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REPORT OF THE CHAIR OF THE SCIENTIFIC AND TECHNICAL ADVISORY PANEL TO THE 70TH GEF, 39TH LDCF/SCCF, AND 5TH GBBF COUNCIL MEETINGS

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the Scientific and Technical Advisory Panel
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STAP
SCIENTIFIC AND TECHNICAL
ADVISORY PANEL
*An independent group of scientists that advises
the Global Environment Facility*

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Report of the Chair of the Scientific and Technical Advisory Panel to the 70th GEF, 39th LDCF/SCCF, and 5th GBBF Council Meetings

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1. Introduction

This report provides an update on the work of the Scientific and Technical Advisory Panel (STAP) to the Global Environment Facility (GEF) since the 69th GEF, 38th Least Developed Countries Fund (LDCF)/ Special Climate Change Fund (SCCF), and 4th Global Biodiversity Framework Fund (GBFF) Council meetings in June 2025.

A year ago, STAP's initial perspective on GEF-9 surveyed the scientific trends influencing the context for GEF strategy and presented a set of seven recommendations to assist the GEF in translating its strategic priorities into practice. This report summarizes new STAP publications addressing four of these recommendations:

- On the theme of *innovation and risk* (recommendation 2), our new advisory document on artificial intelligence (AI) and the GEF focuses on both the promise of harnessing AI to deliver global environmental benefits (GEBs) and the concomitant environmental, social, and governance risks.

- On *policy coherence and governance* (recommendation 3), our new brief on fostering cooperation and managing conflict in GEF transboundary water projects and our new report on biodiversity conservation in the Anthropocene each outline imperatives for coordination across sectors and scales in their respective domains.

- On *social foundations for transformation* (recommendation 4), our new brief on strengthening GEF support for Indigenous Peoples summarizes practical insights validated through extensive consultation, while our new information note on social resilience for system transformation distils the science on an essential prerequisite for broader systems transformation.

- On *early and adaptive learning and networked knowledge management* (recommendation 7), our new brief on real-time monitoring, evaluation, and learning (MEL) summarizes cutting-edge practice that can strengthen adaptive management and track progress towards systems transformation.

Ongoing and planned STAP engagement through the end of the Eighth GEF Replenishment Period (GEF-8) addresses the remainder of our GEF-9 recommendations. This includes feedback on draft GEF-9 Policy and Programming Directions, including the *portfolio-wide theory of change* (recommendation 1) in support of the GEF replenishment process. Our work on the theme of *market transformation in targeted sectors* (recommendation 5) includes planned analysis on breaking "lock-in" within the Chemicals and Waste focal area. We plan to continue engaging the GEF Secretariat and GEF agencies as they *revisit the GEF results framework* (recommendation 6). Other planned work will synthesize emerging evidence on principles for catalysing sustainable transformation (cross-cutting several recommendations, and building on STAP's Enabling elements of good project design); analyse the implications of the suite of emerging technologies for the GEF (recommendation 2); and summarize the science on global governance of the hydrological cycle, including approaches to build greater policy innovation and coherence (recommendation 3). STAP will also prepare its quadrennial Assembly report, collaborate with the GEF Secretariat to co-organize a global forum on learning from the GEF IPs, and organize briefings and webinars, as requested by the GEF, on a variety of topics.

The next sections highlight key findings from the new STAP briefs (section 2) and reports (section 3), STAP's recent engagement with Integrated Programs (IPs) and multilateral environmental agreements (MEAs) (section 4), and the screening of the current GEF work programs (section 5).

The proposed STAP work program for the next six months (section 6) is presented for Council review. This is followed by brief updates on the activities of STAP panel members over the past six months (section 7).

2.   New STAP briefs

Responding to feedback from the GEF Council and GEF agencies, STAP has renewed the practice of developing short communicative briefs of its reports to make its scientific and technical advice more applied, accessible, and actionable across the GEF Partnership. The three newest briefs are summarized in this section. In addition to summarizing the original reports presented to the GEF Council, the briefs contain updated information on the latest science.

2.1. Fostering cooperation and managing conflict in GEF transboundary water projects

This STAP brief builds on the STAP information note Fostering cooperation and managing conflict, as well as on the STAP report Environmental security: Dimensions and priorities. Transboundary freshwater and marine water resources are intricately linked to both cooperation and conflict. Accordingly, they can generate multiple benefits for ecosystems, people, and countries, but they can also entail considerable environmental, economic, social, and political costs or be affected by conflict themselves.

A focus on transboundary resource management is crucial for interrupting or mitigating vicious cycles of water-related conflict and promoting virtuous cycles of water-related cooperation for GEBs and co-benefits. STAP suggests four areas of action to further strengthen GEF investment in international waters and harness the co-benefits of cooperation, while also preventing water-related conflicts and effectively managing broader conflicts that can impact GEBs. Some of these actions can be taken during project design, such as through the theory of change, future narratives, and risk assessment; others can be addressed during project implementation. The four dimensions (in bold) and recommendations are as follows:

- **The transboundary nature of water resources requires cooperation between actors, sectors, and States to achieve GEBs.**

  The GEF is encouraged to identify (i) the necessary cooperation between the actors responsible for the shared water resource to achieve the intended GEBs and (ii) the necessary interventions to establish, or strengthen existing, cooperation between those actors.

