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**ACCELERATING TRANSFORMATION IN TURBULENT TIMES:  
STAP'S REPORT TO THE 8TH GEF ASSEMBLY**

# Accelerating transformation in turbulent times: STAP's report to the Eighth GEF Assembly

May 2026



**STAP**

SCIENTIFIC AND TECHNICAL  
ADVISORY PANEL

*An independent group of scientists that advises  
the Global Environment Facility*



Accelerating transformation in turbulent times: STAP's report to the Eighth GEF Assembly

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**ABOUT STAP:**

The Scientific and Technical Advisory Panel (STAP) comprises seven expert advisors supported by a Secretariat, who are together responsible for connecting the Global Environment Facility to the most up-to-date, authoritative, and globally representative science. [stapgef.org](http://stapgef.org). The STAP Secretariat is hosted by the United Nations Environment Programme (UNEP).

**ABOUT GEF:**

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental challenges. Since then, the GEF has provided more than \$22 billion in grants and blended finance and mobilized over \$120 billion in co-financing for more than 5,000 national and regional projects and programmes that generate global environmental benefits. The GEF partnership brings together 186 member governments with international institutions, civil society, Indigenous Peoples, and the private sector to address global environmental issues and support sustainable development. [thegef.org](http://thegef.org)

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# EXECUTIVE SUMMARY

The Ninth Replenishment Period of the Global Environment Facility (GEF-9) begins amid perhaps the most challenging geopolitical period for international cooperation since the inception of the Global Environment Facility (GEF), and certainly at a pivotal moment for global environmental progress. Integrated approaches are increasingly essential to pursue the structural shifts needed across food, energy, city, land, and water systems. This report summarizes the state of the science related to the GEF mandate, highlighting evidence-based solution pathways across the GEF's focal areas. This is followed by a review of Scientific and Technical Advisory Panel (STAP) advice over the last two replenishment periods, centred on integrated pathways to systems transformation, resilience, and durable outcomes; strategies to enable purposeful risk-taking on innovations that increase the likelihood of transformational change; and approaches that harness the wide-reaching scientific and technical evidence available to better focus investments and increase the GEF's long-term impact. We then focus on progress on STAP's seven recommendations from December 2024 for the GEF-9 strategy and areas where action is needed:

- 1 Develop a clear, overarching GEF-9 theory of change**, articulating change pathways relevant across the goals for the targeted systems, the relationships among Integrated Programs, and how projects and partnerships collectively contribute to system transformation.
- 2 Foster more deliberate investment in innovation**, with proactive identification of key barriers to the scaling of global environmental benefits, requiring stronger cultural change across GEF agencies and countries to embrace technological, policy, institutional, financial, and business innovation.

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**3 Support policy coherence within and across sectors**, and across GEF activities, with a focus on learning about barriers to policy coherence – including entrenched economic interests – and strategies to successfully navigate these barriers, aligning national commitments under multilateral environmental agreements (MEAs).

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**4 Focus civil society engagement on strengthening the social foundations for transformation**, ensuring not only expanded financing to Indigenous Peoples, women, and youth but also meaningful participation in project co-design and governance, monitoring, and accountability.

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**5 Work to influence market transformation in targeted sectors**, complementing blended finance with strategies that aim to shift regulatory environments, corporate behaviour, and financial flows towards nature-positive outcomes.

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**6 Continue to improve the GEF results framework**, especially by developing clear and comparable indicators of systems transformation that are conceptually distinct from core global environmental benefits, and providing well-defined incentives to guide programming decisions.

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**7 Strengthen GEF's new efforts on knowledge management in support of adaptive learning**, building on a recent exchange of lessons within and across Integrated Programs, to nurture transparent, open-access, and networked learning systems that encourage the sharing of obstacles, pitfalls, and adaptation strategies as well as successes.

Much of this thinking is now reflected in GEF-9 programming and policy directions documents, including a focused set of Integrated Programs that include many of STAP's enabling elements, with clear intent to increase the participation of Indigenous Peoples, local communities, women, youth, and civil society and to deepen country engagement. Yet challenges remain to be overcome



to put the recommendations into practice. As the GEF's priorities evolve, STAP recognizes its own need to adapt accordingly. STAP proposes to focus on three impact pathways:



### Pathway A:

**Supporting strategic prioritization**, filtering global science through a GEF lens, identifying knowledge needs, and strengthening alignment with MEA priorities and pathways towards systems transformation.



### Pathway B:

**Strengthening quality of design** within the streamlined project cycle that ensures responses to STAP screenings are monitored for follow-up, while also engaging earlier in program and project development and promoting stronger links to regional scientific expertise.



### Pathway C:

**Enhancing adaptive management and learning**, including support for use of real-time evidence, engagement in Integrated Program learning processes, and contributions to broader knowledge systems that accelerate transformation beyond GEF investments.

Putting these pathways into practice, and working to address priority gaps, STAP's priorities for GEF-9 include:

- **Streamlining screening and increasing the relative balance of STAP effort** on upstream engagement prior to design – including outreach to GEF agencies, countries, and regional platforms – and downstream engagement beyond initial project screening.
- **Strengthening the innovation ecosystem**, helping the GEF Partnership engage with regional science networks to identify innovation priorities, in concert with science bodies of the MEAs and other global environmental financing mechanisms.
- **Accelerating learning from integrated programming** to clarify what types of integration most effectively contribute to system transformation and global environmental benefits, generating learning across the full GEF portfolio.



# 1. INTRODUCTION

The Global Environment Facility (GEF) is currently navigating an exceptional juncture characterized by geopolitical challenges to international cooperation. At the same time, global environmental change continues unabated, and the increasingly unstable world order makes managing this change more difficult. The brunt of these geopolitical and environmental changes falls most heavily on least-developed countries and Small Island Developing States (IPCC 2023; UNDDR 2025). Future investments will need to be carefully aligned within this evolving global context.

Despite these significant headwinds, there are important signs of progress that underscore the criticality of the GEF's mission. **As the GEF Partnership moves forward, its strategy needs to balance the urgency of these global threats with a renewed commitment to fostering resilient, large-scale impact in an increasingly unstable world.** Guidance from the Scientific and Technical Advisory Panel (STAP) to the GEF in recent years has centred on the importance of identifying and investing in pathways to transformational change

to address the accelerating environmental crisis. STAP's role must also evolve to most effectively support the GEF in navigating the decisions ahead.

This report to the Eighth GEF Assembly complements STAP's initial perspective on GEF-9, published in 2024 (Bierbaum et al. 2024). This report begins with a summative perspective on the state of the science related to the GEF mandate (Section 2), then a retrospective on STAP's advice and legacy of influence over the last two replenishment periods (Section 3), followed by a brief analysis of the drivers of impact for the GEF Ninth Replenishment Period (GEF-9) (Section 4). This lays the foundation for a prospective look at STAP's evolving role and priorities for GEF-9 (Section 5).





## 2. STATE OF THE SCIENCE

Annex 1 provides an extended narrative on the state of the science around each GEF focal area, but in brief, the global environment continues to degrade due to climate change and processes that drive biodiversity loss, land degradation, water quantity and quality challenges, and pollution from chemicals and waste. These losses bring heightened urgency to addressing global environmental challenges through pathways that embrace systems transformation.<sup>1</sup>

Meanwhile, Earth system science has increasingly moved from documenting environmental degradation towards identifying thresholds, tipping points, and systemic instability risks across planetary processes (Rockström et al. 2009; Steffen et al. 2015; Lenton et al. 2019; Richardson et al. 2023). Successive global assessments now converge on

the conclusion that incremental improvements within existing economic and governance models are insufficient to maintain a safe operating space for humanity. The Planetary Health Check 2025 report (Planetary Boundaries Science 2025) confirms that seven of nine planetary boundaries<sup>2</sup> have been breached, increasing risks to Earth systems and the conditions that support human societies (Ripple et al. 2025). This reinforces the findings in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Synthesis Report (IPCC 2023), which concludes that rapid and far-reaching transitions across energy, land, urban, and industrial systems are required to secure a liveable future.

