Scientific and Technical Advisory Panel

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Report to the GEF Assembly

New Science, New Opportunities for GEF-5 and Beyond STAP's Report to the 4th GEF Assembly, Uruguay, May 2010

Executive Summary & Highlights

The global environment continues to be threatened by the unsustainable exploitation of renewable natural resources and by climate change. Scientists now predict that 'tipping points' may be reached, where terrestrial and marine ecosystems will fail. Severe hypoxia and ocean dead zones are manifestations of the global environment reaching critical thresholds, beyond which recovery may be impossible or very costly.

Using guidance from the Conventions, its networks and the outputs of at least five major global assessments reporting since 2005, STAP draws a vision for GEF-5 and beyond, based on scientific priorities in each focal area of the GEF and, more importantly, on interlinkages between the focal areas and with human development. In climate change, the key scientific and technical question to be addressed is how the world can avoid further dangerous change, using carefully-weighed scientific evidence and global agreements such as the Copenhagen Accord. In biodiversity, the priority is how best to maintain the sustained flow of global environmental benefits through conservation, restoration and incorporation in the design of production systems. New post-2010 biodiversity targets are based on some optimism that rates of extinction are controllable, habitats can be successfully managed and biodiversity will be integrated into national policies. In land degradation, renewed efforts to measure and address the impacts of degradation processes on the functioning of ecosystems are essential, requiring the development of better monitoring methods and better understandings of the drivers of land degradation and deforestation. For international waters, the key questions for GEF-5 are where to concentrate investments most cost-effectively and how to make the linkages between root causes of environmental degradation and impacts on freshwater resources and marine ecosystems. For the chemicals area, the major challenge for science is deriving the global data to assess the degree and scope of chemical contamination and associated risks on human health. Building capacity for monitoring and technology transfer is also highlighted.

STAP wishes to use this report to the Fourth GEF Assembly to underline the importance of integration and cross-focal area approaches in order to achieve global environmental benefits and to show large-scale, sustained improvement of the earth's ecosystems. The trend from single topic projects addressing sub-issues of a focal area towards truly multi-focal area projects needs to be accelerated. Particular linkage issues are: (1) climate change (CC), biodiversity (BD) and sustainable forest management (SFM) in order to reduce the vulnerability of forest ecosystems to climate variability, conserve biodiversity and enhance carbon stocks; (2) CC, SFM and land degradation (LD) through better land management so as to preserve the functioning of ecosystems for productive purposes and enhance the carbon sink potential of soils; (3) international waters (IW), BD, LD and CC to address integrated approaches for improved water resources management, both marine and freshwater; and (4) chemicals and CC to identify how climate change affects chemical use in, for example, agriculture, transport and fate patterns.

For GEF-4, STAP has undergone major structural reform in order to undertake its new strategic role in advising on the scientific content of all focal area strategies, a new operational role in screening all proposals for Full Size Projects, and a continuing advisory role in providing guidance and outputs on topics requested by GEF agencies. Additionally, STAP has been active in a number of GEF-funded targeted research projects on issues important to the agencies such as developing a carbon tracking tool for project managers.

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1 The Global Environment

1.1 Introduction to the role of STAP

The global environment faces mounting challenges at a scale and degree of complexity beyond even that envisioned when the Global Environment Facility (GEF) was created nearly 20 years ago. Science is playing the major role in highlighting new threats to the global environment from climate change, loss of biodiversity and land degradation. The severity of the problems and the options for reversing the loss of biological diversity, the acceleration of land degradation, the mitigation of climate change, the management of water resources within and across national boundaries and the prevention of chemical pollution must all be based on the best available science and technology.

GEF's Scientific and Technical Advisory Panel (STAP) reports to each GEF Assembly, having the formal responsibility of advising the GEF on science and technology. STAP has undergone major changes. These reflect (i) the reforms to the GEF itself (ii); STAP's new strategic role in advising on focal area strategies starting with GEF-4 and now for GEF-5; (iii) its new operational role in screening Project Identification Forms and proposals for programs; (iv) providing strategic advice on emerging science, environmental challenges and opportunities for GEF; and (v) the need to prioritize investments according to the latest scientific and technical knowledge (Annex – Section 4).The body of this report is deliberately forward-looking in order to highlight GEF's unique scientific role in the delivery of global environmental benefits (GEBs) and in advising on new methodologies to the focal areas so that integration to optimize GEBs is achieved across the GEF portfolio. 'Integration' and 'synergy' are the key themes to this report.

1.2 Climate Change

In GEF's focal area of climate change, the latest evidence all points to climate change being even more dangerous than previously expected.[1] Average global temperatures are now 0.75 °C warmer than they were 100 years ago. Current CO_2 concentrations are close to 390 ppm compared to pre-industrial 280 ppm. New projections estimate that, if no action is taken to curb global warming, terrestrial temperatures are likely to rise by 5.5 °C and could rise by as much as 7 °C above pre-industrial values by the end of the century. However, of greater concern than the undeniable evidence that global temperatures are rising and that humans are responsible is the discovery of dangerous 'tipping points'[2] that are potentially a threat to ecosystems upon which human society depends (Box 1).[3]

Almost everywhere on the planet, nature is responding to the climate change that has already occurred, changing timing of life cycles, and altering where species occur. More disturbingly, it has triggered some first threshold changes in ecosystems, such as coral bleaching. The global environment will also be irreparably affected by the decline of the extent of Arctic sea-ice; it is now only 60%

Box 1: Climate change 'tipping points' and trends.

A 'tipping point' is where a small increase in temperature or other change in the climate triggers a disproportionately larger change in the future.

* **Arctic sea ice**: possible total loss of summer sea ice is imminent

* **Greenland ice sheet**: total melting may take 300 years but the tipping point might occur within 50 years.

* **Gulf Stream**: it is likely to slow but its collapse is a possibility.

* **Naturally-stored GHGs**: their release through land use change may tip ecosystem processes

* **El Niño**: the southern Pacific current may be affected by warmer seas, resulting in far-reaching climate change.

* **Indian monsoon**: relies on temperature difference between land and sea, which could be tipped off-balance by pollutants that cause localised cooling.

* **Boreal forests**: cold-adapted trees of Siberia and Canada are dying as temperatures rise.

Source: *Avoiding Dangerous Climate Change* (2006) of the average value for 1979-2000 with the rate of decline accelerating.[4] The Northwest Passage, joining the Atlantic and Pacific via the northern coast of Canada, was ice-free for the first time in living memory. The Amazon rainforest in a warmer world and with continuing deforestation could cause a collapse in the rainfall systems from which its sustainability derives.

1.3 Biodiversity

As well as being the basis for the provision of environmental benefits at the local scale (food, building materials, aesthetic enjoyment), biodiversity is a fundamental provider of global environmental benefits, such as regulation of carbon, nutrient, water cycles and climate and the protection of evolutionary capital. Yet, biodiversity is changing at a rate unprecedented in human history.[5] Accelerated global extinctions and biotic homogenization are the two faces of this process. On the one hand, the number of endangered species in various groups of organisms has been increasing very rapidly, with extinction rates in the twentieth century being at least 100 times the normal background rate. This could accelerate further by another order of magnitude in the next decades as the combined pressures of climate change, land use and other global change become stronger. On the other hand, some cultivated and invasive species and genotypes are becoming increasingly common across the world, mainly as a result of the globalization of travel and trade.

