hydrogen fuel cell technology in transportation markets, emphasizing buses, two- and three-wheel vehicles, and locomotives.
 - (ii) Commercialize hydrogen fuel-cell CHP systems for apartment and commercial building applications.
 - (iii) Produce hydrogen from Coal Bed Methane (CBM) and from coal, with injection and sequestration of the separated CO₂ into CBM reservoirs for stimulating additional recovery of methane from coal beds. This hydrogen would serve both industrial markets (e.g., ammonia production and petroleum refining) and the new hydrogen fuel markets.

Technology Transfer and Innovation

22. In order to advise the GEF as to the most promising strategies for introducing clean and low GHG-emitting and innovative energy technologies in developing countries, STAP convened a workshop on technology transfer in the energy sector. The outputs of the workshop form the basis of STAP's advice to GEF.

23. The workshop addressed the issue of technology transfer as a process for creating a sustainable capacity for introducing into developing country markets energy technologies characterized by both reduced GHG emissions and enhanced local benefits. International technology transfer, inter-sectoral spillovers and domestic technology generation are significant variants of this process.

24. The major findings of STAP are:

- (a) Capacity Building: Capacity building is needed to assess, select, import or develop, manage, adapt or replicate appropriate innovative energy technologies and also to innovate:
 - (i) a base-level of indigenous technological capability is needed for each of the major candidate innovative energy technologies; and
 - (ii) an energy technology assessment capacity independent of both the pressures of technology promoters and the technology selection

process is critical to informing the decision making processes about the merits of alternative technologies.

GEF could assist regional training initiatives that emphasize energy technology fundamentals, technology assessment, and a wide range of skills required for effective technology development, marketing and management.

- (b) The Private Sector: Facilitating major roles for the private sector is essential;
 - (i) coherent policies aimed at unleashing the industrial dynamism of the 'virtuous cycle' of innovation, market growth and price decreases for the new technologies are needed;
 - (ii) the encouragement of a transparent and competitive environment is vital; and
 - (iii) equitable user-supplier agreements and appropriate financial modalities are required.

GEF could promote new instrumentalities (e.g. concessions, auctions, set-asides) to harness the demonstrated capacity of competitive markets for technological innovation and technology transfer.

- (c) R&D: R&D is needed to enhance the prospects that innovative energy technologies will conform to local needs:
 - (i) international industrial collaborative R&D would be especially efficient; and
 - (ii) to maximize the prospects for technology diffusion potential intellectual property rights conflicts should be resolved.

GEF could facilitate initiatives that address these challenges.

25. It is recommended that elements of technology transfer be built into the operational programs by requiring capacity building in as many projects as possible and by facilitating greater private sector participation and energy R&D activities.

GEF's Role in Adaptation to Climate Change

26. In order to strengthen the scientific base for GEF's activities in support of Climate Change Adaptation, STAP prepared a paper entitled "*Adaptation to Climate Change*",

which contained a set of widely reviewed recommendations for GEF. The main findings of the report are summarized as follows:

- (a) As a result of increasing concentrations of greenhouse gases in the atmosphere, the global climate is expected to change at a rate unprecedented in human history. Even in the - hypothetical - case of an immediate stabilization of greenhouse gas concentrations, climate will continue to change for decades. Therefore, in addition to continued mitigation efforts, it is crucial to identify the needs and opportunities to adaptation.
- (b) Climate change will mainly be felt through changes in the return periods of extreme weather events. Particularly vulnerable systems are human health, water and river systems, agriculture, coastal zones, urban areas, and infrastructure. Moreover, natural ecosystems in general are vulnerable as their capacity to migrate is seriously reduced as a result of agriculture, infrastructure and human settlements. Considerable impact is to be expected. However, adaptation can significantly reduce impact. In fact, society's ability to cope with climate change depends to a large extent on its capabilities to adjust.
- (c) In considering adaptation to climate change, three different types of activities can be identified:
 - (i) Enhancing capabilities in (i) short-term climate prediction, (ii) long-term weather forecasting, (iii) the dissemination of such information (including early-warning systems), and (iv) the ultimate use of such information.
 - (ii) Technological and institutional capacity building for adaptation, particularly in the following sectors: water resources, agriculture, land use planning, design of infrastructural works, and public health.
 - (iii) Targeted Research to investigate the need and cost-effectiveness of anticipatory planning for a number of cases in a number of countries/regions.