1 Systems transformation denotes a fundamental change in the structure, functions, and goal orientation of a large-scale societal or economic system. This process involves altering the core assumptions, institutions, and feedback mechanisms that govern sectors like energy finance or food production, moving beyond incremental adjustments. The transformation aims to achieve a sustainable outcome by addressing the root causes of environmental degradation and social inequity. Success requires coordinated policy, technological innovation, and behavioural change across multiple actors and sectors. See Stafford Smith (2022a).

2 Planetary Boundaries Science reports that seven of the nine planetary boundaries have been breached: climate change, biosphere integrity, land systems change, freshwater change, biochemical flows, ocean acidification, and the introduction of novel entities. The two boundaries not currently assessed as breached are atmospheric aerosol loading and stratospheric ozone depletion.



**The impacts of environmental change – while very unequally distributed – affect advanced and emerging economies alike, impacting public health; infrastructure; and economic, political, and social stability.** Despite denialism and growing resistance, these risks remain broadly recognized among business and political elites. The Global Risks Report 2026 (WEF 2026), for example, ranks extreme weather, biodiversity loss, and critical Earth system change among the most severe threats to global stability over the coming decade.<sup>3</sup>

Crucially, the latest global scientific syntheses go beyond signalling risks; they converge in charting viable transformation pathways. The Global Tipping Points Report (Lenton et al. 2025) shows how coordinated policy, market, and social interventions can trigger self-reinforcing dynamics that accelerate resilience-building and reduce future adaptation costs. The Global Environment Outlook 7 report (UNEP 2025c) estimates that transformation in financial, waste, energy, and food systems can lead to a 40-50% reduction in metal and minerals extraction, a 20-25% decrease in water withdrawals, and an increase in natural areas by 2050 compared to continuing current trends. It also notes a substantial long-term global macroeconomic benefit of US\$20 trillion per year by 2070 from these transformations.

**The challenge has now shifted from diagnosing planetary instability to tackling the systemic barriers and enablers needed to deliver durable global environmental benefits (GEBs).** Across GEF focal areas, the science converges on three points: (i) environmental pressures are systemic and mutually reinforcing; (ii) viable transformation pathways can be identified for many of these pressures; and (iii) the principal barriers to achieving transformational environmental outcomes are structural. These structural barriers include institutional inertia and lock-ins<sup>4</sup> deeply embedded in socioeconomic and governance systems, resulting in siloed decision-making, misaligned incentives and financing, and policies and investments that undermine environmental progress. The barriers also include inequitable access to scientific and technological expertise, as well as crucial gaps in disseminating learning from project monitoring and evaluation. Annex 1 summarizes recent findings on challenges and emerging evidence on pathways for transformative action in each GEF focal area.

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3 The Global Risks Report cites the following top risks on a 10-year horizon, in ranked order: extreme weather events, biodiversity loss, critical change to earth systems, natural resource shortages, misinformation or disinformation, adverse outcomes of artificial intelligence technologies, inequality, societal polarization, cyber espionage or warfare, and pollution.

4 In sustainability science, “lock-ins” refers to self-reinforcing mechanisms – entrenched technologies, infrastructure, norms, and policies – that make transitioning to more sustainable alternatives difficult, costly, or nearly impossible. See, for example, Simoens et al. (2022); Goldstein et al. (2023); Jager et al. (2026).



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### 3. STAP GUIDANCE FOR AN EVOLVING GEF PARTNERSHIP

STAP's guidance over the last two replenishment periods has emphasized foundational elements that can enable the GEF to achieve maximal impact. Significant areas of STAP influence on GEF strategy and practice during this period include **growing emphasis on integrated programming, uptake of tools such as theory of change and climate risk screening, adoption of innovation priorities alongside new mechanisms for tracking risk, and attention to multi-stakeholder processes**, including the engagement of civil society and Indigenous Peoples. In its latest synthesis, the GEF Independent Evaluation Office (IEO) noted the positive influence of STAP advice, indicating that STAP thematic papers may be STAP's most influential contributions (GEF IEO 2026). The IEO also noted that "STAP's influence is constrained by its advisory role, with limited involvement in implementation or follow-up."

Recognizing this need, this section reviews STAP guidance, illustrating the connections and themes developed across the breadth of its advisory publications. **Three overarching priorities have animated and sustained STAP's work during the last two replenishment periods: (i) pursuing transformation, resilience, and durability; (ii) enabling innovation and risk; and (iii) leveraging evidence for impact.** Each of these priorities is summarized in the following subsections. (Annex 2 includes the full set of STAP publications, by category, including those referenced in italics in the following summaries.)



## Transformation, resilience, and durability

STAP's [Report to the 7th GEF Assembly](#) emphasized how, in the face of evolving global environmental crises, scientific research “underscores the need... to deliver more, enduring, global environmental benefits and to do so in ways that help transform the systems that underpin those benefits”. The six key entry points for transformation cited in that report map closely to the areas that the GEF committed to in GEF-8 and will further address in GEF-9. The first three entry points emphasize environmental outcomes: the challenges of sustainable food systems and resource use across land, freshwater, and oceans; sustainable urban and peri-urban development, including smart cities and communities; and energy decarbonization alongside the transition to sustainable industries, particularly through renewable energy. The remaining three entry points highlight socioeconomic issues: the importance of education, equity, and the engagement of women, youth, Indigenous Peoples, and other marginalized populations; human health, well-being, capacity, and demographic dynamics; and the development of sustainable and just economies based on new development models and alternative measures of progress.

STAP's guidance on [achieving transformation](#) provides a conceptual framing and rationale for the GEF's focus on systems transformation, arguing that **for investments to be truly transformative, they must move beyond incremental improvements to deliver deep, large-scale systemic change.** This requires a clear theory of change that identifies “leverage points” – such as governance structures or social norms – and maps out credible pathways for scaling innovations from local to national, regional, and global impact.

[Making GEF investments resilient](#) flags the importance of “resilience thinking” and the use of simple future narratives to stress-test the robustness of project designs against interacting and uncertain potential shocks like climate change, conflict, or migration. This includes effective [climate risk screening](#), and in the case of climate adaptation investments, a clearly articulated [adaptation rationale](#). Achieving [enduring outcomes](#), moreover, requires integrating [behavioural change](#) strategies and [natural capital approaches](#) into project design, ensuring that environmental benefits are valued as core economic assets and that stakeholders are incentivized to sustain them over time.

Beginning with an analysis of the scientific evidence on [integration to solve complex environmental problems](#), STAP has developed a diverse portfolio of guidance on integrated approaches, providing a strategic framework for integrated programming designed to tackle interlinked challenges by moving beyond siloed, single-focal area projects. This includes guidance on [policy coherence](#), which aims to inform the alignment of national and subnational policies to ensure that environmental gains are not undermined by misaligned economic or social incentives. It includes advice on the [blue economy](#), in which sustainable marine management must balance diverse trade-offs, as well as [source-to-sea approaches](#) detailing how integrated landscape and seascape interventions can be scaled. [Circular economy](#) approaches apply a systems perspective to reduce materials use, pollution, and waste, while [future food systems](#) focus on regenerative resource use to feed a growing population without depleting the planet. Innovative solutions like [agrivoltaics](#), especially when habitat-enhancing strategies are applied, further exemplify this approach by focusing on synergies that address land competition between food production and renewable energy.