As well as significantly decreasing the variety of life on Earth and the evolutionary legacy of the planet, global extinctions and biotic homogenization are threatening the capacity of ecosystems to sustain all aspects of human life, from the maintenance of physical existence all the way to cultural values. Accelerated biodiversity change is not simply a side effect of global change; it is an integral part of it, significantly affecting essential aspects of the lifestyles and livelihoods of rural people. Since an estimated 75 percent of the world's poorest people – 880 million women, children and men – live in rural areas, and the majority of them depend on agriculture and related activities for their livelihoods[6], the conservation of biodiversity and the functioning of the ecosystems upon which they depend are critical issues both for the global environment and human well-being.

Climate change is projected to impact biodiversity, species dominance and ecosystem functioning. Almost a third of known biodiversity is under threat of extinction due to climate change.[7] This is a critical issue to be addressed during GEF5.

Box 2. 2010 – The International Year of Biodiversity. Some cause for celebration.

2010 International Year of Biodiversity

- slowing of Brazilian Amazonian deforestation by 74%;
- reduction of 45% in the annual rate of mangrove losses;
- 26% increase in the proportion of Important Bird Areas;
- over 12% of terrestrial areas are now under some form of protection.

Source: *Global Biodiversity Outlook 3* [http://www.cbd.int/gbo3/ accessed May 2010]

Underlining the scientific significance of biodiversity is the designation of 2010 as the International Year of Biodiversity. While there is some cause for optimism that investments in conservation do bring benefits – see Box 2 – there is much to be done especially in linking biodiversity with other global environmental benefits.

1.4 Land Degradation

Land degradation is a global environment and development issue.[8] Defined as a long-term decline in ecosystem function and measured in terms of net primary productivity, land degradation and a focus on soil health and productive landscapes have been scientifically justified by STAP as a legitimate concern for funding by the GEF.[9] The following conclusions have recently been derived by the GEF-FAO-UNEP *Land Degradation Assessment in Drylands (LADA)* project[10];

- **Land degradation is cumulative – and a global issue.** A global assessment in 1991 indicated that 15% of land was degraded; *LADA* now identifies 24% of land as degrading. New areas are therefore being affected. Some areas of historical land degradation have been so degraded that they are now stable - at very low levels of productivity.
- **Analysis of 23-year The Global Inventory Modeling and Mapping Studies Normalized Difference Vegetation Index (NDVI) data reveals a declining trend across some 24% of the global land area.** Spatial patterns and temporal trends of NDVI and rain-use efficiency are analyzed for the period 1981-2003 at 8km resolution. Degrading areas are mainly in Africa south of the Equator, SE Asia and S China, N-Central Australia, the Pampas, and the boreal forest in Siberia and North America.
- **Almost one fifth of degrading land is cropland - more than 20% of all cultivated areas**; 23% is broadleaved forest, 19% needle-leaved forests, 20-25% rangeland. Cropland occupies only 12% of the land area and forest only 28%, so degradation is over-represented in both cropland and in forest globally.
- **Loss of carbon fixation from the atmosphere, associated with land degradation over the period, amounts to almost a thousand million tonnes.** At a shadow price of $50 per tonne, the cost is almost $50 billion. The cost of land degradation is at least an order of magnitude greater in terms of *emissions t*o the atmosphere than through the impact of loss of soil organic carbon.
- **Some 16% of the land area shows improvement.** 18% of the improving area is cropland (20% of the total croplands), 23% is forest and 43% rangeland.
- **There is only a weak correlation with biophysical factors other than land cover**: 78% of degrading land is in humid regions, 8% in the dry sub-humid, 9% in the semi-arid, and 5% in arid and hyper-arid regions. There is no obvious relationship between degrading land and the nature of soil or terrain – degradation is driven by management and catastrophic natural phenomena.
- **About 1.5 billion people depend directly on the degrading areas.** There is a weak correlation between degrading land and rural population density but more detailed analysis of land use history is needed to tease out the underlying social and economic drivers.
- **Climate change and land degradation:** Acceleration of land degradation due to climate change through expansion of semi-arid and arid areas and increased water stress are likely to adversely affect land fertility and food production potential.

The conclusion for the global environment is that land degradation presents a complex picture of some areas becoming worse; a few getting better; but in aggregate a massive impact on the productivity of the world's soil resources and on the lives of the rural poor. Of concern to the GEF must be the linkages between degrading land resources, declining biodiversity, emissions of GHGs from soil and reductions in fixed carbon. Yet, grasping these same linkages through land degradation control and sustainable land management opens the opportunity to bring multiple benefits for the other GEF focal areas while at the same time deriving co-benefits for human development [11]

1.5 International Waters

Concerns with International Waters cover freshwater in landscapes and groundwater basins and in marine ecosystems in the world's oceans. Freshwater is the most limiting resource on Earth and its use and over-use cause problems not only for the global environment but also human development. Freshwater biodiversity is declining more rapidly than terrestrial or marine for three principal reasons. First, freshwater drainage concentrates pollution from the land into water bodies, such as rivers, dams and lakes. Secondly, people tend to think of naturally-occurring water not as a living aquatic ecosystem naturally brimming with life, but rather as a liquid of importance for drinking, agriculture, hydropower and industrial use. Thirdly, most freshwater species are highly linked to particular water bodies and geographic locations and therefore vulnerable to threats at very local scales. These states and processes have driven society to exploit 172 of the world's 292 large river systems by dams including eight of the most diverse biogeographically. Further, they impact on freshwater biodiversity, especially on the (under)estimated 125,000 freshwater animal species. Similarly, marine ecosystems are undergoing major change, such that parts of all oceans are now negatively impacted. The drivers of change include shifts in climate such as warming and ocean acidification, acoustic pollution, disturbances to trophic structure, fisheries interactions, harmful algal blooms, and environmental contaminants.

Concerns about freshwater supply occur in all regions. They range from serious overdrawing of groundwater from aquifers to the decline in glaciers which are important sources for the water supply for many cities such as La Paz and for the great Chinese rivers or the Ganges.[12] Glacier-melting is driven by climate change; as a consequence, water availability is projected to decline up to 80% in 130 investigated rivers.

Box 3. Coastal hypoxia in China.

The Chanjiang River mouth off Shanghai has a large hypoxic zone, forming typically each August.

Regular monitoring suggests two principal causes:

- estuarine outflows bringing nutrients and sediments from urban effluent and agricultural pollution
- coastal upwelling intrusion onto the shelf from the East China sea, itself driven by changing currents, possibly as a result of climate change

Source: STAP Expert Consultation to Develop GEF Policy and Management Options for Projects on Hypoxia in the Coastal Zone, October 2009.