Adaptation options to be considered include:

- increasing the robustness of infrastructural designs and long-term investments;

- increasing the flexibility of vulnerable managed systems;
- enhancing the capacity of adaptation/mitigation of vulnerable unmanaged systems; and
- addressing trends that increase vulnerability.

INTERNATIONAL WATERS

Global International Waters Assessment

27. One of STAP's major contributions to the International Waters focal area lies in the promotion of the Global International Waters Assessment (GIWA). STAP continuously argued that the lack of an International Waters Assessment comparable to that of the IPCC and the Global Biodiversity Assessment and Stratospheric Ozone Assessment, was a unique and serious impediment to the implementation of the international waters component of the GEF. While a number of assessments of separate aspects of international waters exists, there is no holistic assessment of the kind needed to develop an intergovernmental consensus on priorities for action by GEF.

28. STAP formally proposed the International Waters Assessment to the GEF Council in April, 1996, as a means of providing the scientific underpinning for future prioritization of GEF/IW projects. This was followed up by a consultation between STAP and the GEF Secretariat in August 1996. Subsequently, STAP produced a scoping paper as a first step towards a global International Waters Assessment. In this paper STAP emphasizes the need to address both diagnostic and prognostic aspects of assessment, i.e. (1) to identify problems to be addressed by GEF in a region-by-region basis, and (2) to assess the capability of current scientific knowledge to predict the outcome of proposed GEF projects, compared with taking no action (business-as-usual scenario).

29. Building upon STAP's work concerning the feasibility of such an assessment, UNEP took the lead in formulating an approach for a Global International Waters Assessment, in collaboration with the wider scientific community. This, when completed, should provide a stronger basis for justifying the existence of the International Waters Portfolio of the GEF and in deciding on priorities in the International Waters field. STAP's support for and promotion of a Global International Waters Assessment (GIWA) as an instrument to facilitate intergovernmental consensus on priorities for action by the GEF is likely to have profound implications for the International Water focal area.

Emerging Technologies and Methods

30. Recent advances in technologies and methods for monitoring and analysis in international waters projects, particularly in OECD countries have led to both improvement in quality and cost reductions. To improve the quality of GEF International Waters projects STAP has advocated the adoption of these new methods. To promote this advance STAP has prepared a report "*Emerging Technologies and Methods for Monitoring and Analysis of International Waters*". The report served as input to the STAP Expert Group Workshop on Emerging Technologies, in The Philippines in February 1998, for experts and GEF project managers. The longer term plan is to try the new methods in existing GEF International Waters projects alongside the traditional methods.

Globality and the Regional Approach

31. In addition to the Theme paper on International Waters STAP undertook a number of studies in response to GEF Council requests. These included "*The Concept of Globality in the GEF Focal Area of International Waters*", "*Incremental Cost in the GEF Focal Area to the International Waters Focal Area*" and "*The Regional Approach in International Waters*".

32. These three papers sought to establish a basis for deciding what International Waters projects are eligible in GEF funding. STAP recognized that many limited area transboundary projects had been accepted by GEF and that this could continue in the future. However, STAP drew attention to the scope for future projects that could be developed on a regional basis but have important global benefits. These include the management of very large scale pollution, of the habitats of migratory species, including the introduction of global observations designed to improve the effectiveness of regional water management and management of the effects of global climate change. On the basis of the STAP analysis it was decided to adopt the regional approach as a starting point for the Global International Waters Assessment.

33. The study on Incremental Costs pointed out that in the development of the incremental cost concept for application to projects under the GEF, little attention has been paid to the focal area of International Waters. Incremental costs can be justified by the achievement of benefits that extend beyond the national area, for example in conserving living resources that are naturally transboundary, and introducing practices and technologies that also improve the water quality beyond national boundaries.

LAND DEGRADATION

34. A major contribution of STAP during the period under review was to provide the policy guidelines and impetus to the Implementing Agencies to develop land degradation projects as they relate to the other GEF focal areas.

35. STAP reinforced the view of the GEF Council that land degradation plays an important role in three focal areas of GEF, and therefore projects related to land degradation should be considered for funding under the GEF. Land degradation results in significant loss of vegetation cover and decreased ability to sequester carbon. Soil loss is enhanced resulting in increased soil erosion. The greatest relevant impact of land degradation is clearly the loss of biodiversity, both flora and fauna.

Global Benefits in Projects Combating Land Degradation

36. In responding to the GEF Council request to prepare a scientific and technical assessment of the relationship between land degradation and the other focal areas, STAP convened a brainstorming session on land degradation in collaboration with the GEF Secretariat and the Implementing Agencies to consider the issues of global benefits and the prevention of land degradation. The brainstorming also prepared the groundwork for the "*STAP Experts Group Workshop*" held in September 1996 in Dakar (Senegal) to further explore the relationship between land degradation and the other focal areas.