## Innovation and risk

STAP has also worked consistently over the last two replenishment periods to encourage the GEF to take a more explicit and purposeful approach to innovation and risk in pursuit of system transformation. [Innovation and the GEF](#) argues that **relying solely on proven, low-risk solutions is insufficient to address the scale of current environmental crises**. Instead, the GEF must purposefully invest in a diversity of innovation domains, including technology, finance, business models, institutions, and policy.

Recognizing that greater innovation naturally entails greater uncertainty, STAP's guidance on [risk appetite](#) presents the case for the adoption of a formal and transparent risk appetite framework to signal a shift towards accepting higher-risk, higher-reward investments paired with a robust theory of change and clear mitigation measures. Subsequent advice on [innovation for transformational change](#) outlines the need for a strategic orientation to identify priority challenges requiring focused innovation investment and experimentation within each priority system.

STAP's guidance on navigating contextual risk factors includes its early framing on dimensions of [environmental security](#) and subsequent analysis of [fragile and conflict-affected situations](#), arguing that innovation is necessary to assess and deliver adaptive management in unstable settings and to pursue synergies between ecosystem restoration and conflict prevention.

In the domain of policy and market innovations, alongside its work on policy coherence, STAP has advocated for mainstreaming [natural capital](#) assessments into economic planning, arguing that identifying, measuring, and valuing natural assets – such as soil, water, and biodiversity – is essential for making informed policy trade-offs and linking environmental health directly to economic performance. A series on [blended finance](#) explores how public funds can be strategically used to de-risk private sector investments in “frontier” areas for financial markets such as biodiversity and land or coastal zone restoration. STAP emphasizes the critical importance of ensuring robust integration between the logic of environmental outcomes and the logic of financial returns.

Regarding technological innovation, STAP has highlighted areas of clear opportunity, including early guidance on harnessing [Earth observations](#) to assess and monitor ecological change, refine intervention priorities, and coordinate actions. This was followed by guidance on [novel entities](#), including synthetic chemicals and altered life forms (e.g. antimicrobial-resistant genes) that can have disruptive positive or negative effects on the Earth system. More focused analyses on [blockchain](#) and [artificial intelligence](#) (AI) have assessed the technologies' myriad promising applications, such as building transparency in land management or supply chain tracking, as well as their substantial risks, including high energy costs, high technical complexity, and sociopolitical disruption. Recent analysis of [emerging technologies](#) focuses on governance, safeguards, institutional readiness, and portfolio-level considerations to ensure that technological innovation effectively contributes to environmental sustainability.

Finally, STAP has given substantial attention to social, cultural, and institutional innovation. This includes guidance on the use of [community-based approaches](#) and [citizen science](#) to foster social learning and behaviour change and to increase the transparency of environmental decision-making. Analysis of [social resilience](#) emphasizes that meaningful community engagement and collective action are not just outcomes but essential prerequisites for achieving transformational change. Guidance on [investing in Indigenous Peoples](#) argues that financial support must be coupled with capacity strengthening, protection of Indigenous land rights, and respect for traditional ways of knowing to deliver more durable environmental benefits. Across all societal actors, from Indigenous Peoples, local communities, and civil society networks to government agencies and industry associations, robust [multi-stakeholder dialogue](#) processes can underpin collaborative action that reinforces existing momentum for change.





## Leveraging evidence for impact

The third consistent theme of STAP advice has been leveraging scientific evidence for sustained impact across the breadth of the GEF portfolio. This includes early analysis on [managing knowledge](#), identifying knowledge management and learning as not merely administrative tasks but fundamental drivers of transformational change. Subsequent, more detailed guidance addressed the GEF's role in enabling [South-South cooperation](#) to accelerate the diffusion of innovations, and priorities for [knowledge management and learning](#) within the Integrated Programs (IPs). Most recently, STAP, jointly with the GEF IEO, has provided case-based, leading practices for [real-time monitoring, evaluation, and learning](#) to **enable adaptive management so that project managers can pivot strategies in response to unforeseen challenges – such as climate shocks or political instability – thereby de-risking investments** and maximizing the long-term effectiveness of the GEF portfolio.

STAP has also developed a suite of evidence-based guidance on effective project and program design. This includes a [theory of change primer](#), advocating a systems-thinking approach to identify

the root drivers of environmental degradation and map the causal pathways through which specific interventions will lead to desired GEBs, including key assumptions, barriers to change, and leverage points. Guidance on [incorporating co-benefits](#) assists with the articulation of targeted outcomes in ways that promote durability across multiple GEF focal areas, realizing synergies for positive change in areas beyond GEF's immediate remit.

Advice on using [simple future narratives](#) encourages qualitative descriptions of multiple plausible futures to aid in selecting robust interventions that work well across different scenarios, aiming to avoid maladaptation and ensure that project outcomes endure over the long term. Operational guidance on [clarifying risks in GEF projects](#) focuses on assisting project developers in explicitly describing the nature of risks, identifying risk mitigation strategies, and rating residual risks, with particular emphasis on innovation risks. [Enabling elements of good project design](#) compiles the essentials of STAP guidance into a single reference for project developers, while [STAP screening guidelines](#) provides a transparent look at the factors STAP assesses in its project screening role.



Lastly, a range of recent reports compiles evidence to aid the GEF Partnership in identifying emerging trends and promising investment priorities across focal areas. To cite just a few recent examples:

- Guidance on [delivering climate change adaptation benefits](#) encourages the GEF to explicitly capture and report on adaptation benefits, ensuring that socioeconomic co-benefits are not overlooked. Analysis on [conservation management in the Anthropocene](#) emphasizes that more than half of terrestrial ecosystems are already experiencing novel climates, which necessitates moving beyond conventional conservation approaches to manage large, interconnected “conservation mosaics” that link habitats and support local climate refugia” – areas buffered from climate impacts – to ensure that biodiversity protection remains effective in a rapidly changing world.
- Guidance on [why drought matters](#) advises the GEF to implement drought-smart land management to protect livelihoods and prevent the vicious cycle of water scarcity accelerating further land degradation, while appropriately addressing the nexus between land, water, climate, and biodiversity in the context of droughts. [Governance of the global hydrological cycle](#) makes the case for a transformational, systems-based approach to addressing hydrological cycle risks.
- Analysis on [fostering cooperation and managing conflict in GEF transboundary water projects](#) identifies success factors for building robust cooperative mechanisms, while new analysis on [illegal, unreported, and unregulated \(IUU\) fishing](#) charts advances in monitoring capabilities and flags gaps in efforts to address the underlying drivers of illegal practices.
- Advice on the [multiple benefits of managing chemicals and waste](#) – such as improved public health and reduced greenhouse gas emissions – outlines how to build incentives for policy and market reforms that decouple economic growth from the use of harmful substances, ensuring that chemical management supports broader sustainability goals. New analysis on [breaking lock-ins](#) on chemicals and waste draws lessons from case examples on antimicrobial resistance and lithium-ion battery waste, identifying both structural drivers that maintain harmful practices and potential entry points to break the lock-in.