In marine ecosystems, the human impact on fisheries resources has reached new dimensions with high world market demand and the increasing ability of fishing technology to penetrate previously unavailable or less used resources.[13] The result has been the widespread depletion of fisheries, including the collapse of some commercial species, impacting entire marine ecosystems and reducing biodiversity.[14] Reported only since the 1960s, dead zones in the coastal oceans have doubled each decade since and thus extending the area of severe hypoxia (<0.5 ml O2/litre) previously reported from the eastern Pacific, South Atlantic off the African coast, Arabian Sea and Bay of Bengal.[15]

Ocean acidification is another area of concern directly linked to the increase in GHGs in the atmosphere. The oceans are now 30% more acid (0.1 pH unit) than in preindustrial times and more acid than they have been for 600 thousand years. The combination of these two factors (if greenhouse gas concentrations reach 500 ppm) will exceed anything that has occurred in the past. Marine life that forms calcareous skeletons is the biological pump that buries much of the excess CO_2 to the deep ocean. This life includes microscopic organisms that are the base of the food chain, as well as macroscopic life such as reef building corals that support biodiversity, fisheries, tourism and protect coasts. Coral 'bleaching' events have, at times, affected up to 90% of the corals in parts of the Indian Ocean, for example.[16] Acidification may, therefore, cause not only a severe loss to the ocean's economic potential but also a significant degradation in the climate-regulating services of the oceans. This last effect leads in turn to severe negative climate feedbacks. Although the notional 2deg/450ppm 'target' for the world climate will help to moderate the process, scientific knowledge suggests even this may be catastrophic for marine life and for the provisioning services of the oceans.

1.6 POPs and Chemicals

Chemicals production continues to expand, meaning that potential exposure to often-toxic chemicals will increase globally. In addition, the accelerated shift in chemicals production from the developed to the developing world, notably to the BRIC countries with often less stringent regulations for workers health and safety and environment protection, reinforces the concern that actual chemical exposures will increase considerably over the next decades.[17] With the trade in chemicals and products growing even faster than chemicals production, the dissemination of and pollution by new potentially-toxic chemicals worldwide is now a reality.

The changing climate impacts on the chemicals area in several ways.[18] First, the distribution of chemicals globally changes as a result of increased global temperature and in response to altered wind patterns, movements of air masses and ocean currents, all of which are sensitive to climate change. Secondly, there is likely to be increased revolatilization of, for example, the heavy POPs such as the PCBs as a purely passive response to increased temperatures. Thirdly, the adverse effects of some chemicals may change as a result of the changing climate. In addition, changing land use as a result of changing climate, with concomitant changes in agriculture and the use of agro-chemicals is an area of uncertainty. Generally speaking, a warmer climate will move agriculture towards the poles, at the same time the use of pesticides will be affected, with increased use of the generally more toxic insecticides and reduced use of the less harmful herbicides. These inter-linked processes will present much more complex global challenges than we have seen to date.

2 Scientific Priorities and STAP's Vision for GEF-5

2.1 Science to Support Priorities and Vision

STAP draws its vision and priorities for GEF interventions from two principal sources - guidance from Conventions (UNFCCC, CBD, UNCCD, Stockholm Convention) and their Subsidiary Bodies; and from its networks. This latter source includes new scientific, technological and policy developments as well as the outcomes of GEF projects. STAP is party to all the GEF's initiatives to refine its approaches and Strategic Programs to reflect emerging scientific and policy developments. Global assessments, such as the Millennium Ecosystem Assessment (MEA, completed 2005 with GEF support), the IPCC's Fourth Assessment Report (AR4 - 2007) and reports of the International Energy Agency[19], have particular and timely relevance to the GEF. UNEP's *Global Environmental Outlook 4* (2007)[20] provides important trend and scenario data for the atmosphere, land, water, biodiversity and the global economy.

This section identifies what STAP believes to be the key scientific priorities for each focal area and how GEF-5 should position itself to make a major contribution to both advancing scientific knowledge and delivering sustainable GEBs.

2.2 Climate Change

Currently the only means of consequence for removing CO_2 from the atmosphere is using biological means to sequester carbon. All ecosystems have the ability to contribute to sequestering carbon, but the role of forests is paramount. Stopping deforestation will eliminate about 20% of current global annual emissions of CO_2, and active reforestation, aforestation, agroforestry and plantation forestry can convert some atmospheric carbon into plants and soil organic carbon. Maintaining deep peat carbon storage is also essential. To achieve meaningful carbon sequestration without compromising biodiversity and livelihoods is one of the major environmental challenges of the next decade. In climate change, STAP has strongly advised the GEF to start removing institutional barriers preventing support for integrating climate adaptation activities in GEF Trust Fund projects, encouraging a more climate-resilient approach in strategic programming and building a longer-term vision for climate resilience of GEF investments. [21]

The key scientific and technical questions now are whether the world can avoid further dangerous climate change and what will be its impact. Current modeling suggests that there is at least a 50% probability of restricting warming to 2ºC. To realise this feasible but challenging goal will need:

- Prompt global action to achieve early peaking and rapid GHG emission reduction leading up to 2020.
- Reducing the risk of triggering irreversible climate change through stringent climate mitigation policies.

- Strategies and policies to avoid impacts on ecosystem goods and services
- Recognizing that climate change may only be successfully addressed with linked mitigation-adaptation strategies.

The GEF should, therefore, carefully weigh the scientific evidence for potential abrupt, extreme and/or irreversible climate change against the current barriers for planning and implementation of mitigation-adaptation strategies. Early peaking of global GHG emissions by 2016 and further reducing GHG emissions by 3% per year is a significant challenge. Fortunately, there is global agreement (the Copenhagen Accord) on the need to restrict warming to 2ºC which requires the stabilization of CO_2 concentrations to 450 ppm (IPCC, 2007), but the means are contested. The GEF has a leadership role in demonstrating how the challenge could be met through investments in natural resource management, as well as intensive mitigation actions such as the implementation of energy efficiency and renewable energy.

Stabilization of CO_2 concentrations in the atmosphere (the 450 ppm scenario) will require an investment of US $10.5 trillion in energy infrastructure and energy related capital stock.[22] The GEF's principal role must be in promoting technology transfer, building capacity and creating a suitable enabling environment. The cost of the additional investment will at least partly be offset by economic, health and energy-security benefits. STAP encourages the wider social and economic analysis of the challenge so that the challenge of a 450 ppm stabilization scenario can realistically be assessed.

As a financial mechanism of UNFCCC, the GEF should plan strategies to promote the planning and implementation of the Copenhagen Accord, which is in accordance with the IPCC recommendation to limit global warning to <2ºC. Helping to develop strategies for early and rapid reduction in GHG emissions, by assisting developing countries to move to a low carbon development path in a way compatible with national economic development, is one area for action. The GEF should also support efforts to identify technologies and strategies relevant to different regions to achieve rapid GHG emissions reduction at low cost. A low-cost mitigation strategy is urgently required. The strategy on actions to achieve rapid reduction in GHG emission may need rethinking in, for example, the role of energy efficiency, peatland stabilization, methane emission reduction strategies in the livestock sector, REDD, eco-cities, and the containment and recovery of fluorinated gases. There is a need for a short-term and rapid (before 2020), as well as long-term and sustained, GHG emission reduction strategy to address climate change.