- **Cooperation over shared water resources benefits nature and people and could support cooperation and peacebuilding beyond water.**

  The GEF can more clearly capture the cooperation benefits that International Waters projects generate and account for these increasingly important peace co-benefits throughout the project cycle. Identifying co-benefits in context and incorporating

them into project and program design, as noted in [STAP's information note on co-benefits](), helps ensure their realization.

- **The shared nature of water resources can lead to disagreement and conflict among nearshore users and States, with repercussions for GEBs.**

  Proactively assessing the conflict potential related to shared water resources in designing projects and considering ways to prevent or mitigate conflicts in theories of change would assist the delivery of GEBs. Such an assessment requires a sound understanding of the basin, aquifer, or large marine ecosystem that the GEF intends to engage in, including the diverse interests of stakeholders, particularly across national boundaries.

- **Insecurity, fragility, and conflict can negatively affect freshwater and marine ecosystems and thus threaten GEBs.** Dynamics in active conflict or fragility settings can evolve rapidly throughout a project's life cycle; project teams need to be attuned to detecting escalating tensions and adjusting interventions before those tensions disrupt or delay project implementation. Supporting this capability could include training project staff in conflict sensitivity and crisis response. By embedding flexibility and conflict sensitivity into project management and monitoring, projects can remain responsive to changing conditions.

2.2. Strengthening GEF support for Indigenous Peoples

STAP's brief on [strengthening GEF support for Indigenous Peoples]() outlines how the GEF can more effectively and equitably support Indigenous Peoples, whose knowledge, governance systems, and territorial stewardship are central to achieving GEBs. This brief builds on the STAP information note [Strengthening GEF support for Indigenous Peoples](), which drew from a STAP dialogue event, consultations with members of the GEF Indigenous Peoples Advisory Group and the Global Steering Committee of the GEF Inclusive Conservation Initiative, and completed GEF projects.

The brief elaborates on the recommendations of the main report and provides specific actions and case studies to inform how the recommendations can be implemented across the GEF Partnership:

- **Bridge scientific and technical knowledge systems to promote mutual learning and incorporate Indigenous perspectives in projects and programs.** Specific actions for GEF consideration include (i) developing formal guidance on the role of Indigenous knowledge in GEF programs and projects and (ii) adopting more integrative, culturally relevant indicators for use in projects involving Indigenous Peoples.

- **Reinforce Indigenous rights and control of the free, prior, and informed consent process and protocols** to ensure that Indigenous Peoples are involved in initiatives affecting them on their own terms. One action to facilitate this is to develop a harmonized free, prior, and informed consent standard and safeguard process among GEF agencies.

- **Recognize and strengthen Indigenous Peoples' role in GEF governance,** as has been called for by some MEAs that the GEF supports. Institutionalizing Indigenous representation within GEF decision-making bodies is an option for achieving these strengthened roles.

- **Co-design projects and programs with Indigenous Peoples to advance Indigenous Peoples' guardianship and secure GEBs.** Work towards this recommendation could be facilitated through an interactive working group with diverse representation of Indigenous Peoples to develop principles and practical guidance for project co-design and co-implementation.

- **Expand fit-for-purpose finance to enable Indigenous Peoples to move from vision to implementation,** for example, by systematically clustering multiple grants (e.g. multiple small grants) to build capacity among Indigenous communities; by strategically integrating multiple medium-sized, full-sized, and small grants; or by creating multi-donor Indigenous partnerships to advance Indigenous-led funds.

2.3. Real-time monitoring, evaluation, and learning in GEF-9
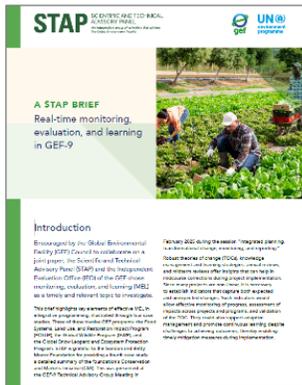
STAP's brief Real-time monitoring, evaluation, and learning in GEF-9 outlines how real-time MEL can strengthen adaptive management and transformational change in GEF-9. It is based on the STAP/GEF Independent Evaluation Office (IEO) information note on the same topic, presented at the June 2025 GEF Council meeting, which contains analyses of four case studies from within and outside the GEF on food systems, wildlife, ecosystem protection, and conservation and markets.

The case studies offer insights into how MEL practices and adaptive management processes can foster resilience and enhance programming outcomes.

The brief highlights key elements of effective MEL in integrative programming and presents five recommendations, along with specific actions to improve MEL. The recommendations are as follows:

- **Use theory of change as a key tool for early evidence-based learning.** The GEF is encouraged to improve early monitoring of project and program theories of change during implementation to support iterative learning and adaptive management.

- **Establish "learning questions" to support the foundation of a robust MEL framework.** An MEL framework guided by learning questions supports data collection, analysis, and monitoring, helping capture knowledge and inform better practices and outcomes.

- **Strengthen regional and thematic platforms for learning and sharing best practices to promote collective management, shared responsibility, and learning exchanges**, and to foster innovative solutions. Specific actions include connecting the GEF-7 and GEF-8 knowledge platforms and purposefully designing future programs to leverage knowledge and learning from existing platforms.

- **Encourage adaptive planning by embedding flexible frameworks that support continual learning and adjustment.** Embedding flexible, adaptive planning approaches, such as using future narratives to understand plausible futures, can help

projects adjust to evolving global change drivers. Midterm reviews should drive midcourse corrections.

