
Report of the Chairperson of the Scientific and Technical Advisory Panel (STAP) to the 52nd GEF Council

1. Introduction

This report provides an update on STAP's work, and progress in implementing its work program since the last Council meeting in October 2016.

Over the last six months STAP has:

- i) begun work on its report for the GEF Assembly, commissioning three new studies on the science of integration. Two of these look at lessons learned across the natural resource management portfolio of the GEF, and the chemical and climate portfolio, respectively. A third looks at the role of the GEF in financing innovation;
- ii) completed and posted the report on strengthening, monitoring, and evaluation of climate change adaptation projects reported on at the last Council;
- iii) further considered its advice on Knowledge Management (KM);
- iv) made progress on four ongoing analyses: the socio-economic aspects of protected areas; climate risk analysis; green chemistry; and mercury; and
- v) contributed to the GEF-7 replenishment discussions, and to the work of the IEO, and made presentations to a number of Conventions, as well as reviewed 30 projects.

2. GEF-7 Replenishment

STAP Panel members joined the technical advisory group meeting in Washington, D.C. (February 7-9) and provided comments on the draft programming document. The Panel also took part in various technical sessions. The STAP Chair attended the first replenishment meeting in Paris (March 29-30), as an observer.

3. STAP report to the GEF Assembly

The Panel continues to work on its report to the GEF Assembly; this will present a science review identifying opportunities for the GEF partnership to strengthen the sustainability of the environment and livelihoods, to achieve the objectives of the Multilateral Environment Agreements (MEAs), and help deliver the Sustainable Development Goals.

In preparation for the Assembly report, STAP commissioned three special reports on natural resource management; integrated climate change, and chemical and waste projects; and on innovation.

a) Study on the Science of Integration in Natural Resource Management

This study, the “A Review of the Science of Integrated Approaches to Natural Resource Management” (GEF/STAP/C.52/Inf.02) addresses three questions: what are the principles for designing integrated natural resources management projects; what lessons can be drawn from the literature on systems thinking, and selected GEF and non-GEF case studies, for the design and implementation of integrated approaches?

The study drew on systems thinking literature, reviewed 28 randomly selected multi-focal area projects, and undertook an in-depth analysis of 10 case studies (GEF/STAP/C.52.Inf.03).

The study indicates that integration in project design varies greatly, and suggests a number of key elements that merit further attention.

- i) In most projects, the integration has been limited to environmental and agricultural related sectors. Few projects include other sectors outside of the natural resources management area. Given the drivers of environmental degradation, projects would benefit from also considering other sectors important to local and national economies, such as mining, tourism, industries, and infrastructure.
- ii) Regarding spatial integration, most projects integrate smaller waterbodies and terrestrial ecosystems. However, wider water bodies that take into account flows from source-to-sea are seldom within system boundaries. Considering flows and processes from source to sea, for example, would require a very large system boundary which may not be feasible to manage in the context of a project, more explicit consideration of upstream and downstream implications of different interventions could avoid unintended consequences and trade-offs across environmental media and the GEF focal areas.
- iii) Concerning equity, most projects include some consideration of gender aspects, yet in many projects the level of analysis appears superficial, suggesting that equity issues are considered only in compliance with project preparation requirements, rather than reflecting a thorough understanding of cultural gender roles, for example, and how projects can tackle them.
- iv) Poverty is usually mentioned in the projects, but few projects target the most vulnerable or poorest populations.
- v) Indigenous populations are commonly considered at the consultative level and as beneficiaries when relevant in the project area, but higher levels of participation, i.e. collaborative, were not evident during project review.
- vi) With respect to learning and adaptive knowledge management, all projects include consultations, but few projects practice ‘co-production of knowledge’ where local