2.3 Biodiversity

In biodiversity, STAP has consistently advocated targeted interventions to protect not only species but also habitats and associated human wellbeing through, for example, the sensitive management of ecosystems especially forests.[23] The priority for GEF-5 is to identify how best to maintain the sustained provision of GEBs by biodiversity, through its conservation, restoration and incorporation in the design of production systems. While the Millennium Ecosystem Assessment set an important scientific knowledge-base for this challenge, there are now many more specific questions to solve.[24] In this context, a high priority should be given to mainstreaming biodiversity in interventions related to climate change adaptation and mitigation, land degradation, international water and POPs – see Section 3 below. In many cases, this will involve biodiversity not simply as a trade-off or positive side effect, but as a means to achieve the primary goal, the conservation of life on earth in its widest sense, more effectively.

Core to this goal is the protection and enhancement of the role of biodiversity as evolutionary capital that provides option values for the future, as well as generates new living variation in response to a rapidly changing environment (contemporary evolution). The past focus on protected areas needs to be maintained but with a clearer vision on the linkages between biodiversity and human needs. To this effect, the integration between protected areas and production areas needs to be more consistently advocated. The mutual benefits in so doing are essential to human society. Examples abound, but some of the clearest demonstrations come from GEF projects themselves: protected mangroves as nurseries for fisheries; forests and shrublands as sources of pollinators; capture and purification of drinking and irrigation water by well-covered watersheds; protected coastal vegetation and mangroves as a buffer against sea intrusions. At the same time, negative trade-offs need to be minimized: such as intrusions of dangerous wildlife into human settlements; leakage of fires into protected areas from settlements; protected areas as reservoirs of pests, pathogens and vector-born human and domestic animal diseases.

The key scientific and technical question now is how biodiversity can be integrated into other areas of human endeavor to support ecosystems and livelihoods. STAP identifies *inter alia* some priority topics:

- Tipping points - to identify the thresholds beyond which biodiversity components will lose the capacity to provide ecosystem services, i.e. the tipping points at which biodiversity stops being part of the 'solution' and then becomes part of the 'problem';

- Invasive alien species (IAS) – arguably, IAS has the second biggest immediate impact on biodiversity after land use change. A key question to be addressed is what biosecurity measures need to be put into place to support international trade while at the same time preventing the world's natural and productive ecosystems from being dominated by IAS. Setting IAS in the context of climate change may mean accelerated loss of biodiversity. Therefore, STAP suggests the development of suitable preventative measures based on scientific risk assessments and import pathway analyses, using climate change scenarios, where appropriate;

- Biodiversity and carbon sequestration – the long-term net sequestration of carbon through forest protection is well verified.[25] However, the composition and variability of plants and soil organisms can have various direct effects on the amount, speed and stability of carbon sequestration. Biodiversity can also affect carbon sequestration indirectly, through the provision of other benefits to society, thereby influencing peoples' willingness to maintain a certain land use or protection regime.[26] In short, biodiversity is not just a fortunate by-product of carbon sequestration, but a key intervening factor, without which carbon cycles are unsustainable. Therefore, biodiversity warrants incorporation into the design, implementation, and regulatory framework of carbon sequestration initiatives.

- Genetic resource access and benefit sharing (ABS) – throughout GEF-4 and now GEF-5, ABS has been a stand-alone objective of the GEF, and many parties to the CBD remain optimistic about a legally-binding ABS protocol being established soon. However, underwriting any legal instrument there has to be a thriving knowledge of taxonomy to monitor the samples and trade in realising the benefits. Capacity-building in taxonomic research and application is especially needed in developing countries, where the numbers of trained taxonomists are desperately low.

STAP remains committed to assisting the GEF to support the CBD in defining new post-2010 biodiversity targets that will be more effective in achieving "a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth".[27] While the 2010 targets will not be met, some areas of optimism persist that rates of extinction can be controlled, habitats can be successfully managed, and biodiversity can be integrated into the mainstream of policy nationally and globally.

2.4 Land Degradation

Land degradation has been bedevilled by problems of measurement, assessment and monitoring. Over the last 30 years, many local and national and one global assessment of soil (land) degradation have been made, but most have been based on poor methods and inexact science. Indeed, there is evidence that rates of soil erosion, for example, have been deliberately exaggerated in the erroneous belief that this would raise attention to the subject amongst policy makers.[28] Statistics for the processes involved in land degradation, such as soil erosion by water, must be treated sceptically. The impact of land degradation on agricultural productivity and human livelihoods should be open to even greater scrutiny. So, for example, one estimate of the economic effect of soil erosion globally put its impact at only 0.05% per year of the production value,[29] whereas dramatic effects of land degradation are estimated by others with figures reaching 10% of the value of agricultural production each year.[30] A number of major shortcomings of land degradation assessments are evident, including measurement systems that are either very costly or impractical, poor attribution of impact to biophysical process and the lack of cause-effect understanding between degradation and productivity.

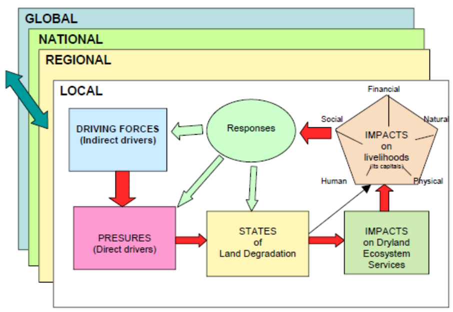
The GEF has, therefore, invested resources in updating and making more rigorous our understanding of land degradation, its cause and severity. More remains to be done, especially if land degradation and its converse, sustainable land management, are to receive the attention they deserve. STAP advises that the following need high priority attention in GEF-5 and beyond:

- Tracking changes in total system carbon, especially of the largest terrestrial sink for C, in the soil. Currently, the GEF is financing a project to develop the necessary tools, using a mix of remote sensing, modelling and ground sampling, all to be presented on a web portal for use by project managers.[31] However, the systems to be developed need wider testing and verification, especially in their user-friendliness and cost-efficiency. If carbon trading is to become a widespread reality, reliable and uncontroversial tracking and verification of carbon sequestration will be needed.

- Identifying the drivers and impacts of land degradation – see Box 4. While the state and extent of land degradation are important, an understanding of the direct and indirect drivers is also needed, as well as how society responds and livelihoods are impacted. The Driving Forces-Pressures-State-Impacts-Responses (DPSIR) framework is an aid to organizing the information. It is also a help to appreciating where interventions may be feasible.