- **Identify indicators that can track the progress of scaling processes.** The GEF could consider developing common indicators across its IPs that incorporate intermediate and long-term goals and capture processes for delivering transformational change.

Overall, the brief provides a roadmap for strengthening MEL in GEF-9 by promoting early learning, flexible planning, stronger knowledge platforms, and indicators that track transformation, increasing the likelihood that GEF investments will deliver durable GEBs.

3. New STAP reports

3.1. Artificial intelligence and the GEF: STAP's early thoughts

AI is rapidly reshaping several areas of the GEF's work, including environmental monitoring, decision support, and project delivery, creating opportunities to enhance efficiency and environmental outcomes. However, unregulated adoption of AI can adversely affect the GEF's objectives due to increased energy, water, and natural resource use.

STAP, in collaboration with the GEF Secretariat and the GEF IEO, organized a virtual consultative workshop on 4 November 2025, titled "Maximizing the benefits and managing the risks of artificial intelligence in the GEF". The event brought together participants and speakers from more than 30 institutions across 15 countries, representing GEF agencies, international organizations, academia, civil society, and the private sector. Panellists and moderators represented, among others, the World Resources Institute, the International Telecommunication Union, the United Nations Environment Programme, the World Bank, Conservation International, the United Nations Development Programme, the United Nations Educational, Scientific and Cultural Organization (UNESCO), Code for Africa, and the Royal Academy of Engineering. See the Annex for the workshop agenda.

Building on these deliberations, the STAP information note Artificial intelligence and the GEF provides an assessment of the opportunities and risks associated with AI, drawing on scientific

evidence, case studies, and expert inputs. It highlights the potential of AI to accelerate the delivery of GEBs and adaptation benefits, as well as the environmental, social, and governance challenges associated with AI that need to be addressed to enable responsible adoption.

The note finds that AI is already being deployed across all GEF focal areas. These include biodiversity monitoring, anti-poaching efforts, deforestation detection, climate modelling, renewable energy optimization, early warning systems, precision agriculture, transboundary water management, and circular economy solutions. AI is also increasingly used by GEF agencies to strengthen portfolio management, project preparation, monitoring, evaluation, knowledge management, and policy coherence. Some GEF-funded projects have incorporated AI components, and demand for such tools is expected to grow in GEF-9 and beyond.

The note also highlights that AI poses environmental risks throughout its life cycle (Figure 1), including high electricity consumption, substantial water usage for cooling, pressure on mineral supply chains, rapid hardware obsolescence, and increasing e-waste generation. Without safeguards, AI may also exacerbate social and economic inequalities due to uneven data availability, digital divides, algorithmic bias, loss of traditional knowledge, lack of transparency, and risks to privacy and community rights. The use of generative AI in project design and strategic planning also requires strong human oversight to mitigate the risks of inaccurate or biased outputs.
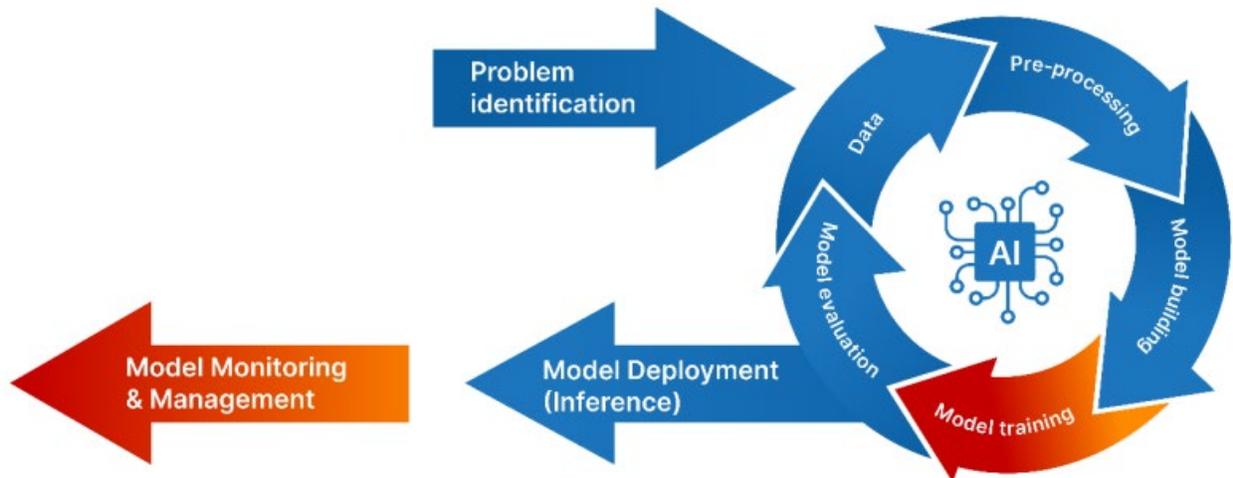
Figure 1: The AI lifecycle is an iterative process that begins with identifying a problem, collecting and preparing data, building and training a model, and then evaluating its performance. Once validated, the model is deployed into real-world settings, where ongoing monitoring and management ensure it remains accurate and may trigger updates that loop back to earlier stages. Source: Adapted from The United Nations International Telecommunications Union (ITU).[1]

The note highlights several implications for the GEF:

- The GEF needs to assess the potential of AI use to improve the efficiency and responsiveness of GEF operations.

- The GEF Partnership would benefit from tailored guidance on the responsible and inclusive use of AI.