- stakeholders are engaged from start to finish in development and implementation of projects. Some projects have advisory boards that include a wide range of stakeholders from different levels (local, regional, national), but this is limited. Advisory boards or steering committees in many projects consist of only government representatives.
- vii) All projects take knowledge management into consideration, a standard requirement in GEF projects, and many are based on demonstration activities expected to be replicated and up-scaled afterwards. However, there is little indication that learning and adaptive knowledge management is taking place during project implementation.
 - viii) While all projects include monitoring and evaluation mechanisms - where projects are reviewed during implementation - a thorough learning and adaptive knowledge management approach requires iterative participatory assessments, discussions of progress, and development of necessary adjustments. There is little indication that the iterative and participatory aspects of adaptive knowledge management are integrated with monitoring and evaluation.
 - ix) Additional financial resources and time can help enable adjustments in project plans based on lessons learned during implementation. In addition, monitoring and evaluation of progress can empower stakeholders and strengthen their capacity to continue project activities after project completion. Training and field visits of people not part of the project's target group, rather than just workshops to disseminate findings at the end, could be an important approach for learning and adaptive knowledge management.
 - x) The study concludes that integrated approaches need to be flexible and not become a 'straight jacket' or 'check-list', and be adjusted to the particular context and social-ecological system.

b) Study on Principles for Developing Integrated Climate Change, and Chemical and Waste projects

To complement the study on integration in an NRM portfolio, a study is underway for the GEF partnership on how to develop integrated climate change and chemical/wastes projects and programs. The study includes an in-depth analysis of 32 projects. Initial findings suggest that there is a linkage between long-term project performance – in terms of achieving the project's long-term goals - and the incorporation of complex adaptive thinking in project design and implementation. The 18 projects examined that had been rated "high" on their contribution to long-term impact in OPS5 introduced a new technology, business model, or approach that had important comparative advantages to the status quo. This also helped ensure the supporting financial, institutional, and regulatory conditions would enable continuity in changes. All projects included information and awareness-raising campaigns to explain the benefits of the innovations. The final STAP report will also review literature on systems thinking.

c) Study on the GEF and Innovation

This study reviews experience of financing environmental innovation within the GEF and beyond, across four realms: finance, business models, technology, and policy. It presents recommendations on how the GEF can more effectively finance innovation and experimentation. Preliminary findings indicate:

- i) Innovation can rarely be accomplished by a narrow focus on any one of the four areas (e.g. technology, business model, policy or financial innovation). Achieving lasting impact almost always requires a willingness to consider innovation as a function of several (or all) of these areas - particularly if the action is highly transformative or disruptive.
- ii) Significant, lasting impact usually requires time, persistence, and some adaptation, and learning from failure. Rapid success of an innovative approach, while of course welcome, is as likely to indicate that perceived barriers were – in reality – simply perceived, and that the utility of concessional funding for some projects is simply in helping to provide a ‘demonstration’ effect for market participants.
- iii) Innovation is a dynamic process and not a one-time event. Technologies can rapidly evolve and require updating or change, e.g. incandescent bulbs were replaced by CFLs, which in turn are being replaced by LEDs, and what works today may have to be rethought in future projects.
- iv) Innovative solutions to global environmental problems are often location specific. Practical, on-the-ground, solutions vary by region and often even within a country, although sharing experience, e.g. by bringing leaders from coastal cities dealing with rising sea levels together, is often beneficial.
- v) Partnerships will continue to be a critical component of GEF success, particularly with regard to innovation. The number of public and private funders with some commitment to supporting global environmental projects has increased dramatically, outreach to a wider range of partners, particularly from the private sector, will be key.

d) Emerging Environmental Problems

For the Assembly report, STAP is also exploring a number of emerging environmental problems that the GEF may need to confront in the coming years, and evaluating the available scientific evidence:

- i) Sustainable consumption and production patterns through circular economy approaches, including a closer look at the agri-food supply chain, and plastics.

Understanding food systems through a “circular economy” lens involves: reducing waste generation; re-using food, e.g. animal feed, composting; utilizing by-products, e.g. straw, animal manure, and food wastes – for biogas and nutrient effluent; producing sewage gas for bioenergy, and sewage sludge and effluent to recycle nutrients.

STAP will explore the life cycle of plastics: drivers for upstream and downstream interventions; drivers for materials innovation: sustainable chemistry, including public-private partnerships for addressing pollution and waste management; and links to chemicals Conventions.

- ii) Environmental security, including migration and demography, e.g. urbanization patterns, climate change; freshwater scarcity and security; and conflict and peace management-hotspots.

Competition for, and degradation of, natural resources, e.g. freshwater, and arable land, can be a source for conflict; this may be exacerbated by increased urbanization and global climate change. Interventions to deliver environmental benefits may forestall conflict, which often has negative effects on the environment, e.g. directly via defoliation, chemical spills, over-use of high value natural resources, such as timber and wildlife, and indirectly via migration, leading to land degradation, and deforestation.