- Developing systems of agriculture that are both environmentally-friendly and productive, without increasing food prices or creating barriers to food security. Currently, there are strongly-entrenched perceptions that either society has commercial agriculture on an industrial scale or it has low-production, high-labour, organic agriculture. 'Sustainable land management' is about bringing together a variety of low-cost, environmentally-sensitive practices to bear on food security. One of the GEF's high priorities must be to demonstrate the co-benefits of sustainable land management, not just among global environmental issues such as biodiversity and climate change, but also with the provisioning services of ecosystems such as agricultural production.[32]

Box 4: The DPSIR Framework for Land Degradation – organizing and understanding how and why land degradation occurs



- Integrating systems of land use across landscapes, enabling trade-offs that not only enhance aesthetic and cultural values but also support the needs of local communities. The link between landscapes and local communities is a vital aspect of achieving global environmental benefits. Rural land users are the guardians of landscapes, while at the same time being the protectors of the environment. Trade-offs are inevitable between local demands and global imperatives, but they can be minimised by providing appropriate incentives.[33] The valuation of aesthetic, cultural and economic worth of the land may provide a key to where interventions will be most effective, and where global environmental benefits may be maximised.

- Assessment of climate change risks in accelerating the processes that cause land degradation, linked with potential adaptation measures whereby rural land users may cope with the additional stresses. Climate change is already creating a more difficult and problematic production scenario, especially for small-scale farmers in the world's drylands, where the increasing prevalence of drought and floods cause wide-scale food insecurity.[34]

2.5 International Waters

In the areas of concern to the International Waters focal area, the impacts of human activity are widely dispersed and often unseen; yet they are also pervasive and potentially life-threatening. Water is the basis of life, and one of the most critical linkages is with biodiversity. Both freshwater and marine ecosystems are intrinsically bound up with adjacent terrestrial ecosystems, such that the primary threat to aquatic ecosystems comes primarily from land-based activities. Fisheries, however, are also an immediate threat but many of the changes brought about by over-exploitation may also be ascribed to other less-obvious processes such as ocean acidification, eutrophication from land-based nutrient inputs and environmental contamination.

The scientific and technical challenge to advise on delivering global environmental benefits from activities related to oceans and freshwater bodies is immense. Clearly, the GEF must focus its investments on subjects and interlinkages where there is evidence that benefits may be derived from the relatively modest funds available for the IW focal area. GEF experience with IW projects shows that interventions in multiple countries with regional projects are essential in gaining commitments to transboundary action simultaneously by multiple countries.[35] Targeting single topics such as coral bleaching and pollution from aquaculture is unlikely to bring beneficial restoration to these complex aquatic ecosystems, without also addressing the root causes which are usually land-based and economically-driven.

The key questions for the IW focal area in GEF-5 are where to concentrate investments most cost-efficiently and how to make the necessary linkages between root causes of environmental degradation and impacts on freshwater resources and marine ecosystems. STAP identifies a number of priority candidate topics where there is evidence that GEF resources can make a difference:

- Transboundary governance arrangements. Creating these provides the foundation on which countries can diagnose and agree priority goals, strategies and actions for management of shared water systems. This is a necessary first step in addressing critical international waters problems;

- Coastal hypoxia and eutrophication from land-based nutrient inputs. The main nutrients are nitrogen and phosphorous, derived from urban wastes and agriculture. The related eutrophication of water and coastal 'dead zones' can be addressed at least partially by more sustainable and conservative land use systems.

- Using new scientific knowledge to help protect biodiversity in Ecologically and Biologically Sensitive Areas in the open ocean and deep seas (in Areas Beyond National Jurisdiction);

- Climate variability and change - major new ocean and freshwater results (warming, acidification, relative lack of IPCC AR-4 attention to the oceans).

- Marine protected areas (MPAs). It has long been known that, with biodiversity restoration, services recover; MPAs sited to protect fish refugia actually improve fisheries productivity in neighboring waters[36]. Although in the current GEF structure, this comes under 'biodiversity', it hais key linkages with IW.

One further topic in the IW area of interest is the role of aquaculture and its impact on biodiversity. In 2009, aquaculture production was estimated to have equalled capture/wild fisheries production for direct human consumption for the first time in history. As happened in agriculture, this means an increasing narrowing of the number of species that provide the bulk of aquatic products. Little attention has been paid to the biodiversity aspects (genetic and species, mainly) of utilized aquatic biodiversity. Nature and a very limited number of private sector genebanks, largely spermbanks, are the only protection for the genetic diversity on which more and more aquatic production rests. International scientific cooperation is called for to identify the priority issues and to organize conservation actions consequent upon the further development of aquaculture.[37]

2.6 POPs and Chemicals

According to the OECD, many essential elements of good chemical safety policy have been developed and used both by countries and through international co-operation. This has included reducing emissions of hazardous chemicals during production, keeping unsafe new chemicals from entering the market, developing harmonized methods for safety testing and ensuring test quality to avoid duplicative testing, and discouraging non-tariff barriers to trade. Nevertheless, significant dangers remain: for example, the WHO estimates that about 3% of exposed agricultural workers, most of whom are in developing countries, suffer from an episode of acute pesticide poisoning every year (Box 5). Further effort is needed in providing global data in order to fill the current gaps in knowledge about the characteristics, effects and exposure patterns of existing chemicals.

There is an important role for science in deriving the necessary global data. The effectiveness evaluation under the Stockholm Convention requires collection of POPs data from environmental and human media, but there remain important gaps at the regional level, especially for information on effects and exposure as the basis for risk management decisions.[38] Few global data are available on the total contribution by the chemicals industry to the release of substances which promote the formation of tropospheric ozone (VOCs, NOx) and acid rain (SOx) and the generation of hazardous waste. There is a need for cost-effective collection of meaningful and comparable data. An urgent need remains for capacity building in monitoring[39], technology transfer and funding for developing countries in order to achieve a truly global monitoring coverage.[40] STAP advises that the GEF should support efforts to bridge the gap between existing conventional data gathering systems and newer, more innovatory approaches to provide confidence to policy makers and others about the validity of the data.

Box 5 Children, Chemicals and Poverty.

A survey of child labor in several developing countries found more than 60% of all working children were exposed to hazardous conditions, and more than 25% of these hazards were due to exposure to chemicals
(Source: Bo Wahlstrom presentation, STAP Meeting, April 2009)

STAP's vision for GEF-5 and beyond includes the following three topics that are central to the delivery of GEBs in the chemicals area, especially in a cross-focal context where the major challenges now lie:

- Climate change and chemicals, for the reasons outlined in Section 1.6 above. The linkages are subtle but pervasive, and could render serious damage to human health without close monitoring, further research and interventions.

- Toxic substances and poverty; chemicals exposures are unevenly distributed between and within societies. STAP has already issued guidance on selection of technologies for POPs disposals in developing countries.[41] However, access to the technologies is an issue, as is the greater susceptibility to exposure by poor rural people seeking a living from agriculture, even children – see Box 5.

- A programmatic approach towards chemicals is needed. Such an approach needs to address the legislative and institutional frameworks necessary for managing chemicals, as well as the linkages between chemicals and other focal areas. This is an approach very different from the more traditional chemical-by-chemical or convention-by-convention regulatory approach.