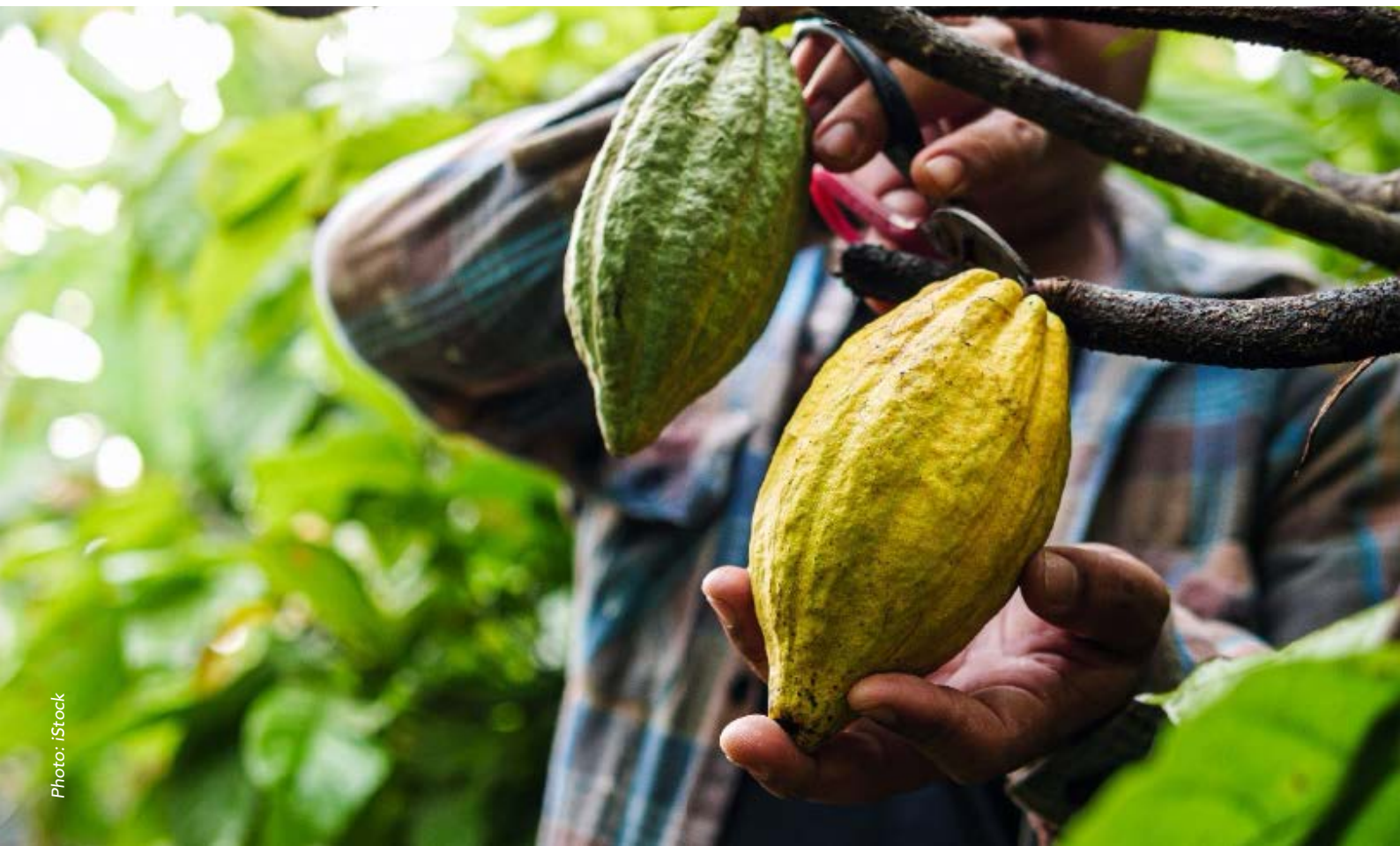
## 4. STAP'S PERSPECTIVE ON CATALYSTS OF IMPACT IN GEF-9

STAP's last GEF Assembly report highlighted the need for "programmatic and portfolio-wide coordination to build momentum systematically towards large scale transformation" and endorsed the importance of integrated programming to pursue synergy with other investments or change processes, as well as mobilizing some carefully prioritized external partnerships aiming for "a catalytic effect in transforming global economic systems, improving policy coherence, reorienting financial flows, and facilitating learning" (Stafford Smith et al. 2022b).

In the intervening years, the need for catalytic finance focused on advancing the GEF's goals has only grown more acute. The challenge is not only "filling the gap" in financial flows to meet the projected costs of ecological restoration; it also entails dismantling and reorienting the "nature-negative finance" that in 2023 totalled about US\$ 7.3 trillion, while investment in nature-based solutions was about US\$ 220 billion, an imbalance

of roughly 30:1 in favour of activities that degrade nature (UNEP 2026).

In its [Initial perspective on GEF-9](#) (Bierbaum et al. 2024), STAP argues that a strategy of incremental improvement is no longer sufficient to address the accelerating pace of global environmental degradation. Instead, **STAP calls for a rigorous focus on targeted transformations at scale, aligning with the key systems identified in the GEF-9 strategy.** By harnessing incremental achievements to build momentum towards system transformation, the GEF can more effectively tackle the root drivers of environmental change. This requires evidence-based change pathways, grounded in strategic partnerships, oriented towards ambitious but achievable targets that capture the diverse ways in which GEF-financed interventions contribute to system transformation. Figure 1 summarizes the strategic priorities that STAP proposed and the corresponding recommendations to translate those priorities into practice.



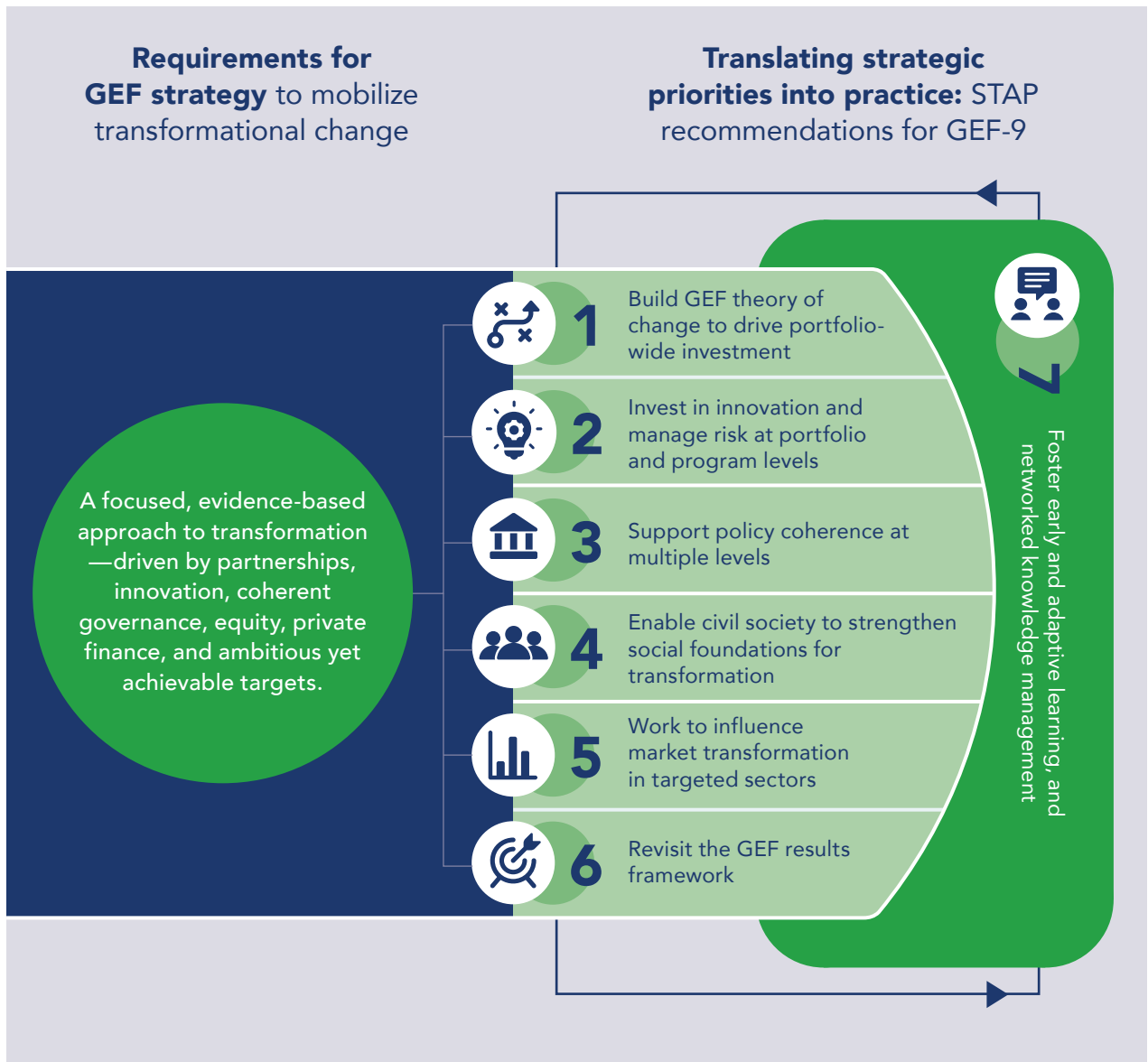
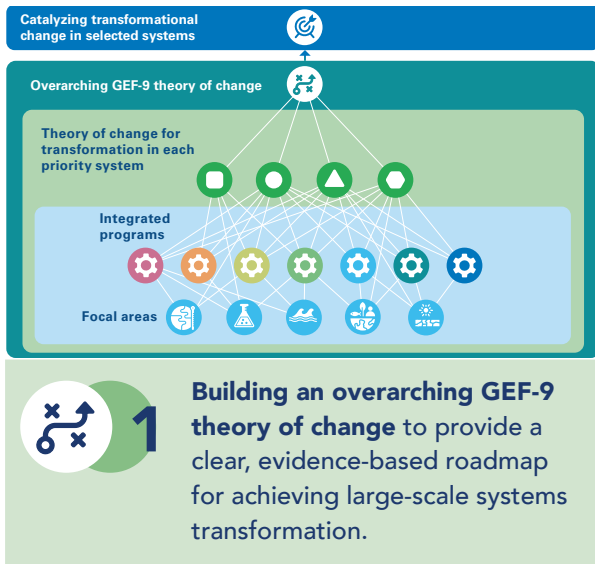