- iii) Novel entities, such as emerging chemicals, nanomaterials, products of synthetic biology, and their effects on human and environmental health.

This will consider a number of key questions: What are the human and environmental health implications of novel entities? How do novel entities affect the GEF's ability to deliver Global Environmental Benefits (GEBs)? What do novel entities mean for the MEAs?

The analysis on each of these topics will also consider cross-cutting issues such as climate change, the health of our oceans, and future resilience of soils and terrestrial ecosystems.

Initial findings from this work will be given at the November GEF Council meeting.

4. Issues in KM that need highlighting and further scientific attention

STAP is continuing to work on a responsive and GEF-relevant KM Strategy. We welcome the World Bank/GEF publication "The Art of Knowledge: a results-focused planning guide for the GEF partnership" as a downpayment on moving towards a robust KM strategy: it has important information on process and products. A fully functioning KM system will include a well-functioning database system for storing information, but go beyond this in order to develop, manage, track and, above all, learn, from GEF projects and programs.

Key elements STAP recommends include:

- i) Clear goals and objectives, and defining and phasing a KM roll-out. What are our KM systems intended to do, apart from being a repository of information?
- ii) (Choice of management tools: the KM system must avoid information overload, and must deliver tailored, interactive and user-friendly answers.

- iii) Collaborative knowledge creation: consultation with countries and agencies, as well as consideration of new forms of knowledge development, such as social media. There must be links with monitoring and evaluation.
- iv) Employment of powerful analytics to optimize usefulness, discover trends and make evidence-based decisions. Analytical tools include statistical packages, e.g. regression analysis, grouping methods, multiple equation models, trend analysis (MS Excel is the most popular tool but there are many newer sources), stakeholder analysis (a systematic way to analyse stakeholders by their power and interest), and so on.

Economic rationality of project interventions: calculation of cost efficiency of interventions is needed in the GEF, and for most current projects, data are missing to calculate returns on investment capital. STAP made nine recommendations in its earlier report, “Knowledge Management in the GEF” (May 2015) (GEF/STAP/C.48/Inf.03/Rev.01) which we still think need to be incorporated into a true GEF KM strategy.

5. Update on the Socio-Economic Impact of Protected Areas

This report “Assessing the Socio-Economic Impacts of GEF-Supported Terrestrial Protected Areas” will provide operational guidance to help project managers working on terrestrial protected areas to measure the effects of proposed interventions on affected populations: it will propose indicators to assess baseline conditions, and to monitor change, which will contribute knowledge to inform future GEF investments in protected areas. This report follows from the 2014 STAP Advisory Report entitled “Assessing the Effects of Terrestrial Protected Areas on Human Well-Being”, which synthesized the empirical evidence of positive, negative or neutral impacts of protected areas (PAs) on human well-being at the local to regional scales. It concluded that, “The evidence base provides a range of possible pathways of impact, both positive and negative, of PAs on human well-being but provides very little support for decision-making on how to maximize positive impacts.” The GEF Secretariat therefore requested STAP to develop a framework for assessing impacts and to provide field-tested methods to support it, including indicators that project managers can use to determine baseline conditions and to monitor progress; this information will also be helpful in improving future projects.

In June 2016, with support from UNDP, STAP field-tested several assessment methods in South Luangwa National Park (SLNP) in Zambia to get a better understanding of both the positive and negative effects of projects on local businesses and communities. One of the methods focused on tourism – the Tourism Economic Model for Protected Areas (TEMPA) – which estimates the economic benefits of protected areas on the national economy. Applied in Zambia, results using the TEMPA showed that tourism in SLNP generates \$ USD 38 million of value added annually, of which \$ USD 23 million accrued in wages, salaries and fees, resulting in 1,825 local jobs. Applied across Brazil, the TEMPA analysis indicated that direct expenditure by 8.1 million visitors generated more than \$ USD 347 million in direct sales, \$ USD 153 million in personal income, added \$USD 194 million to GDP, and supported 23,813 direct jobs nationally. Other

methods focus on the impact of protected areas on local livelihoods, including the Social Assessment of Protected Areas (SAPA), developed by the International Institute for Environment and Development (IIED).