37. The Dakar workshop made specific recommendations on activities which can be supported in a number of ecosystems:

- (a) In forestry ecosystems experiencing deforestation and forest degradation:
 - (i) Activities which promote sustainable use of forest ecosystems such as planning for, and implementing sustainable forest management, preparation and implementation of harvesting plans, application of reduced impact logging, application of efficient utilization technologies and studies related to the utilization of biodiversity.
 - (ii) Activities which address causes of deforestation such as alternatives to slash and burn agriculture, fire control and protection measures against nutrient loss.
 - (iii) Activities which promote forest rehabilitation and afforestation such as agro-forestry, forest plantations and biomass plantations.

- (b) In rainfed and/or irrigated agriculture ecosystems:
 - (i) Activities related to the control of water and wind erosion, more efficient use of water, reduction of salinisation or alkalinization, management of wetlands, and control of fertility depletion.
- (c) In rangeland/pastoral ecosystems
 - (i) Activities related to measures to prevent land degradation and promote land rehabilitation.

Given the extensive nature of rangeland ecosystems, effective measures to control land degradation should rely more on prevention and rehabilitation rather than restoration.

38. The outcome of the workshop provided the basis for the GEF Secretariat decision paper to the May 1997 Council meeting on "*Follow-up to the STAP Workshop on Land Degradation*". In addition, a technical assessment of the workshop outcomes was undertaken by STAP as an input for the GEF decision document.

TARGETED RESEARCH

39. STAP, in consistence with the Council's guidance prepared a strategy on Targeted Research entitled "*Principles for Financing Targeted Research*". This document was approved by the GEF Council at its April/May, 1997 meeting. In order to facilitate the preparation of the Targeted Research paper, a number of background papers were formulated by STAP members⁴.

40. Targeted Research has been defined as "goal oriented research that supports the GEF Operational Strategy by providing information, knowledge and tools that improve the quality and effectiveness of the development and implementation of GEF projects and programmes".

41. The Targeted Research paper provides the basis for GEF policy on research. In addition, the STAP chair has been charged with the Chairmanship of the GEF Research Committee. This committee will determine the Targeted Research projects which should receive GEF funding.

⁴ The following background papers on Targeted Research were prepared:

1. Some consideration about Targeted Research on Climate Change for the STAP/GEF;
2. Targeted Research in International Waters;
3. Targeted Research in Land Degradation as related to GEF Focal Areas;
4. Targeted Research on Biodiversity.

ROSTER OF EXPERTS

42. Consistent with the GEF Council's guidance, STAP has developed a Roster of Experts for the GEF, probably the first of its kind in multi-lateralism. The establishment of the STAP Roster of Experts and its management made a significant contribution to the GEF project review process as it ensured the scientific and technical soundness of GEF projects. Each GEF project proposal requires an external technical opinion by at least one expert listed in the Roster.

43. The management of the STAP Roster of Experts has a number of components, namely:

- (a) The development and management of a roster database;
- (b) Quality control including:
 - (i) *Emphasis is placed on selecting experts with the necessary qualifications and experience in the given area relevant to the GEF. In addition to the quality of the expert, consideration is also given to the regional distribution, gender, and thematic spread between natural and social science.*
 - (ii) *Conflict of Interest.* Every effort is made to minimize the occurrence of conflict of interest. Since the Implementing Agencies have the responsibility for selecting the expert to review their projects, STAP relies on them to carry out this requirement. As a check however, a disclosure requirement has been put into place whereby the reviewer is expected to disclose any contracts he or she has with the Implementing Agency and other connections with any party with the proposed project.
 - (iii) *Standardization of the content and technical review of the project proposal.* To facilitate this, generic terms of reference have been designed outlining the major and secondary issues which should be addressed by the experts in reviewing project proposals. These could be elaborated on by the Implementing Agencies and/or refined, depending on the nature of the project to be reviewed.
 - (iv) *Quality of the Review.* To ensure the highest quality of the reviews, STAP maintains a system to assess the performance of the Roster reviewers and to analyze the review process. The performance management system consists of the following elements:

- an assessment of the technical review by STAP members;
- an assessment by individual task managers of the Implementing Agencies;
- follow-up consultations with Implementing Agencies and GEF Secretariat staff; and
- the results of the assessment are analyzed and contained in the Annual Review of the Roster. On the basis of the quality of the reviews decisions are made with respect to amendments of the Roster and improvements in the Operational Guidelines.