3 The Big Cross-Cutting Issues and Recommendations

3.1 Enhancing Climate-Resilience of GEF Focal Areas

Climate change is projected to impact all natural and socio-economic systems.[42] It is the principal cross-cutting issue that potentially impacts the delivery of GEBs of all of the GEF's focal areas. Climate change could impact 20-30% of plant and animal biodiversity. Along with associated disturbances such as droughts, floods, wildfires, pest attack, ocean acidification, climate change will enhance the vulnerability of biodiversity and agricultural production. Climate change is projected to lead to expansion of deserts and semi-arid areas, leading to enhanced land degradation. Evidence-based science indicates that biodiversity, land degradation, sustainable forestry and even climate change mitigation itself are threatened by further climate change. The linked issues of climate change, biodiversity loss and land degradation are the major global environmental challenges impacting on food, water, livelihoods and ecosystems. It is essential that the GEF takes effective steps not only to enhance resilience of its own investments in projects and programmes but also to take the lead in showing how building resilience to climate change may be done in a cost-effective way.

Resilience to climate change impacts is shorthand for identifying risks to GEF project outcomes and outputs, or any other specified natural or human asset, as a consequence of climate variability and change, and ensuring that those risks are reduced to acceptable levels through long-lasting and environmentally sound, economically viable, and socially acceptable changes implemented throughout the project cycle.[43] For the GEF, the risks of climate change impacting on GEBs such as GHG reductions, biodiversity conservation, land fertility improvement and carbon sequestration is particularly acute. Building resilience to climate change is a paramount topic.

The GEF already recognizes the importance of climate resilience in one of its strategic goals – *"conserve, sustainably use, and manage ecosystems and natural resources globally, taking into account the anticipated impacts of climate change"*.[44] It, therefore, has to find a mechanism to make the concept of resilience operational and cost-effective. Scientific guidance needs to be developed, aimed at enhancing resilience for all GEF programs and projects to the projected impacts of climate variability and change. This use of the term 'resilience' is part of a suite of actions in a sector or country to promote adaptation to climate change. The concept of project (or program) climate resilience in the context of GEF interventions would require *anticipating the impacts of climate change and variability* and *incorporating adaptation strategies*. The goal should be that all GEF-5 projects and programs are designed explicitly to address climate risks and the incorporation of practices to ensure sustained delivery of GEBs.

3.2 Cross-focal Area Integration

STAP has previously advised the GEF on the potential of interlinkages between focal areas, and encourages the GEF to maximize the synergies possible through projects that deliver co-benefits even if the source of finance is derived from just one focal area. Global Environmental Benefits are best delivered by promoting the synergies and avoiding the negative trade-offs not only between GEF focal area strategies but also between environmental and human development needs. Numerous linkages and opportunities exist – see Box 6 for a suggested priority list within the purview of the GEF.

Integrated approaches to addressing global environmental benefits have been accepted by the GEF for at least the past decade.[45] IPCC Assessment Reports and the Millennium Ecosystem Assessment provide overwhelming scientific evidence of the linkages and the need to promote synergy between different GEBs. Global environmental conventions such as UNFCCC, UNCBD and UNCCD also highlight the inter-linkages and recommend actions to promote complementarity and synergy in seeking multiple global environmental benefits and avoiding any trade-offs or negative impacts. In its projects, GEF-4 has only recently started to build a sizeable portfolio of multi-focal area projects, the institutional barriers for which can be daunting. STAP advises that integrated approaches can only successfully be realised if the barriers to multiple focal area projects are lowered and multi-disciplinarity as a legitimate area of scientific endeavour becomes fully accepted.

Box 6. Cross-focal area integration – some priority topics to maximise Global Environmental Benefits (GEBs).

- **Climate Change, Biodiversity and Sustainable Forest Management (SFM)**: Many natural ecosystems (forests, grasslands, wetlands, coasts) are highly vulnerable to the projected climate change. According to the IPCC, *"major changes in ecosystem structure and functions, species' ecological interaction and geographical ranges with predominantly negative consequences for biodiversity and ecosystem goods and services"* will result. However, conservation of biodiversity in forests, grasslands and wetlands and maintenance of peat swamps theoretically leads to increased resilience to climate impacts as well as conservation of carbon sinks. SFM practices could provide multiple GEBs - reduce the vulnerability of forest ecosystems to climate impacts, conserve biodiversity and enhance carbon stocks. But there are some trade-offs that are unavoidable, which will also need addressing.

- **Climate Change, SFM and Land Degradation:** Arid and semi-arid land areas in Africa are projected to increase under a range of climate change scenarios. Further, climate change could exacerbate expansion of degraded lands, deserts and semi-arid regions, potentially increasing CO_2 emissions. This could adversely impact food and grass production in arid and semi-arid (rain-fed) land systems, even up to 50% in some regions, especially in Africa. Halting land degradation and land reclamation could provide multiple GEBs - increase carbon stocks in soil and vegetation and reduce vulnerability to climate change. SFM practices could also potentially contribute to halting land degradation as well as conservation and enhancement of carbon sinks.

- **International Waters, Biodiversity, Land Degradation and Climate Change:** Integrated approaches for improved water resources management projects can help with the transition to sustainable use of specific landscapes, catchments, seascapes or wetland basins. Projects proposing to use hydro as renewable energy should evaluate the aquatic biodiversity and land management costs so as to avoid tradeoffs in ecosystem services.

Seeking multiple GEBs in a GEF focal area or within the context of a multi-focal area project has technical, institutional and financial implications. Particular attention will have to be given to the often different scales at which the GEBs and the interventions operate. For example, a local renewable energy project may affect biodiversity in a transboundary water catchment. There is a need to develop operational guidelines for identifying the potential positive and negative implications of cross focal area linkages and to design, implement and monitor technologies and practices and institutional arrangements to promote cross focal area synergies between GEF focal areas. The cost implications need to be considered and cost-benefit analyses conducted for activities that promote potential cross-focal area synergy and multiple GEBs.

3.3 Other Cross-cutting Issues

According to the IPCC, controlling deforestation, promoting aforestation and reforestation, and implementing SFM provide the largest and most cost-effective mitigation opportunity to address climate change, particularly in the short-term. GEF5 has to take an integrated view of land related C-sink conservation and enhancement strategies to enable the global community to stabilize CO_2 concentration at 450 ppm and to limit warming to below 2°C. Strategies linking SFM to REDD and LULUCF need to be implemented based upon scientifically-verified monitoring and tracking techniques.