- The GEF could actively build strategic learning partnerships with actors at the frontier of AI and environmental action to advance a precautionary, ethical, and inclusive approach, anchored in safeguards, transparency, equity, and alignment with global governance standards.

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[1] ITU (2024). AI and the Environment - International Standards for AI and the Environment 2024 Report. International Telecommunication Union. https://www.itu.int/dms_pub/itu-t/opb/env/T-ENV-ENV-2024-1-PDF-E.pdf

- Supporting recipient countries in developing the foundational elements of digital infrastructure specific to environmental applications will be essential to ensuring equitable access.

- As AI tools become more prevalent in project preparation and monitoring, the GEF should promote strong principles of human oversight, validation, and accountability in GEF-financed activities.

- Alignment with international AI governance norms, such as those of UNESCO, the Organisation for Economic Co-operation and Development, and the broader United Nations, is crucial for upholding human rights and environmental sustainability in GEF-supported interventions.

- AI-related environmental and social risks should be reflected more explicitly in the GEF's environmental and social safeguards, with attention paid to algorithmic bias, data justice, life cycle impacts, and transparency.

3.2. Considerations for biodiversity conservation in the Anthropocene

More than half the terrestrial biosphere, including existing protected areas and key biodiversity areas, now comprise novel ecosystems: ecosystems that have been irreversibly altered by human actions, both directly (e.g. through land-use change, overexploitation, and introduced alien species) and indirectly (e.g. through differential species responses to climate change). Novel ecosystems are those where species composition, abundances, interactions and/or ecosystem functions are without historical precedent. Such areas have crossed a threshold precluding their return to a state before significant human modification. Traditional conservation approaches, which assumed that stable historical ecological conditions could be conserved or restored, are outdated in today's world of rapid and sometimes unexpected environmental change. STAP emphasizes that conservation policies and management strategies must explicitly recognize and adapt to ongoing changes and ecosystem transformations to ensure the continued provision of ecosystem services, even as ecosystem structures and compositions evolve. STAP's information note Considerations for biodiversity conservation in the Anthropocene discusses these issues and includes several illustrative case examples.

To respond, the GEF projects may consider designing future projects to be resilient to novel conditions attributable to climate change, both expected and unexpected. In addition, public-private partnerships such as Project Finance for Permanence can mobilize significant long-term funding for biodiversity management within and outside of currently protected and conserved areas, with time scales ranging from 10 to more than 50 years. The GEF has invested in several of these partnerships.

Based on these overarching needs, STAP makes several recommendations for consideration in GEF-9 to assist in developing projects and programs that are resilient to global change:

- **Increase connectivity, going beyond migration corridors to manage large-scale conservation mosaics for landscape permeability.** Conservation mosaics are large, multi-jurisdictional landscapes and seascapes with collaborative governance to coordinate planning, facilitate co-management, and promote environmental justice. Ecological connectivity has become a core priority for achieving global biodiversity goals, including Global Biodiversity Framework Targets 2 and 3 (restoration and "30x30" target). Well-connected ecosystems are crucial for maintaining ecological and evolutionary processes, especially in the context of climate and other environmental change. Ecological connectivity refers to links between particular habitat patches that facilitate the movement of species between areas (e.g. via corridors).

  In addition to corridors, it is increasingly important to consider overall landscape permeability: the degree to which landscapes, natural and developed, can sustain ecological processes and are conducive to the movement of many different organisms under the multiple stresses of climate change and land-use change.

- **Identify and support the protection of climate change refugia** for biodiversity. Refugia are areas that are relatively buffered from current climate change, enabling terrestrial and marine species and ecosystems to persist. In some cases, it may make sense to prioritize the protection of climate refugia over the restoration of historic conditions, which may be impossible. Ensuring that both existing and emerging

terrestrial and marine refugia are fully incorporated into protected area networks offers a strong pathway to securing long-term ecosystem function, preventing local extinctions, and enhancing the future resilience of biodiversity.

- **Explicitly consider the implications of climate change for maintaining and restoring ecosystem services.** Restoration efforts may find it more effective to focus on continuing the delivery of ecosystem services (supporting, provisioning, regulating, and cultural) by explicitly considering the implications of climate change for restoration objectives, rather than by re-establishing historic species assemblages, or reference states, which may not be possible.

  Explicitly considering interactions between biodiversity and climate mitigation and adaptation measures can ensure coherence between land-use and sea-use objectives and planning in national biodiversity and climate strategies. Restoration that integrates the priorities of the three Rio Conventions, rather than implementing projects for each convention separately, can be more effective at tackling multiple stresses and more cost-efficient.

The GEF needs to closely monitor and integrate emerging science on climate refugia, as these areas hold significant potential for multiple co-benefits, including improved productivity and livelihoods and strengthened protection from extreme events.

3.3. Social Resilience for System Transformation

The STAP information note responds to the increasing recognition across the MEAs and in the draft GEF-9 Programming and Policy Directions that delivering durable global environmental and adaptation benefits and achieving transformational change through projects and programs involving communities depends on strengthening foundational factors that enable communities to act collectively.

This note builds on previous STAP guidance documents, including our report on behavioural change, advice on achieving durable outcomes in fragile and conflict-affected situations, and synthesis on the enabling elements of good project design. The note synthesizes evidence from the behavioural and social sciences to show that many community-based approaches fall short

when communities lack social resilience and therefore cannot act collectively. Importantly, it emphasizes that social resilience should be treated as a prerequisite for durable GEBs, particularly in least developed countries, small island developing States, and fragile and conflict-affected situations, where stressors tend to be more acute. Social resilience enhances communities' ability to sustain collective action beyond project closure and strengthens the durability of outcomes.