44. Version 1 of the Roster was produced and submitted to the GEF Council in October, 1996 and Addendum 1 in November, 1997; comprising 368 and an additional 50 experts respectively. Consistent with the Operational Guidelines for the Management of the Roster STAP prepared an "*Annual Report on the Use and Management of the Roster*" which was submitted to the GEF Council in November, 1997. Based upon the findings of the Annual Report various aspects of the management of the Roster were updated.

STAP'S ROLE IN THE PROJECT CYCLE

Keeping Track of Projects

45. As part of its strategic role, STAP kept track of the GEF projects at various stages of the project cycle and provided comments which were introduced by the STAP Chairman, as a member of GEF Operations committee (GEFOP). The comments presented by the STAP Chairman were based on written inputs received from Panel members, and synthesized by the STAP Secretariat. These comments were presented to the GEF Secretariat in written form.

46. STAP's scientific and technical contribution to GEFOP is not only ensuring the scientific and technical soundness of the project but also advising on new trends and available technologies. Issues raised by STAP in their comments include gaps in the GEF Portfolio, incremental costs and baselines as well as potential for replicability. The discussion on the evolving Portfolio of GEF projects is used as a basis for identifying GEF projects that merit a Selective Review.

Selective Review

47. STAP's involvement in the selective review of GEF projects can be divided into two main areas:

- (a) Preparation of criteria to guide the selective review of projects. The document prepared by STAP was adopted by the GEF Council in October, 1995; and
- (b) Undertaking of Selective Reviews: At the time of the preparation of this report STAP had undertaken three selective reviews:
 - (i) Rajasthan Solar Thermal Energy Project;
 - (ii) Lake Victoria Environmental Project;
 - (iii) Alternatives to Slash and Burn Project, Phase 1.

48. An integral part of the STAP Selective Review process is specific site investigations and visits. While undertaking the Selective Review for the Lake Victoria Environmental Management Project a site visit was undertaken by STAP, accompanied by the stakeholders from the participating countries (Kenya, Uganda and Tanzania) and the World Bank as Implementing Agency. In the case of Alternatives to Slash and Burn Phase 1, site visits were made to Cameroon, Brazil and Indonesia, to the areas where the projects have been implemented.

Rajasthan Solar Thermal Energy project

49. In light of the fact that the Rajasthan Solar Thermal Plant had not been built at the time of Phase 1 of the Selective Review, a site visit was not undertaken. Instead it was deemed desirable to gain first-hand experience with the technology; as a consequence site visits were made in July, 1996 to the Solar Two Heliostat) central receiver solar demonstration plant at Daggeth, California and to the SEGS III-VII commercial parabolic trough solar thermal plant at Kramer Junction, California. In addition to these visits STAP commissioned outside reviews by Solar Thermal Electric (STE) experts. In its assessment STAP found that the parabolic trough technology to be deployed at Rajasthan involves relatively modest technological risk and offers the best prospects for launching a global STE industry in developing countries. Although advanced concepts (e.g. heliostat/central receiver or parabolic disk technologies) will probably ultimately be less costly, there are likely to be significant market opportunities and opportunities for cost reduction for parabolic trough technology, relative to what has already been achieved. However, it was recognized that it is of crucial importance to develop and maintain a policy environment favorable for replication of this technology.

Lake Victoria project

50. STAP considered that the Lake Victoria Environmental Management Project (LVEMP) provides an excellent example of an integrated approach to environmental management. STAP recommended that management actions be guided by an over-all strategic science plan still to be developed. Such a plan should set the targets, priorities, sampling procedures and quality control arrangements needed to achieve the goal of the LVEMP. On the basis of the Lake Victoria selective review, STAP recommends that any GEF International Waters project should have a strategic science plan, to guide management actions and to monitor the effectiveness of interventions.

Alternatives to the Slash and Burn project

51. The STAP Selective Review of Alternatives to Slash and Burn Agriculture concluded favorably as regards the GEF relevance of the project, the contribution of its activities to achieve the stated objectives, its policy relevance, its innovativeness, and its potential for replicability. It also observed that there is room for improvements as regards the interaction between the scientific community and policy makers in the countries where the pilot projects were carried out.

MOBILIZATION OF THE WIDER SCIENTIFIC COMMUNITY

52. Implicit in STAP's role and mandate is engaging the wider scientific community in providing scientific and technical advice on GEF policies, Operational Strategies and Programmes.