Figure 1: A visual summary of STAP analysis of GEF-9 strategy requirements and corresponding recommendations. The GEF strategy requirements are detailed in STAP’s initial perspective on GEF-9 (2024). The seven recommendations are recapped in the following text, recognizing progress made and focusing on next steps that remain critical to put the recommendations into practice.

Much of this thinking is now reflected in GEF-9 programming and policy directions documents, including a focused set of IPs reflecting many of STAP’s enabling elements, with clear intent to increase the participation of Indigenous Peoples, local communities, women, youth, and civil society and to deepen country engagement. Yet significant challenges remain to put the recommendations into practice. As the GEF-9 replenishment process

reaches its conclusion, we can now take stock of early progress against those recommendations and identify areas where STAP deems concerted efforts remain necessary.



**Next steps:** In STAP’s judgment, this remains a high-priority need and deserves concerted focus at the outset of GEF-9 programming. The current GEF-9 Programming Directions<sup>5</sup> provide an overview of the programming architecture but not an integrated picture of change pathways that need to be activated to achieve targeted system transformation goals. Identifying a common set of change pathways and describing how those pathways apply in different combinations across the five focal areas and eight Integrated Programs can underpin more focused program design; improve synergies among projects, activities, and partnerships across the portfolio; and provide a foundation for more rapid learning and adaptation.



**Next steps:** The GEF Council’s adoption of an explicit risk appetite for the GEF is a substantial advance in establishing a shared framework for risk classification, reporting norms, and data for deliberation at the portfolio level. Yet portfolio monitoring reports to date confirm STAP’s observations that the GEF Partnership must seriously promote and build a culture of innovation and embrace innovation risk. Proactive identification of key barriers to achieve scaling of GEBs in different country and regional contexts is needed – prior to individual project design. This can help shape GEF’s Country Engagement Strategies; guide investments in policy, institutional, technological, financial, and business model innovations; and accelerate cross-country learning.



**Next steps:** Policy coherence has been given increased prominence in the GEF-9 strategy, particularly through priorities for whole-of-society engagement and the “family of funds” approach. Given the deeply entrenched economic interests that often frustrate progress in aligning policy design and implementation with environmental and sustainability outcomes, GEF programming should prioritize learning about barriers to policy coherence and strategies to successfully navigate these barriers. Strategic partnerships in the IPs as well as at the project level are critical to enable this learning and co-develop response strategies. The GEF’s role as a financial mechanism for a growing number of multilateral environmental agreements (MEAs) puts it in a unique position to support countries in achieving their policy commitments efficiently.

<sup>5</sup> GEF-9 Programming Directions (GEF/R.09/18). <https://www.thegef.org/council-meeting-documents/gef-r-09-18>.



Photo: PROAmazonía



4

**Enabling civil society to strengthen social foundations for transformation** with a focus on empowering marginalized groups, such as women, youth, and Indigenous Peoples, in environmental decision-making.

**Next steps:** Commitment to the engagement of Indigenous Peoples and civil society is central in the “inclusion” priority of GEF-9, and the intent to significantly ramp up investments channelled to civil society and Indigenous Peoples is laudable. Yet these efforts cannot be divorced from system transformation goals. Country Engagement Strategies can establish mechanisms through which typically marginalized stakeholders will exercise meaningful influence on investment priorities and subsequently contribute to the co-design of projects, implementation strategies, outcome monitoring and accountability mechanisms, and knowledge management.



Photo: Shutterstock



5

**Working to influence market transformation in targeted sectors** by using strategic partnerships to strengthen national regulatory environments and influence private sector financial flows.

**Next steps:** GEF-9 strategy signals a notably increased focus on private sector engagement, reflected in rapidly growing ambition for the proportion of GEF financing that enables blended finance mechanisms. New focus is needed, however, on measurement of programmatic outputs and outcomes to understand which strategies work to achieve durable influence on private sector investment and operations in line with system transformation goals. Such strategies include but should not be limited to blended finance approaches. Also critical are approaches that aim to shift corporate behaviour through regulatory reforms, promote industry-wide commitments and practices, or influence a nature-positive transformation of the finance system.

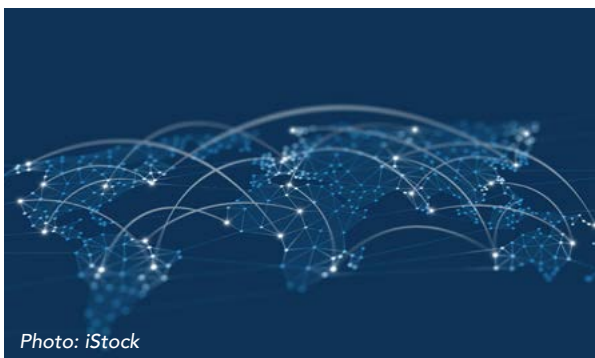


Photo: iStock



6

**Revisiting the GEF results framework** to better measure contributions towards transformational change and socioeconomic co-benefits.