The note highlights seven interdependent institutional and psychological factors for resilient communities. Institutional factors represent established social structures that shape behaviour and are already familiar to the GEF and embedded in current and forthcoming programming. They include anchor institutions, resilient livelihoods, and women's empowerment. Psychological factors reflect how individuals think, feel, and interact, including well-being, care, hope, and agency. Social cohesion falls into both categories because it operates simultaneously at the structural (institutional) and subjective (psychological and social-relational) levels. These foundational elements directly reinforce the GEF's increasing focus on behaviour change, participatory governance, multi-stakeholder engagement, whole-of-society approaches, and women's empowerment.

STAP identifies several actions for the GEF Partnership to continue to integrate these foundations into its work. These principles reinforce the considerable progress made in areas covered in past STAP advice, including the effective use of theory of change in project and program design, the adoption of simple future narratives, guidance on climate risk screening, and other measures to make GEF investments resilient. The actions identified in this information note are as follows:

- Embedding the principle of social resilience into project design, theories of change, and implementation strategies.

- Strengthening partnerships with local anchor institutions, such as civil society organizations, cooperatives, Indigenous governance structures, faith-based groups, schools, and health centres, drawing on lessons from the GEF Small Grants Program.

- Advancing women's empowerment and investing in local leadership, as intended in the draft GEF-9 Programming Directions, including through leadership and business development training for women and young people.

- Integrating community well-being and care into adaptation and resilience investments, for example, by supporting scalable community approaches.

- Enhancing monitoring, learning, and communication on social resilience by capturing best practices and communicating successful community transformations to inspire hope and replication.

4. STAP engagement with MEAs and IPs

First Global Meeting of the Food Systems Integrated Program. STAP joined the first such gathering since the launch of the IP, with 25 of the 32 participating countries represented, at the headquarters of the Food and Agriculture Organization of the United Nations in Rome, Italy (10–12 September 2025). The meeting discussed key opportunities and challenges in implementing the IP, including countries' technical needs and how the global coordination project could best address them.

Of particular interest to STAP are the "communities of practice" planned to support the program. Discussions focused on identifying priority themes to support the IP's goal of transforming food systems by addressing the drivers of environmental degradation in targeted systems (aquaculture, livestock, commodities, and food crops), while embracing sustainable finance and policy coherence. Initial ideas from the GEF Secretariat about the interoperability of the IP's knowledge platforms were also briefly discussed. STAP plans to stay informed and engaged in the IP, including participating in communities of practice where STAP advice may be needed. Possible topics on which STAP could offer advice include transformation metrics, policy coherence, and future narratives to avoid maladaptation.

Inaugural Plastic Reboot Integrated Program Conference. STAP participated in the first annual Plastic Reboot Conference, held in Salvador, Brazil (22–24 October 2025). The event brought together representatives from 15 national child projects across Africa, Asia, and Latin America, participating in the Plastic Reboot IP (formerly Circular Solutions to Plastic Pollution). Hosted by the Government of Brazil in partnership with the GEF, the United Nations Environment Programme, and the World Wildlife Fund, the event highlighted the IP's focus on upstream and

midstream interventions to reduce plastic pollution in the food and beverage sector, emphasizing governance and policy reform, knowledge and capacity-building, public awareness and consumer behaviour change, locally adapted extended producer responsibility systems, and finance and investment for scaling circular solutions.

A common framework of indicators, including a harmonized plastic footprint and a core program indicator, is currently being developed consultatively, with STAP input. STAP will continue to engage with the IP through participation in the community of practice and offer advice on topics such as indicators and metrics for transformational change; emerging solutions across various innovation domains; effective MEL; and synergies with the Elimination of Hazardous Chemicals from Supply Chains and the Sustainable Cities IPs.

Sixth Meeting of the Conference of the Parties to the Minamata Convention on Mercury. STAP attended the Minamata Conference of the Parties in Geneva, Switzerland (3–7 November 2025) and participated in discussions with country delegates, the GEF Secretariat, the Secretariat of the Minamata Convention, GEF agencies, civil society, and Indigenous Peoples. In addition, STAP participated in the ad hoc Programme Steering Committee Meeting for planetGOLD and the information exchange among representatives of small island developing States.

Committee for the Review of the Implementation of the UNCCD and Tafa'ul Process on Drought Resilience. STAP will participate in the 23rd session of the Committee for the Review of the Implementation of the United Nations Convention to Combat Desertification (UNCCD), to be held on 1–5 December 2025 in Panama City, Panama. The session is designed for Parties to the Convention to exchange views on UNCCD reporting methodologies, implementation frameworks, priorities for science–policy guidance, and deliberations for the future strategic framework. The outcomes form the basis for negotiations and the decision text at the next UNCCD COP17 in Mongolia.

STAP will be especially attuned to thematic topics, including policy frameworks and priorities for science–policy guidance, with the expectation that some of the outcomes could influence its future work program. STAP will also participate in the Tafa'ul Process on Drought Resilience,

organized by the UNCCD COP16 president, to discuss the structure and scope of a future global drought framework or protocol as part of the UNCCD Action Agenda.