53. STAP has indeed mobilized the wider scientific and technical community primarily through the convening of STAP Workshops and STAP Expert Group Workshops. STAP with its modest resources, has organized wider scientific and technical inputs in its strategic advice to the GEF Council on specific issues identified by that body. Workshops were convened on "*Stimulating Private Sector Initiatives for Accelerating the Introduction of Renewable Energy Technologies into the Power Sectors of Developing Countries*", "*Options for Mitigating Greenhouse Gas Emissions from the Transport Sector*"; "*Options for Improving Coal Systems to Reduce Greenhouse Gas Emissions*", and "*Technology Transfer and Innovation*". Expert Group workshops were also convened on "*Land Degradation*"; "*Sustainable Use of Biodiversity*"; "*Emerging Technologies in International Waters*". These Expert Group Meetings were convened with the GEF Secretariat and the Implementing Agencies. The total number of participants/experts involved in these workshops was about 300.

54. STAP collaborated with the National Academy of Science (NAS) of the USA in convening a workshop on "Building Scientific Capacity into the GEF Enabling Activities

and Operational Programmes" in November 1997. The report of this workshop will be presented to the GEF Secretariat by NAS.

COOPERATION AND COORDINATION

Scientific and Technical Bodies of the Conventions

55. During the period under consideration STAP participated in the meetings of the Scientific and Technical bodies of the Conventions. STAP developed its own agenda on the basis of the results of these meetings. Moreover, joint papers on selected topics were prepared. The meetings of STAP were organized in such a way that the active participation of the Scientific and Technical bodies of the Convention could be ensured.

Monitoring and Evaluation

56. STAP, through its Chairman played an active role in the activities of the Monitoring and Evaluation Unit in the GEF, particularly in the Project Implementation Review (PIR) process.

Interaction with Non-Governmental Organization

57. STAP through its Chairman and Secretary has since November 1996, played an active role in the GEF/NGO Consultations which are convened immediately prior to the GEF Council meetings.

OBSERVATIONS RELEVANT FOR THE FUTURE OF STAP

58. STAP's role in the GEF is particularly important in view of the need of a solid scientific analysis of the many interlinkages between the GEF focal areas. In the end all GEF projects deal with food, energy, water and land use. STAP should watch and ensure the coherence and promote synergy in the approach promoted in the Operational Programmes of the various focal areas.

59. The present mandate of STAP is clear and good. However, the modalities for the channeling of STAP's work to the GEF Council, and getting a feedback on how STAP advice have been incorporated in GEF operations, can be improved. It is important to ensure that the Secretariat and the Implementing Agencies respond to the strategic advice and the selective reviews. STAP should be charged more systematically with providing scientific and technical advice on new issues to be addressed by the GEF before they are taken up or not taken up in the Operational Programme. The results of such advice should be brought to the Council for discussion. On the basis of STAP's

analysis and the Council's discussions, the issues can be taken up in operational terms by the GEF Secretariat and the Implementing Agencies.

60. The use of the Roster of Experts in GEF work and STAP's role in engaging the scientific community at national and regional level can be developed further to the benefit of the quality of GEF project identification and implementation.

61. The Selective Review of GEF projects by STAP should be expanded. However, consideration should be given to the participation, especially of regional experts in this process as a means of ensuring the input of specific regional knowledge and strengthening regional ownership of GEF projects.

62. STAP could play a more important role in identifying the need for Targeted Research aimed at improving the effectiveness of GEF projects and programmes. In close cooperation with the Implementing Agencies STAP should identify the most promising topics and assist these Agencies in formulating the Terms of Reference for Targeted Research projects.

63. It is important for STAP to have a systematic interaction with the Secretariat and the Implementing Agencies. Yearly strategic sessions on the STAP agenda are a most important instrument to ensure synergy. Moreover, it is important that STAP does organize informal gatherings in the margins of the GEF Council meetings to stimulate interaction with the Council members and to clarify scientific and technical issues.

64. STAP's interaction with the Subsidiary Bodies of the Conventions should be strengthened. As initiated under GEF 1, issues to be addressed by STAP should be identified in close consultation with the Scientific and Technical Bodies of the Conventions. The present reciprocal presence in meetings should get a formal status.