**Next steps:** The GEF-9 results framework incorporates significant advances with the introduction of a new category to capture progress towards system transformation and more explicit recognition of co-benefits. STAP continues to see significant opportunity for improvement, especially in the indicators of system transformation, making these indicators more conceptually distinct from the core GEBs and enabling integration and comparison across the five target systems. Ideally grounded in the overarching GEF theory of change, such an approach would provide a much clearer set of incentives to guide programming decisions. Measuring progress along transformation pathways would reinforce that the scale and quality of impact at the programmatic and portfolio level is much more important than the percentage of “satisfactory” projects.



Photo: iStock



**Fostering early and adaptive learning** through a knowledge management system made more transparent, open-access, and networked with other actors.

**Next steps:** STAP views GEF strategy for knowledge management and learning as still very preliminary, without a clear vision of its potential contribution to accelerate systems transformation well beyond the reach of its own investment portfolio. A very promising early sign, however, concerns the structured efforts to enable the exchange of lessons within and across IPs (see Box 1). To sustain and accelerate this progress, STAP envisions a near future in which partners at all levels have ready access (in any language) to lessons learned across the range of GEF priorities, grounded in effective monitoring and evaluation that encourages sharing of obstacles, pitfalls, and adaptation strategies as well as successes.

### Box 1: Global Forum on Integrated Programs

In April 2026, over 270 participants gathered in Nairobi for the first Global Forum on Integrated Programs, organized by the GEF Secretariat and hosted by the UN Environment Programme. The Forum highlighted the converging evidence from multiple global assessments (IPCC, Global Tipping Points, IPBES, and GEO-7) that not only underscore the interrelated challenges of climate, biodiversity, pollution, equity, and health but also point to similar principles and priorities for systems transformation. STAP's new information note, *Towards principles for sustainability transformations*, summarizes these principles and their applications to program design, implementation, and monitoring and evaluation.

A key focus of the 3 days of discussion was the role that Integrated Programs can play in systems transformation. Highlights include:

- **Different types of integration**—across sectors, scales, MEA priorities, and environmental, economic, and social goals—may require tailored approaches in GEF programming. Programs should clearly identify and prioritize the most critical dimensions to achieve their intended outcomes.
- A clearer understanding is needed of how **program governance**—including the role of global coordinating projects—can either support or hinder environmental outcomes, as well as broader policy and institutional innovation.
- Fruitful comparison among models of private sector engagement in value chains as diverse as cocoa, livestock, and plastics, reinforces the conclusion that **influencing market transformation** requires a combination of efforts addressing policy and financial levers alongside mechanisms (such as certification) that can help shape consumer demand.
- Long-term partnerships that **strengthen existing multi-stakeholder networks** (rather than establishing new program structures to fulfil similar roles) can significantly accelerate impact and durability of outcomes, with examples including those focused on cities, Indigenous rights, and corporate accountability.
- There are many **metrics and tools that can capture contributions to systems transformation**, and these should be collated and made available rather than 'reinvented'. These incorporate a diversity of change pathways, including influence on public and private financial flows, reductions in environmentally harmful subsidies, and agency of Indigenous Peoples and local communities in environmental decision-making.
- Global coordinating projects should be resourced as enablers of **adaptive management and learning within and across IPs** during implementation. Communities of practice linking IPs are critical to develop shared indicators, harmonize outcome metrics, and make joint learning accessible through shared and open knowledge management platforms.
- The **GEF operating model** can significantly evolve to better harness the complementary strengths of agencies, capitalize on the inherent connections across focal areas, enable adaptive management, and support and strengthen the initiative and progress of civil society and private sector actors.



Photo: iStock

## 5. STAP'S EVOLVING ROLE AND PRIORITIES IN GEF-9

In its latest synthesis, the GEF IEO (2026) confirms STAP's role in strengthening evidence-based decision-making across the GEF Partnership and ensuring that investments are grounded in robust science, spotlighting examples of STAP's forward-looking thematic work on integrated programming, risk appetite, and innovation, and its recommendations for scaling up GEF support for Indigenous Peoples, all of which have shaped GEF strategies and improved the scientific quality of project design. **The IEO highlights STAP's role in identifying emerging tools and technologies, advancing adaptive learning, and helping embed resilience and knowledge management into project design.** It finds that STAP thematic papers offer the most significant potential to shape GEF operations while also informing project-level assessments. The IEO also notes the need to update STAP's mandate, governance, and terms of reference, and the GEF Council has launched a process to undertake an independent review (GEF 2025).

How can STAP best evolve to service the GEF in navigating the rapidly changing context in which it must deliver results? In the following subsections, we outline STAP's anticipated priorities for GEF-9, informed by the IEO review and by consultations with the GEF Council, the GEF Secretariat, GEF agencies, representatives from the MEAs, and country focal points.

### STAP's evolving role

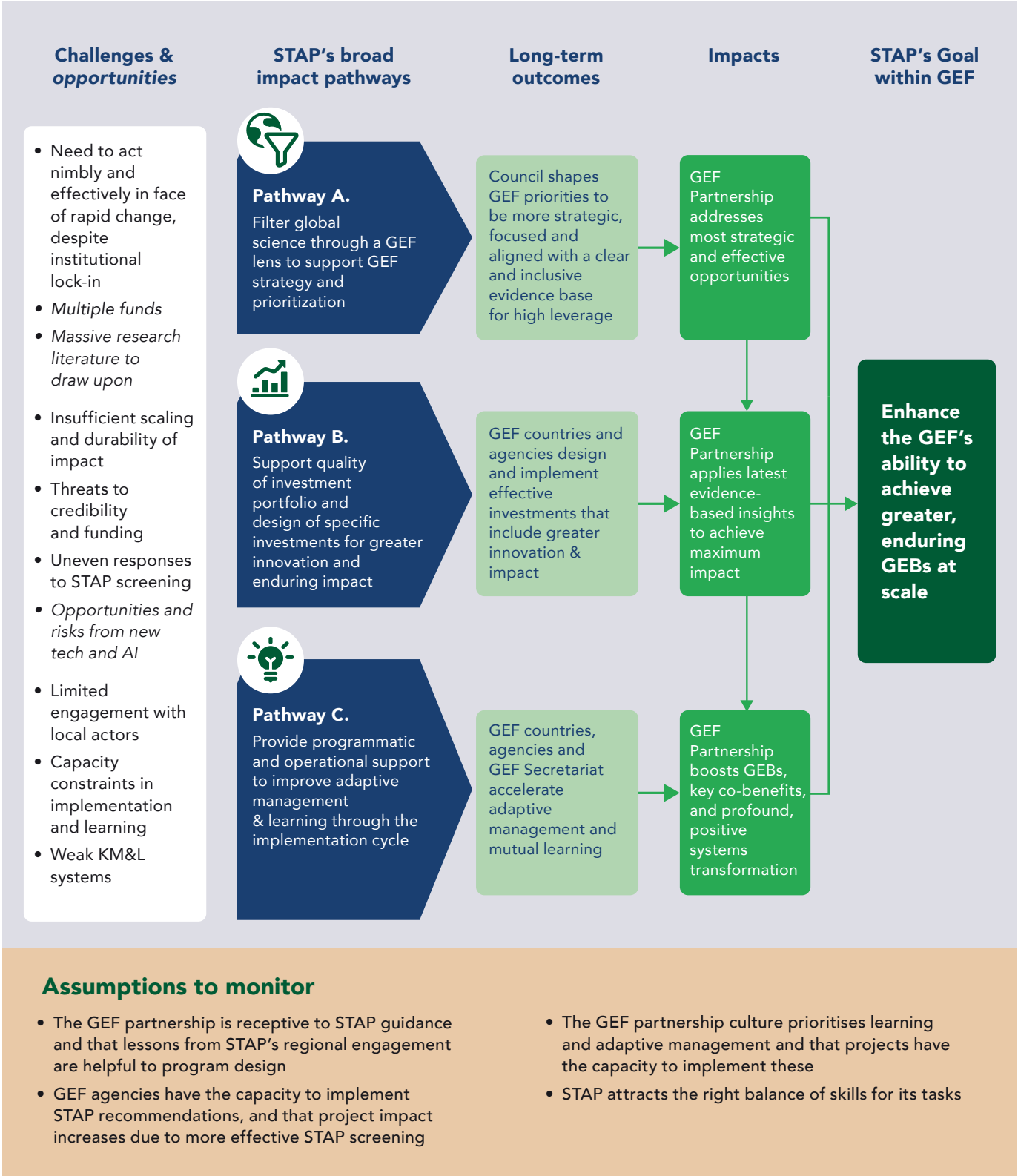
The GEF Council originally defined STAP's role as being to "provide independent, objective, strategic