The guidance is being finalized and will include standalone manuals on the different assessment methods. Eventually, the methods tested in Zambia and Brazil will be developed into a series of short policy briefs, and a practical guidance document aimed at assisting GEF Agency managers to design, assess and report on the impact of protected area projects on communities and businesses through financial, economic and social analyses. STAP will continue to work with UNDP, and other GEF Agencies, to review the proposed methods and indicators to ensure that the final product meets the needs of those working on GEF-funded terrestrial protected area projects.

6. Climate risk analysis and a primer for climate information

Mainstreaming climate resilience across GEF activities has been a longstanding request of the GEF Council (e.g. 2010 Decision on Agenda Item 9 Evaluation of the Strategic Priority for Adaptation, GEF/ME/C.39/4). Moreover, recent guidance from the UNFCCC to the GEF requested it, “[...] to take into consideration climate risks in all its programs and operations, as appropriate, keeping in mind lessons learned and best practices” (2016). In its advisory role, STAP can support the GEF’s renewed efforts to mainstream climate resilience across its portfolio of activities, by achieving a more effective use of climate data to support evidence-based risk screening and decision-making in the development of GEF projects.

STAP is preparing an analysis of the use of climate information and climate risk assessment in sixty-eight full-sized GEF projects from GEF-5 onwards, from all funds and focal areas. The work will be complemented by guidelines for improving the use of climate information for climate risk screening, tailored to the needs of practitioners. Criteria will be proposed for determining what would be considered a “good” or “adequate” climate risk assessment at the PIF and PPG stages. STAP will also a review of climate risk screening approaches currently being used in the GEF partnership.

7. Report on Strengthening, Monitoring and Evaluation of Climate Change Adaptation

STAP and UNEP’s Global Programme of Research on Climate Change Vulnerability, Impacts, and Adaptation initiated a process to assess the state of knowledge on the monitoring and evaluation (M&E) of climate change adaptation (CCA). This report reflects the synthesis of efforts over the past two years in that area, and draws from a wide base of knowledge regarding the current state of national and multilateral actions on adaptation, the outcomes of the Paris Agreement, and the needs and priorities of the GEF.

This synthesis report identifies a number of methodological challenges and difficulties for M&E starting with the difficulty of defining “success” in CCA. The long-term nature of climate change makes the success of adaptation efforts only apparent over time and in retrospect, creating difficulties for current and near-term assessments of progress. Further, adaptation interventions occur against the background of evolving climate, environmental and developmental baselines –

posing challenges for attribution and evaluation – including the relative lack of counterfactual examples for comparative purposes. Finally, the report suggests a number of areas that appear promising for strengthening CCA through more effective M&E. These include:

- i) orienting M&E and adaptation interventions to support learning;
- ii) adopting indicators that reflect the processes of adaptation at different scales and provide contextual richness, while allowing for some degree of comparability and aggregation;
- iii) progressing from project-based M&E to ‘M&E and learning’ (MEL) systems that are linked with developmental efforts; and
- iv) creating environments that enable learning and knowledge management.

STAP hopes that this report will provide timely and actionable inputs to the GEF partnership and looks forward to continued engagement with the partnership in the implementation of its recommendations. An extended executive summary of this paper was presented at the October Council. The full report is now available on the STAP website.

8. Update on Green Chemistry

STAP is developing a “Green Chemistry Compendium” on the application of green chemistry to specific sectors and types of projects. The first part of this is about how to deal with plastics in the environment using green chemistry innovations, following up an earlier STAP report on “Marine Debris as a Global Environmental Problem: Introducing a Solutions-Based Framework focused on Plastics” (A STAP Information Document, 2011).

The work examines how new alternatives and processes could be incorporated into existing production systems, and identifies the policies and incentives necessary to achieve widespread adoption of green alternatives. Preliminary findings show that alternatives to fossil fuel-based plastic feedstocks, including natural polymers from cellulose, starch and glucose derived from crops, such as potatoes or corn, can be processed into thermoplastic starch for use as bags, yogurt tubs, cups, plant pots, cutlery, diaper foil, coated paper and cardboards. And biopolymers, which are naturally synthesized by soil bacteria, can be used for producing stiff packaging goods, as well as highly elastic materials for coatings. However, there are barriers to incorporating alternatives and new processes into existing production systems because of the low cost of current feedstocks, and the initial capital cost.