ANNEX 1
PRODUCTS PRODUCED BY STAP DURING GEF 1

TITLE
Adaptation Stage Activities and Priorities - Annotated Outline - January, 1996
Reflections on the GEF Work Programme - A Theme Paper - January, 1996
Thematic Paper on Climate Change - January, 1996
Report of the Fourth Meeting of STAP - February, 1996
Progress Report of STAP to the Seventh Meeting of the GEF Council, 2-4 April, 1996, Washington D.C. - April, 1996
Thematic Paper on Biodiversity and the GEF Operational Strategy - April, 1996
The Concept of Globality in the GEF Focal Area of International Waters - May, 1996
Incremental Cost in the GEF Focal Area of International Waters - June, 1996
Report of the Fifth Meeting of the Scientific and Technical Advisory Panel, Amsterdam, The Netherlands, 11-13 June, 1996 - June 1996
Targeted Research in International Waters - June, 1996
Targeted Research on Land Degradation as related to GEF Focal Areas - June, 1996
Targeted Research Paper on Biodiversity - June, 1996
Theme Paper on Land Degradation as related to Biodiversity, Climate Change and International Waters - June, 1996
Implementation of the Biodiversity Convention (The Ecosystem Approach as Strategy to Achieve Sustainability in the Use of Biodiversity) - August, 1996
Report of the Scientific and Technical Advisory Panel of the Global Environment Facility Expert Group Workshop on Land Degradation, Dakar, Senegal, 18-20 September, 1996 - September, 1996
Report of the Sixth Meeting of the Scientific and Technical Advisory Panel, Amsterdam, The Netherlands, 10-12 September, 1996 - September, 1996
The Outlook for Renewable Energy Technologies, Public Policy Issues, and Roles for the Global Environment Facility - Executive Summary of Two Reports on Renewable Energy for Developing Countries - September, 1996
The Outlook for Renewable Energy Technologies, Strategic Consideration relating to the GEF Portfolio, and Priorities for Targeted Research - September, 1996

TITLE
The STAP Workshop on Stimulating Private-Sector Initiatives for Accelerating the Introduction of Renewable Energy Technologies (RETs) into the Power Sectors of Developing Countries - September, 1996
STAP Roster of Experts - Version 1, September, 1996
Scientific and Technical Advisory Panel of the Global Environment Facility, STAP Roster of Experts - October, 1996
Some Considerations about Targeted Research on Climate Change for the STAP/GEF, November, 1996
Report of the Seventh Meeting of STAP - November, 1996
Report of the Eighth Meeting of STAP - March, 1997
Progress Report of STAP Selective Reviews - March, 1997
Report of the STAP Workshop on Options for Mitigating Greenhouse Gas Emissions from the Transport Sector - March, 1997
Advanced Coal Conversion Strategies, June, 1997
Report of the Ninth Meeting of STAP, June, 1997
Report of the Tenth Meeting of STAP, September, 1997
Planning for Adaptation to Climate Change, September, 1997
Annual Review of STAP Roster of Experts, September, 1997
STAP Roster of Experts - Addendum 1 Version 1, September 1997
Prospects for Reducing GHG Emissions in Coal Systems, September, 1997
An Ecological Perspective for Sustainable Use of Biodiversity Components: Indicators of Sustainability, November 1997.
Sustainable Use: An Economic Perspective, November, 1997.
Report of the STAP Expert Group Workshop on the Sustainable Use of Biodiversity, January, 1998.
A Private Sector-led Strategy for Accelerating the Introduction of New Environmental Technologies in Developing Countries, January 1998.
A Systems Approach to Technology Transfer in the Energy Sector, January, 1998.
Emerging Technologies for Analysis and Monitoring International Waters projects, January, 1998.

TITLE

Report of STAP Workshop on Technology Transfer and Innovation, January, 1998.

Report of the Eleventh Meeting of STAP, January, 1998.

ANNEX 2 ACRONYMS

CBM	Coal Bed Methane
CHP	Combined Heat and Power
EIA	Environmental Impact Assessment
GEF	Global Environment Facility
GEF/IW	Global Environment Facility / International Waters
GEFOP	Global Environment Facility Operations (regular interagency meeting)
GHG	Greenhouse Gases
GIWA	Global International Waters Assessment
GOOS	Global Ocean Observation System
IGCC	Integrated Gasification / Combined Cycle
IPCC	Intergovernmental Panel on Climate Change
IWA	International Water Assessment
LVEMP	Lake Victoria Environmental Management Project
NAS	National Academy of Science
NGO	Non Governmental Organisation
OECD	Organisation for Economic Cooperation and Development
PIR	Project Implementation Review
RET	Renewable Energy Technology
R&D	Research and Development
STAP	Scientific and Technical Advisory Panel
STE	Solar Thermal Electricity