and technical advice on GEF policies, operational strategies, and programmes...; provide a forum for integrating expertise on science and technology, including their social, economic and institutional aspects; and function as an important conduit between the GEF and the natural and social science communities and relevant technologists, and, synthesize, promote and galvanize state of the art contributions from them" (GEF 1995).

While these broad objectives remain relevant, our consultations have highlighted the need to present a sharper articulation of the way STAP aims to support the GEF's strategic ambition and results. With this in mind, we see STAP's goal within the GEF Partnership as enhancing the GEF's ability to achieve greater, enduring GEBs at scale, leveraging science and technical evidence while adapting to rapid global change. This goal translates into three key impacts. STAP proposes to work to ensure that, within its mandate, the GEF Partnership:

- a. **Prioritizes the most strategic and effective opportunities** from a scientific and technical perspective
- b. **Applies the latest evidence-based and scientific insights** in the design and implementation of its programs and projects to achieve maximum impact
- c. **Embraces knowledge for learning and adaptive management** that boosts GEBs, key co-benefits, and profound, positive systems transformation

The three causal **impact pathways** linking STAP actions to short- and long-term outcomes in the GEF are summarized in Figure 2 and detailed below.



**Assumptions to monitor**

- The GEF partnership is receptive to STAP guidance and that lessons from STAP's regional engagement are helpful to program design
- GEF agencies have the capacity to implement STAP recommendations, and that project impact increases due to more effective STAP screening
- The GEF partnership culture prioritises learning and adaptive management and that projects have the capacity to implement these
- STAP attracts the right balance of skills for its tasks

Figure 2: Simplified theory of change for STAP to deliver to its role within the GEF partnership, noting some of the challenges and opportunities that affect that role, and assumptions that underlie it. The detailed analysis of the pathways identifies key interactions among them, where STAP can prioritise its efforts.



## Pathway A

Pathway A focuses on filtering global science and knowledge through a GEF lens to guide strategic prioritization and ensure alignment with the priorities of the MEAs. This pathway requires STAP to identify the knowledge needs of the GEF, introduce relevant new scientific findings to the GEF, and communicate research gaps back to the broader scientific community. To support this, **STAP intends to engage more deeply with the GEF Council, GEF agencies, and science interface bodies of the MEAs.** For future work, STAP plans to develop a more structured method for tracking MEA priorities and synthesizing them into opportunities for integrated GEF investments. Additionally, STAP will prioritize assisting the GEF in refining its results framework to better target and value investments during each replenishment period.



## Pathway B

Pathway B is dedicated to improving the quality of investments by strengthening STAP's long-standing role in screening project and program designs. STAP aims to further standardize screening procedures and make the decision criteria more transparent, while **advocating for adjustments within a streamlined project cycle that ensure responses to its screenings are feasible in the available time, documented, and monitored for follow-up** prior to CEO endorsement. This pathway also emphasizes engaging with regional research networks to enrich STAP's analyses and build regional capacity. There is also scope for exploring the development and maintenance of a tailored chatbot to provide real-time tips for designing higher-quality projects, drawing on the significant body of STAP guidance and other vetted resources.



## Pathway C

Pathway C emphasizes adaptive management and learning throughout the implementation cycle to boost GEBs. This involves **balancing the production of high-level research papers with increased outreach and capacity-building activities to ensure STAP's guidance is consistently applied.** A key mechanism for this pathway could be STAP's systematic involvement in cross-IP learning (see Box 1) as well as GEF learning missions and thematic analyses of midterm reviews to identify emerging priorities. STAP could also seek to collaborate with the GEF Secretariat on reflective, peer-reviewed publications to communicate the GEF's research needs to the wider scientific community.



Photos: Ahmed Nayim, Yusuf/UNEP

### STAP priorities in GEF-9

Recognizing the need to adapt as STAP's mandate and governance is refined, and as GEF-9 programming takes shape, we can nevertheless anticipate three thematic priorities. These build on our review of the state of the science (Section 2), the foundations laid with our past guidance (Section 3), and our analysis of progress and gaps with regards to STAP recommendations on GEF-9 strategy (Section 4).

#### Streamlining project and program screening

STAP will aim to adjust its work cycle as the overall streamlining agenda proceeds, which could include adopting a more targeted and risk-based, selective project screening approach. In so doing, we **anticipate increasing the relative balance of STAP effort on upstream engagement prior to design** (see the priorities that follow on the innovation ecosystem and engaging markets) **and downstream engagement beyond project screenings** (including accelerating learning from integrated programming).

We aim to continue STAP's high-leverage engagement in IP design consultations, for example by providing feedback and inputs on theory of change and results measurement. We also expect to increase outreach to GEF agencies, countries, and regional platforms on STAP guidance for effective project design, including practices that enable sensitivity to geopolitical and governance risks amid other sources of uncertainty. These practices include the application of simple future narratives, robust risk analysis, and processes for midterm reviews to enable real-time adjustments and adaptive management during project implementation.



### Strengthening the innovation ecosystem

STAP has argued for a more strategic approach to innovation for system transformation. With the GEF risk appetite affirming that intent, we envision a **greater role in helping the GEF Partnership engage with regional science networks and science bodies of the MEAs and other global environmental financing mechanisms to identify region-specific innovation priorities and barriers.**

The aim would be to strengthen both Country Engagement Strategies and multi-country project and program design, encouraging investments that embrace diverse types of well-informed innovation. This includes assessing and harnessing promising and viable emerging technologies, alongside approaches to achieve policy coherence, engage civil society actors, and increase support for Indigenous Peoples and integration of Indigenous and mainstream science. With the anticipated growth in financing for private sector engagement, STAP also sees a need for guidance that consolidates recent evidence on how to scale sustainable business models and shift market behaviours, including in areas where the financial incentives for private investment may be lacking and other policy and regulatory measures are needed.

### Accelerating learning from integrated programming

The GEF is distinguished by its sustained and growing emphasis on integrated programming. Starting from the premise that integration is a means (implying costs and trade-offs) rather than a goal, STAP aims to focus on the ways that integrated programming contributes most effectively to system transformation, and ultimately to GEBs at scale. This requires distinguishing between different types of integration (across sectors and focal areas; across MEA priorities; across actions at country and regional scales), linking analysis of progress to leading indicators of system transformation within the GEF Results Framework, and supporting adaptive learning in collaboration with regional and sectoral centres of excellence. STAP efforts would aim to position the GEF at the forefront of learning and practice on enhancing synergies and minimizing trade-offs across the Rio Conventions, thereby enabling progress on interdependent crises including biodiversity loss, climate change, pollution, desertification, and land and ocean degradation. While focused on the IPs, the intent is to generate learning that influences programming across the full GEF portfolio.