5. Screening of the GEF Trust Fund, LDCF/SCCF, and GBFF work programs

STAP will screen the December 2025 work program of the GEF Trust Fund, the LDCF, the SCCF, and the GBFF.

The work program comprises

- 25 GEF Trust Fund projects
- 1 LDCF and 1 SCCF projects
- 2 multi-trust fund projects
- 6 GBFF projects. The GBFF projects comprise 3 medium-sized projects (between $2 million and $5 million) received for screening between June and November 2025, and 3 regular work program projects.

The STAP Chair will present STAP's observations on the work program during her presentation to the GEF Council.

6. Future work: STAP work program to June 2026

The proposed STAP work program for the remainder of the GEF-8 period is described below, including details on work program items, their relevance to the GEF mandate, rationale, and expected outputs.

Reports

STAP report to the 8th GEF Assembly. STAP will prepare its formal report to the 8th GEF Assembly – as mandated under its terms of reference to submit a quadrennial report that considers the broad scientific and technical issues that emerged during the preceding phase of the GEF, the state of the science, emerging issues, and gaps – as an outlook for the subsequent replenishment period of the GEF. Priority areas for this report will be sharpened on the basis of the current Council meeting and subsequent replenishment discussions.

Principles for catalysing sustainable transformation. STAP is developing a paper to outline pragmatic principles to guide, assess, and strengthen GEF interventions aimed at catalysing sustainability transformations. Although the GEF's mandate, scale of financing, and emphasis on transformational change position it to exert important influence, sustainability transformations are complex, political, and uncertain. The paper will synthesize recent research and practice to identify principles to help GEF partners navigate complexity, power dynamics, and uncertainty when designing and implementing transformative interventions. This priority emerged from the STAP workshop in June 2024, which brought together more than 40 global experts as part of preparing STAP's initial perspectives on GEF-9. The analysis is being coordinated with the GEF's Integration and Knowledge Division, and the findings are expected to inform the design and rollout of the GEF-9 IPs.

Global governance of the hydrological cycle. The hydrological cycle is undergoing profound disruption due to warming temperatures, land-use change, pollution, groundwater depletion, melting cryosphere systems, and shifting precipitation patterns. These changes impact all GEF focal areas; however, governance arrangements remain fragmented, sectoral, and poorly coordinated at the transboundary, regional, and global scales. As water becomes increasingly variable, unpredictable, and contested, weak governance will amplify risks to ecosystems, human health, food systems, energy security, and the delivery of GEBs. The Water Law Working Group at the World Bank is developing a report on the governance of the global hydrological cycle. STAP's Panel Member for International Water, Prof. Susanne Schmeier, is part of this working group and a co-author of the forthcoming report. STAP will prepare a brief highlighting the key findings and recommendations of the World Bank report from the GEF perspective. The brief will highlight how changes in the global hydrological cycle may impact the delivery of GEBs and present actionable aspects of the report that are most relevant for future GEF programming.

Breaking "lock-in" within the Chemicals and Waste focal area. "Lock-in" refers to the combination of economic, social, technological, and political dynamics that perpetuate and reinforce the status quo, including reliance on harmful practices. These dynamics have contributed to the continued production and use of hazardous chemicals. Because lock-ins constrain change, interventions need to address underlying structural drivers or will only deliver

incremental or temporary improvements. As the GEF increasingly seeks systems transformation, a lock-in lens offers a practical way to identify leverage points, anticipate perverse incentives, and design interventions capable of shifting entrenched systems. Informed by discussions with the GEF Chemicals and Waste team, as well as by the Stockholm and Minamata Conventions, this analysis aims to strengthen the effectiveness, durability, and transformational potential of GEF interventions in the Chemicals and Waste focal area and other relevant focal areas. The report will use the following two contrasting case studies to illustrate how lock-in shapes challenges related to chemicals and waste: antimicrobial resistance, and hazardous releases from end-of-life lithium-ion batteries. The report will provide a framework for analysing lock-in and improving the design of projects where lock-in is applicable and will identify cross-cutting lessons to enhance the GEF's contributions across different focal areas and IPs.

Emerging technologies and the GEF. Emerging technologies, including AI, machine learning, the Internet of Things, digital twins, blockchain, robotics, biotechnology, nanotechnology, 3D printing, and cloud computing, are experiencing rapid growth. STAP's earlier work on novel entities underscored that these technologies could unlock major opportunities for delivering GEBs but can also create new (or exacerbate existing) risks, including increased energy, water, and mineral demand, as well as have unintended impacts on ecosystems, climate mitigation, and human well-being. It would be helpful for the GEF to have a systematic way to evaluate emerging technologies across focal areas, ensuring that their adoption is environmentally sound, equitable, ethical, and context-appropriate. This analysis will build on STAP's prior advisories on innovation and novel technologies, STAP's insights from its initial perspective on GEF-9, findings from the IEO evaluation of technology application in the GEF, a review of existing strategies within the GEF Partnership, and relevant global assessments, to consider develop principles, safeguards, and decision criteria that could guide the responsible uptake of emerging technologies.