The work will also emphasize a need for significant shift from the use of plastics as a precondition for achieving multiple Global Environmental Benefits, including for greenhouse gas emissions reduction, reduced chemical and waste contaminations, water pollution and reduced biodiversity impacts.

The next set of publications in the “Green Chemistry Compendium” will focus on other fields where green chemistry can be applied including alternatives to emerging persistent organic pollutants, green chemistry alternatives to use of endocrine receptors in key production processes such fertilizers production, and the implementation of green chemistry in the textiles industry.

9. Update on Mercury

The STAP has concluded Phase 1 of a project to design a Global Mercury Knowledge Platform to identify the science-based knowledge needed for decision-making under the Minamata Convention, and also to improve data quality and access to information about mercury. The aim is a one-stop open access shop for all science-policy relevant mercury-related information essential for monitoring and review of mercury contamination and its global impacts, and for risk assessment, including sampling and data protocols.

Phase 1 identified the desired structure for the web platform as part of UNEP Live; this will provide not only data access but also knowledge, and assistance in delivery, recognizing the needs of different types of users. Phase 1 calls for raising global awareness, an educational campaign on mercury toxicity, and the establishment of an online Communities of Practice, for scientific experts, policy advisors, healthcare professionals, advocacy groups, and interested publics. The report will be available by August 2017.

Phase 2 of the project will focus on operationalizing the web platform on UNEP Live and the implementation of the recommendations of the Phase 1, including establishment of an online Community of Practice.

10. Engagement with the Conventions

UNFCCC COP22 (Marrakech, Morocco, 7-18 November 2016). STAP Panel members Annette Cowie and Anand Patwardhan, alongside colleagues from the GEF Secretariat, UNDP and IRDC (Canada), hosted a side event on “Lessons from adaptation project design and implementation in a development context”. Participants emphasized the role of applied research in informing adaptation priorities, the importance of climate information in decision-making, and the benefits a resilience thinking tool, such as STAP’s Resilience, Adaptation Pathways and Transformation Assessment Framework (RAPTA), can bring to climate change adaptation where decisions are made under uncertainty.

CBD COP 13 (Cancun, Mexico, 2-17 December 2016). STAP held a side event, with GEF colleagues, and Brazil, to present work underway by STAP, in collaboration with UNDP and IIED, to develop methods for project managers to use in assessing the socio-economic impacts of GEF-supported terrestrial protected areas – see also 4 above.

Basel, Rotterdam and Stockholm (BRS) Conventions (Geneva, Switzerland, 24 April to 5 May 2017). STAP participated in two side events. “Looking Back, Looking Forward - Programming for Impact” (24 April) was organized by the GEF. The event highlighted how the GEF’s Chemicals and Waste portfolio has expanded (in terms of total funding and number of chemicals covered) between GEF-3 and GEF-6 and plans for the chemical and waste portfolio in GEF-7. Ricardo Barra, the STAP panel member for chemicals and waste, participated as a panelist and highlighted the important role that science plays in achieving global and local chemical and waste management objectives and call for the incorporation of science from the onset in order to achieve a bigger impact in GEF-7. “From Science to Action”, co-organized by STAP, Nigeria and BRS Secretariat

focused on the Science to Action Roadmap which STAP contributed to its development in collaboration with the BRS secretariat. The event highlighted the importance of bridging and strengthening the science-policy interface for achieving the objective of three BRS Conventions. Ricardo Barra participated as a panelist and emphasized the importance of adopting an integrated and interdisciplinary approach as well as understanding other perspectives (including economic and sociology) in order to solve complex chemical problems, noting that chemistry alone will not solve the world's complex chemical challenges.

UNCCD COP (hosted by China, September 6-16 2017). Annette Cowie, the STAP member for land degradation, will speak at side events about the links between land degradation neutrality, and resilience. She will draw from the Land Degradation Neutrality Framework, and the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) Framework. The UNCCD released the “Scientific Conceptual Framework for Land Degradation Neutrality (LDN)” in February 2017: Annette Cowie is a co-author of the report. The framework provides a scientifically-sound basis for planning, implementing and monitoring LDN. The conceptual framework focuses on the goal of LDN and the supporting processes required to deliver it, including biophysical and socio-economic aspects, and their interactions. It emphasizes integrated land use planning as a mechanism for achieving LDN, and describes indicators for assessing LDN status.

11. Observations on STAP's Screening of the GEF Work Program