The world's oceans are the largest active carbon sink. They have absorbed approximately 30% of the CO_2 emitted by human activities, slowing the rate at which CO_2 accumulates in the atmosphere and, therefore, the rate of global warming. Combined biological and physiochemical processes enable the oceans to absorb more carbon than they emit. Direct human interventions to sequester more carbon in the ocean, such as iron fertilization to stimulate the growth of plant plankton where the lack of iron limits their development, and direct carbon injection to the deep ocean, are not understood well enough to determine whether they will achieve cost-effective and beneficial outcomes.[46]

The cross cutting strategy on chemicals management needs to be expanded. For example, we need to consider how best to address chemicals management and capacity building issues beyond the Stockholm Convention and particularly in relation to chemicals-related strategy priorities in the international waters and other focal areas. As conditions change in other focal areas (e.g. climate change), so too does chemical use, transport and fate patterns. These changes need to be addressed by GEF-5. Further, there are other cross-cutting issues primarily linked to Chemicals:

- Projects supporting studies on transboundary transport of POPs (e.g., with IW focal area) will help to inform future GEF interventions

- Science-based regional projects based on regional priorities should be supported. There is already a good basis in good agricultural practices and good manufacturing practices. Stronger emphasis on POPs hot-spots is needed

- GEF should take a more pro-active and anticipatory approach to candidate POPs and focus more on emerging chemical contamination issues and their management

- GEF is advised to develop a targeted research project on global approach to predicting and documenting contamination by PBT chemicals

Cross focal area integration must also include issues that are high priority for human development. Continuing population and consumption growth means that the global demand for food, an essential provision of healthy ecosystems, will increase for at least another 40 years.[47] Food security is commonly conceptualized as resting on three pillars: availability, access and utilization.[48] The first of these pillars is intimately bound with the global environment – availability relies on the functioning of ecosystems, the existence of biodiversity, the control of climate change, and the supply of suitable water. Addressing this challenge not only requires systems of production that are environmentally and socially sustainability but also means of production that recognize earth's resources of land, soil, water, air and plants to be finite.[49] It also requires that our seeking global environmental benefits should not be undertaken without examining the trade-offs with human needs and the potential impacts on livelihoods.

Half of the present human population lives in cities and this is projected to increase to 60% within the next two decades.[50] From the development perspective, sustainability of future generations depends strongly on how well urban challenges including environmental one are tackled today. Growing environmental burdens associated with accelerating urbanization are air pollution, urban water extraction and contamination, waste dumping, impacts on biodiversity. Urbanization has environmental impacts of planetary scale on the coastal ocean; fourteen out of nineteen world's largest cities (more than 10 million inhabitants) are located near coasts. The GEF-5 climate change strategy recognizes the importance of growing urbanization on the delivery of GEBs by enhancing support for energy efficient, low-carbon transport and urban systems. STAP welcomes this approach, but growing cities represents not only a threat, but multiple cross focal area opportunities and there is a need to address environmental consequences of unsustainable urban development in a more systematic way across all GEF focal areas including international waters, POPs/Chemicals, biodiversity and land degradation.

4 ANNEX: STAP and GEF-4 and Major Changes since the 3rd Assembly

This report is provided by STAP IV for the GEF-4 period to date during which major reforms to the GEF, including to STAP, were implemented. In this Annex the major drivers and resulting changes within the GEF are reviewed in order to provide a historical context as to where STAP is now positioned and the advice it has provided. A listing of the main STAP outputs is provided, all of which are accessible on STAP's new website - http://www.unep.org/stap.

4.1 Major changes within the GEF and the contribution of STAP

Until the end of GEF-3, the GEF prioritized its investments using the strategic frameworks contained in the 15 Operational Programs, which contributed to the 1995 GEF Operational Strategy. This Strategy remains the over-arching strategic document which laid the foundation for GEF's efforts in the Operational Programs. In 2007 the Programs were replaced with six Focal Area Strategies presenting long-term Strategic Objectives as well as medium-term Strategic Programs. In addition, strategic programming documents were also prepared for sound chemicals management and sustainable forest management.

GEF-4 heralded a significant intensification of STAP's role and responsibilities. STAP participated centrally in the drafting of the GEF-4 Focal Area Strategies (and the strategic programming documents for sound chemicals management and sustainable forest management) through its membership of each of the supporting Technical Advisory Groups for the focal areas. The GEF-4 Programming Document, prepared as a record of replenishment negotiations from 2004 to 2006[51], summarizes not only the strategic outcome of the programming but also the proposed distribution of resources among focal areas within GEF-4. This was approved by Council in June 2007 with STAP's strategic advice on scientific and technical matters substantively anchored to these documents.

During GEF-4 STAP has also taken the same role in the drafting of GEF-5 Focal Area Strategies, currently being used to inform replenishment negotiations. For both the GEF-4 and GEF-5 drafting processes, STAP advised the GEF to strengthen cross-focal area integration but noted that the framework used by the GEF to plan and manage the drafting of the Focal Area Strategies was not effective in reducing their isolation from each other.

The GEF's support and funding for more multi-focal area (MFA) projects is an indicator that cross-focal area integration is starting to be accepted. However, MFA projects constitute only a small minority of the portfolio. In presentations to Council and at STAP meetings, STAP has suggested a greater commitment to MFA projects because of their potential to maximise GEBs, deliver co-benefits for human development and increase overall impact across focal areas. Barriers remain – structural, institutional, technical and scientific; for example in the Resource Allocation Framework and in the GEF's segmented architecture.

4.2 Increasing STAP's effectiveness

With the reforms at the start of GEF-4, STAP simultaneously underwent major change. Its structure and functioning were subject to Council decisions in 2005 and 2006 and new reforms were approved in June 2007 and completed by September 2008 to make STAP more effective through:

- a more independent system for selection of external experts for provision of advice;
- reduction of the Panel to a total of six experts including the Chair, offset by increased contracted time and encouragement of greater ownership of GEF's science needs;
- an increased emphasis on staff scientific competency supported by an increase of one professional grade post within the STAP Secretariat;
- GEF scientific advisory needs supported by an open and transparent formulation of STAP Work Programs involving GEF focal area Task Forces.

STAP noted in its last report to the GEF Assembly[52] the major environmental challenges and highlighted the inter-linkages between global environmental issues such as loss of biodiversity, climate change, and freshwater and coastal systems degradation at different scales, as well as factors such as trade and the movement of invasive alien species and viruses, intellectual property rights and access and benefit sharing. STAP highlighted the need to scale up efforts in areas such as climate change and biodiversity, taking existing knowledge to practice through GEF projects aiming at providing incentives, and guidance to markets to mainstream sustainability. Through GEF-4, STAP then supported several major global assessments, including the Millennium Ecosystem Assessment, the IPCC Fourth Assessment Report (AR4), and UNEP's Fourth Global Environment Outlook (GEO-4) and the Global International Waters Assessment (GIWA). Each of these starkly outlined the huge challenges and reminded everyone in the GEF community how few the resources are through GEF in comparison with the scale of the global environmental threats.

4.3 STAP results achieved in GEF-4

Three results areas were supported by STAP during GEF-4

<u>Results Area 1: Formulation of GEF-4 and GEF-5 Focal Area strategies</u>

The GEF-4 focal area strategies, provided to Council at its June 2007 meeting, were the culmination of six months of drafting work by Panel Members as principal authors or co-authors working closely with the STAP Secretariat as one integrated team. This was the first major product of the STAP reform process, and the work was negotiated in close partnership with the CEO and GEF Secretariat. Similarly the GEF-5 focal area strategies were drafted with major contributions from Panel Members during the first half of 2009.