IP engagement

Global Forum for the GEF Integrated Programs. STAP will support and collaborate with the GEF Secretariat to co-organize a global forum for the GEF IPs in April 2026. The overall objective of the IP forum is to strengthen learning and knowledge exchange on the GEF integrated approach

programming for impactful and durable outcomes. It presents an opportunity to learn from and share experiences across the GEF Partnership since integrated programming began in GEF-6. The forum will bring together GEF agencies, country project teams, and executing partners to foster learning and knowledge-sharing on the IPs. STAP will collaborate with the GEF Secretariat to develop a framework that will inform and guide the call for session proposals, provide substantive input into the forum's content, help identify expert participants, and organize targeted training and STAP sessions at the forum. The forum is also expected to inform the STAP work program in GEF-9.

Briefings and training events

STAP will collaborate with the GEF Secretariat to organize targeted training, briefings, and webinars aimed at enhancing the visibility and practical impact of its reports and advice. Training sessions will focus on providing practical and actionable information from STAP guidance documents, including future narratives, risks and innovation, theory of change, and transformational change, to support the design of projects. Webinars will focus on presenting the key findings and recommendations from STAP thematic reports. Two to three briefings are anticipated in the first half of 2026, prioritized in response to the GEF Secretariat's identification of needs.

Project screening

STAP will contribute to ensuring the scientific soundness and technical quality of GEF projects by screening full-sized GEF Trust Fund and LDCF/SCCF projects, as well as all GBFF projects with budgets above $2 million.

7. Panel member updates

Dr Rosina Bierbaum, STAP Chair, presented an integrated vision on global change needs for the next decade to the Governing Council of IIASA (the International Institute for Applied Systems Analysis) in July, based on a year-long study she chaired. She designed, supported, selected, and hosted the first group of Health and Climate Change young professionals in Michigan in August.

She attended the GEF 2nd replenishment meeting in Kasane, Botswana, in October. She also participated in the Center for Molecular and Clinical Epidemiology of Infectious Diseases workshop on the Impacts of Climate Change on water and health in October, a special session focused on the emerging issue of deoxygenation of aquatic systems. She presented updates on the latest climate science to the Climate Reality Board in both July and November. She chaired a Conservation and Wildlife Health Panel for the Wildlife Conservation Society in October. She participated in meetings with the American Academy of Arts and Sciences in October and the National Academy of Sciences in November. She opened the STAP AI workshop held in consultation with the GEF Secretariat and the IEO.

Dr Jonathon Barnett, Panel Member for Climate Change Adaptation, co-authored three recent peer-reviewed papers: Health risks of migration in a heating world, Hope as an enabler of climate change adaptation, and Local observations of impacts and responses to climate change rise in the Marshall Islands (in press). He contributed a book chapter on the role of policy networks in adapting to sea-level rise – the case of Victoria, Australia in Planning and designing cities for a rising sea level. Dr Barnett also presented on methods for tracking adaptation progress and on the role of hope in climate responses at the Climate Adaptation 2025 Conference in Perth, Australia, and on adaptation monitoring in the Marshall Islands at Adaptation Futures 2025 in Christchurch, New Zealand. He co-led several seminars on Australia's adaptation efforts and the Australian Adaptation Database.

Dr Ermias Betemariam, Panel Member for Land Degradation, recently co-authored the following publications: A transdisciplinary framework to bridge science–policy–development gaps in global land management initiatives, Balancing livestock free grazing and ecosystem functionality: investigating the carrying capacity of grazing land in the Eastern Savannah of Rwanda, and Modelling and mapping maize yields and making fertilizer recommendations with uncertain soil information.

Dr Ngonidzashe Chirinda, Panel Member for Climate Change Mitigation, spoke at a side event of the RISE-SWC international conference, on "Different names, one goal – climate change mitigation, carbon sequestration, soil health and food security". He co-authored a chapter in the Food and Agriculture Organization of the United Nations report *Update on scientific findings on*

the interactions between agriculture, food systems and climate change. He also co-authored the following articles: Nitrous oxide emissions and wheat yield responses to nitrogen rate and source in contrasting rainfed cropping systems in Morocco; Can drone images predict within-field variability in soil fertility? A case study in the Northern Region of Ghana; and Seasonal rainfall patterns affect rainfed maize production more than the management of soil moisture and different plant densities on sandy soils of semi-arid regions. Dr Chirinda also wrote an opinion piece for Business Green, a media platform and community that provides news, analysis, and events for the green economy in Europe, titled Seeds of stability: How African agritech can secure global food futures.

Dr Miriam Diamond, Panel Member for Chemicals and Waste, received the Excellence in Exposure Science Award from the International Society of Exposure Science in July. She was a member of the Steering Committee of the World Economic Forum's publication 10 Emerging Technology Solutions for Planetary Health. She published five papers, including a study of microplastics along a 2200 km transect from the Laurentian Great Lakes to the Arctic, a study of "forever chemicals" (per- and polyfluorinated alkyl substances or PFAS) in outdoor building products, and corporate "capture strategies" that impact human and ecosystem health. She gave several media interviews, including regarding the contamination of Canadian waters with PFAS. Her research was recognized as one of the 7 game-changing University of Toronto innovations and ideas making a global impact, which also appeared in The Guardian.

Dr Blake Ratner, Senior Adviser to the Chair, led dialogue to pursue strategic alignment across three global initiatives addressing people-centred land and natural resource governance: the International Land Coalition, the Global Landscapes Forum, and the 1000 Landscapes for 1 Billion People initiative, at New York Climate Week in September. In India, he co-facilitated deliberations on collaborative governance arrangements among more than 60 civil society organizations working to strengthen the social infrastructure for community-led regeneration of forest, pastureland, river, and coastal ecosystems as part of the Common Ground Initiative. Collaborating for Resilience, the nonprofit Dr Ratner leads, has developed innovative tools to form and strengthen civil society coalitions focused on natural resource governance, agroecology, and

environmental security. These tools have been applied recently by partners in Guatemala, India, Kenya, and Nepal.