<u>Results Area 2. Advisory papers to the GEF</u> (supported by participatory workshops)

STAP advice was sought on a number of issues across focal areas, and the Panel with the STAP Secretariat developed advisory papers for the use of the GEF, which were provided to the GEF Council. One feature of this work is that a STAP Work Program was reconstituted and tested annually with partners to ensure that task justification was documented. Work Programs for FY08, FY09 and FY10 are available on the STAP website at: http://stapgef.unep.org/activities/STAPWP

STAP advisory documents provided to the GEF within GEF-4 include:

- Environmental Risk Assessment of Genetically Modified Organisms Volume 3: Methodologies for Transgenic Fish. A.R. Kapuscinski, K.R. Hayes, S. Li and G. Dana (eds) (October 2007)
- Sustainable Forest Management: STAP Guidance on Implementing the new Work Program, November 2007
- Liquid Biofuels in Transport: Conclusions and Recommendations of the Scientific and Technical Advisory Panel (STAP) to the Global Environment Facility (GEF) (GEF.C.31/Inf.7);
- Land Degradation as a Global Environmental Issue: A Synthesis of Three Studies Commissioned by The Global Environment Facility to Strengthen the Knowledge Base to Support The Land Degradation Focal Area (Prepared by the Scientific and Technical Advisory Panel) (GEF/C.30/Inf.8)
- Carbon Capture and Storage, Conclusions and Recommendations from a STAP meeting, October 17-18, 2007 (GEF/C.33/Inf.14)
- A Science Vision for GEF-5. Proposals from the Scientific and Technical Advisory Panel (GEF/C.34/Inf.14)
- Payments for Environmental Services and the Global Environment Facility, A STAP guideline document, December 2008 (GEF/C.35/Inf.12)
- Scientific and Technical Advisory Panel response to the Mid-Term Review of the Resource Allocation Framework, December 2008
- Options for a GEF-wide Resource Allocation Framework: Initial Panel response, February 2009
- Panel's response to the Eighth consultation draft (19th February 2009) 'Strategic Positioning of the Global Environmental Facility for Its Fifth Phase', February 2009

- Measuring the Success of GEF Investments and Catalyzing Change through Experimental Project Design
- Benefits and Trade-offs between Energy Conservation and Releases of Unintentional POPs
- Biofuels, Climate Change and Biodiversity
- Marine Protected Areas (MPAs) and the Generation of Global Environmental Benefits

Results Area 3: Operational advice within the GEF Project Cycle

The GEF Project Cycle was reformed in 2007 leading to early stage screening by STAP for scientific and technical adequacy of all full-size project concepts. This now enables scientific screening and advice that assists the further formulation of projects, including *inter alia* ways to optimise global environmental benefits and to learn from other projects.

4.4 Fourth Overall Performance Study (OPS4) and science

As an example of both its operational and strategic advice, STAP reported to the OPS4 on the impact of science upon the focal areas, mentioning:

1. Biodiversity projects are characterized by hypotheses that are highly variable and rest on many untested assumptions, and while “conservation practice” has built up a body of consensus on what appears to work and what doesn’t, STAP has frequently observed the need to test more objectively these assumptions through obtaining empirical evidence for the proposed approaches. Conservation planning (i.e., allocation of resources) is about maximizing expected net benefits from investment. In GEF-4 STAP has proposed a number of additional guidance papers to enable a more structured approach to project design and to improve the chances of increasing impact.

2. Land degradation as a focal area has had – and on occasions continues to have - the challenge of justifying itself in the delivery of measurable global environmental benefits (GEBs). STAP has addressed this in a number of reports and presentations, most recently at the GEF Assembly in Cape Town, and the argument is now widely accepted that projects that focus on Sustainable Land Management and land degradation control may deliver GEBs both directly through terrestrially-based processes and indirectly through synergies with other focal areas such as biodiversity, climate change and international waters. This places Land Degradation as an important component in MFA projects. Nevertheless, most projects screened by STAP in GEF4 still struggled with specifying GEBs. GEF agencies must ensure that their land degradation and SLM projects do not simply echo standard projects of support to the agriculture and rural development sectors, but instead focus on GEBs and beneficial environmental impacts.

3. International Waters projects have been consistently the most broadly grounded GEF interventions by virtue of the transboundary and integrated diagnostic approach that establishes a baseline for the proposed intervention. International Waters and Land Degradation are the only focal areas to endeavour to capture the experiences and lessons learned by creating knowledge management projects (IW:Learn and KM:Land). STAP observations on where future improvements and directions lie for IW are:

    - In GEF-5, IW should consolidate its gains in ongoing water systems (large marine ecosystems, transboundary surface and groundwater systems) as experience reveals the long time horizons needed to achieve impact from transboundary governance arrangements. New regional platforms such as the Pacific Alliance for Sustainability and the Coral Triangle Initiative offer the chance to put many past lessons into practice.

    - GEF-IW is encouraged to undertake comparative governance and institutional analyses across suitable projects. In individual projects, GEF should test interventions, e.g., invasive species eradication measures, against controls using good experimental designs.

    - Climate variability and adaptation to climate change are particularly severe and under recognized issues in water systems and GEF-IW projects will bear this out. A degree of re-planning is needed to take these effects into account and to build greater climate resilience into GEF-5 projects.

- GEF-CC – mitigation and adaptation – efforts must move rapidly to incorporate the emerging negative news on climate impacts on water systems; IPCC assessment reports to date have not paid enough attention to the oceans, and yet the impacts of rising GHG emissions on the oceans, e.g., ocean acidification, is starting to have devastating effects on ocean life and hence ecosystem services and may severely compromise the ability of the oceans to sequester the 30-40% of carbon emissions it presently does. STAP urges GEF5 planning to revisit this issue.

- Although some collaboration in projects occurs between IW and BD focal areas, both would benefit from greater collaboration in future. For example, freshwater biodiversity, one of the most threatened types, merits much greater attention.

4. Chemicals focal area work has, up to OPS-4, mainly been concentrated on enabling activities, i.e. development of the National Implementation Plan (NIP) including action plans as appropriate. During OPS-4 there has been a shift towards projects to address the NIP priorities. However, there are still relatively few projects that have been under implementation for any significant time and the results are not yet ready for assessment. Overall, more projects are needed to address development of BAT/BEP for sources of relevance in developing countries. STAP guidance on synergies and trade-offs between energy efficiency and POPs releases and on disposal technologies is underway but will not likely influence OPS-4 to any great extent.

5. Multi-focal area (MFA) work is in its infancy. In presentations to Council and at STAP meetings, STAP has suggested a greater commitment to MFA projects because of their potential to maximise GEBs, deliver co-benefits for human development and increase overall impact across focal areas. STAP draws attention to one of the core benefits that MFA and land degradation control projects in particular should deliver – the increase in carbon sequestration through improved land management, reduced perverse incentives and the possible co-benefits in terms of preservation or sustainable management of biodiversity. The principal barrier regarding the quantification of carbon benefits is the technical means to monitor and measure changes in total system (above- and below-ground) carbon. STAP has recently been instrumental in helping to develop a new targeted research project that will address this barrier. However, attention needs to be devoted to ensuring that the methods and associated monitoring and tracking are made mandatory across all relevant projects.

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