Dr Susanne Schmeier, Panel Member for International Waters, has co-authored several publications, including Clearing the waters: a review of transboundary water quality governance (*Water International*, online pre-publication); revisiting the effectiveness of joint basin institutions in managing international water disputes (*Environment & Security*, online pre-publication); and Pathways to instability: a synthetic framework to parse connections between water and conflict (*Environment & Security*, online pre-publication). She also contributed a book chapter titled Actors in Water Diplomacy – the good, the bad and the ugly, in the *Routledge Water Diplomacy Handbook*.

8. Annex: Agenda of the STAP workshop

Agenda for STAP Artificial Intelligence (AI) Workshop

Title of the workshop: Maximizing the Benefits and Managing the Risks of Artificial Intelligence (AI) in the GEF

Date: Tuesday, 4th November 2025

Time: 10:00 – 13:00 EST

Agenda

Time	Sessions	Key Question/Theme	Speaker
10:00 -10:10	Opening Remarks	Welcome remarks and framing: What is the GEF, and its interest in AI?	**Rosina Bierbaum**, Chair of STAP
10:10 - 10:15	Scene setting – STAP moderated by **Ngonidzashe Chirinda**, Climate Change Mitigation Panel Member, STAP (5-minute introduction by Ngoni)		
10:15 - 10:22 (7 minutes)	AI for Nature, Pollution, and Climate Action	How can AI help address the challenges of the triple planetary crisis?	**Evan Tachovsky**, Global Director of World Resources Institute Data Lab
10:22 - 10:29 (7 minutes)	Environmental Impact of AI Systems	What are the environmental impacts of AI systems?	**Thomas Basikolo,** ITU AI for Good and ITU Green Computing Pillar of the Green Digital Action
10:29 - 10:39	Moderated Q&A by Ngonidzashe Chirinda		
10:40 -10:45	Thematic Segments 1 and 2 Moderated by **Geeta Batra**, Director, GEF Independent Evaluation Office (IEO) (5-minute introduction by Geeta)		
10:45 - 10:52 (7 minutes) 10:52 - 10:59 (7 minutes)	Segment 1: Institutional Readiness	Digital and AI capacity and readiness in GEF agencies and the current best practice	**David Jensen**, Digital Transformation, UNEP **Nagaraja Rao Harshadeep** (Harsh) Global Lead (Disruptive Technology) & Lead Environmental Specialist, World Bank
11:00 - 11:07 (7 minutes)	Segment 2: GEF Agencies' Experience with AI use	How has AI been used in GEF and non-GEF projects/programs by GEF agencies, and what lessons	**Carly Batist,** Nature Tech & AI Innovation Manager, Conservation International

11:07 - 11:14 (7 minutes)		can be learned from these projects/programs	**Marc Lepage**, Principal Information Technology Specialist, Asian Development Bank
11:15 - 11:25	Moderated Q&A by Geeta Batra		
11:25 - 11:30	Thematic Segments 3 Moderated by **Mohamed Bakarr**, Manager, Integration and Knowledge Division, GEF (5-minute introduction by Mohamed)		
11:30 - 11:37 (7 minutes) 11:37 - 11:44 (7 minutes)	Segment 3: Use of AI in organizations' operations, including Knowledge Management, and Learning	How can AI be used in streamlining organizational operations as well as in project design, implementation, monitoring, evaluation, and knowledge management and learning?	**Jenner Guzman,** Senior Knowledge Management Specialist, Integration and Knowledge Division at GEF **Alicia Olago,** Senior Product Manager, Code For Africa/sensors Africa
11:44 - 11:54	Moderated Q&A by Mohamed Bakarr		
11:55 - 12:00	Thematic Segments 4: Moderated by **Susanne Schmeier,** International Waters Panel Member, STAP (5-minute introduction by Susanne)		
12:00 – 12:07 (7 minutes) 12:07 - 12:14 (7 minutes) 12:14 - 12:21 (7 minutes)	Segment 4: Data Governance and Safeguards, Responsible AI	Data sharing, automation, open data, training datasets. How can we harness the benefits of AI while minimizing its unintended negative consequences?	**Leona Verdadero**, Programme Specialist, Digital Policies and Digital Transformation Section, UNESCO **Reina Otsuka**, UNDP, and representing *The Coalition for Digital Environmental Sustainability (*CODES) **Eliot Gillings,** AI expert and Policy Advisor, Royal Academy of Engineering
12: 21 - 12:31	Moderated Q&A by **Susanne Schmeier,** followed by open discussion		
12:31 - 12:55	Guiding questions: - What institutional capacities, digital infrastructure, and governance frameworks can help across GEF agencies to responsibly scale AI solutions for environmental sustainability? - What lessons from current AI-enabled projects can inform future programming, particularly in maximizing environmental benefits while minimizing sustainability risks?		

	• How can AI be practically integrated into project design, implementation, and monitoring to enhance efficiency and reduce burdens on practitioners? • What principles and safeguards should guide the use of data and automation in AI systems to ensure transparency, equity, and environmental integrity across the GEF portfolio?
12: 55 - 13:00	Closing: **Rosina Bierbaum**, Chair of STAP