### Conclusion

At a moment when the foundations of international cooperation are under greater strain than any time since the GEF's creation, and when technological disruptions are accelerating, the international scientific community has converged on the imperative of systems transformation. This underscores the importance of the GEF's multidimensional mandate and its commitments, reaffirmed in GEF-9 strategy, to address the drivers of change in energy, food, land, marine, and urban systems, with attention to the synergies with human health and equity goals.

STAP's guidance in recent years has centred on pathways to invest in systems transformation, resilience, and durable outcomes; strategies to enable purposeful risk-taking on innovations that increase the likelihood of transformational change; and harnessing of the wide-reaching scientific and technical evidence available to better focus investments and increase the GEF's long-term impact.

This guidance has already helped sharpen the GEF's agenda, yet STAP recognizes the need to continue to adapt. **Our aim is that future STAP support be even more engaged and effective in aiding strategic prioritization, more closely connected to learn from implementation processes at country and regional scales, and more catalytic in promoting critical, evidence-based learning and adaptive management.**



Photo: UNDP Pacific



# ANNEX 1. STATE OF THE SCIENCE BY GEF FOCAL AREA

## **Biodiversity**

Biodiversity and ecosystem services are declining globally, with an estimated 1 million documented animal and plant species (around one quarter of all known species) currently threatened with extinction, many within decades, largely driven by human activities such as land-use change, overexploitation, pollution, invasive species, and climate change (IPBES 2019). The *Making Peace with Nature* report

(UNEP 2021) emphasized that human well-being critically depends on Earth's natural systems, but also highlights how humans have reduced the Earth's capacity to support current and future well-being. For example, in 2023, global public and private spending with direct negative impacts on nature were estimated at US\$ 7.3 trillion (US\$ 2.4 trillion in public spending; US\$ 4.9 trillion in private spending) (IPBES 2026b).





Photo: Patrizia Cocca/GEF

Shifting economic, financial, and productive systems to value nature is essential for transformation.

**Action to address biodiversity degradation must also consider the role of climate change, and vice versa,** as noted in the joint

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and IPCC report on biodiversity and climate change (Pörtner et al. 2023). Coordinated efforts to protect and restore biodiversity and ecosystems across landscapes and seascapes, along with policies that support equitable access to conservation use and management, are a top priority for future ecological function and human well-being.

Businesses remain at the centre of how economies and societies depend on and impact nature (Dasgupta 2021). The World Economic Forum estimated in 2020 that half of the global gross domestic product (GDP), US\$ 44 trillion, depends on nature (WEF 2020). A more recent analysis now estimates 55% of GDP, or US\$ 58 trillion (PWC 2023). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services business and biodiversity assessment (2026b) finds that unsustainable economic activity and a focus on GDP as the measure of growth represent significant barriers to transformative change. The assessment recognizes that both governments and

businesses play important roles in reducing adverse impacts on biodiversity. The assessment's science-based roadmap for systems change identifies five components to creating an enabling environment: policy, legal, and regulatory frameworks; economic and financial systems; social values, norms, and culture; technology and data; and capacity and knowledge.

The assessment also finds that **consistent risk assessment frameworks for biodiversity-related financial decision-making are needed, augmented by regulatory coherence to mainstream biodiversity across governance agencies and levels**, sustained over time. While building this enhanced enabling environment, collaborations among governments, businesses, and financial institutions can co-design and implement innovative financing mechanisms such as green or blue bonds<sup>6</sup> or high-integrity biodiversity credits to fund activities aligned with achieving global biodiversity goals and targets. Civil society can advocate for, monitor, and hold businesses to account for the fair and equitable sharing of benefits from the use of genetic resources. Businesses can also participate in community-based finance or decentralized structures supporting conservation and sustainable use.

<sup>6</sup> As part of the Blue and Green Islands Integrated Program in GEF-8, for example, the GEF is supporting Belize's conservation goals through a Project Finance for Permanence mechanism associated with Belize's 2021 debt-for-nature swap.



Photos: UNDP

## Chemicals and waste

The impacts of chemical pollution and waste are intensifying globally, with an estimated 90% of pollution-related deaths occurring in low- and middle-income countries (Fuller et al. 2022).

**Close to 2 million deaths annually have been attributed to chemical pollution** – a figure believed to be undercounted (Fuller et al. 2022). Mismanaged waste (i.e. waste that is not properly collected, transported, or disposed of, leading to pollution of natural environments) alone is estimated to cause up to 1 million deaths annually (UNEP 2025c). Evidence also suggests that exposure to pollution and related risk factors, including socioeconomic disadvantage, gender inequality, migration-related stressors, and broader sociopolitical conditions, such as lack of democratic governance, can compound health burdens. For example, study participants from African and Latin American countries exposed to these combined stressors have shown accelerated biological ageing compared with populations in Asia and Europe (Hernandez et al. 2025).

Patterns of consumption further exacerbate these impacts. High-income countries use six times more

materials per capita than lower-income countries (UNEP 2024), driving increased resource extraction, pollution, and waste generation. Through complex global value chains, international trade links this overconsumption in high-income economies with disproportionate environmental and health impacts in lower-income countries (e.g. Zhou et al. 2024; Wiedmann 2025).

Addressing chemicals and waste requires interventions that tackle upstream drivers of pollution, beginning with reducing unsustainable levels of consumption (UNEP 2024). Key priorities include improving resource use efficiency and redirecting and repositioning subsidies towards sustainable resource use, while also mobilizing private finance towards environmentally sound investments (UNEP 2025c).

<sup>7</sup> “Circularity” refers to the extent to which materials, products, and resources are kept in use within economic systems for as long as possible through strategies such as regenerative design, reuse, repair, refurbishment, remanufacturing, and recycling, thereby minimizing waste generation and the need for virgin resource extraction. See STAP papers: Barra & Leonard 2018; Ali & Leonard 2021a; Ali & Leonard 2021b.



**Food production illustrates the scale of the challenge: it is currently the single largest driver pushing humanity beyond planetary boundaries.**

Transitioning to sustainable dietary patterns could significantly reduce the use of fertilizers, pesticides, and plastics; cut the biodiversity footprint of food consumption by nearly 50%; and deliver substantial public health benefits through reductions in all-cause mortality and major chronic diseases (Guzman et al. 2024; Rockström et al. 2025). Sustainable food production systems can also help address the growing problem of antimicrobial resistance, with significant health and other socioeconomic benefits (FAO 2024; Astbury et al. 2025).

Increasing the circularity<sup>7</sup> of material use can further reduce pollution and waste. Rather than continually expanding the extraction and production of new materials, **economic systems must shift towards managing existing material stocks more efficiently** (UNEP 2025c). However, circular approaches are most effective when accompanied by reductions in overall material demand. Achieving this shift requires a combination of regulatory incentives, economic instruments, and changes in social norms.

Circular economy strategies must also account for rebound effects, where efficiency gains inadvertently lead to increased consumption (Dos Santos et al. 2025).

In parallel, shifting production systems towards being “safe and sustainable by design” can also reduce reliance on inherently hazardous chemicals (van Dijk et al. 2025). While these solutions offer promising opportunities to reduce chemical pollution and waste, their effectiveness ultimately depends on broader systemic change, including shifts in societal values; coherent and coordinated governance structures; and the political will to overcome entrenched economic, technological, and social lock-ins that perpetuate unsustainable production and consumption patterns.





Photo: UNDP Cuba

## Climate change

The latest assessments from the IPCC (2023) and the World Meteorological Organization (WMO 2025) report record global temperatures and early signs of weakening land carbon sinks, indicating that key natural systems that regulate the climate are under increasing strain. The UNEP *Emissions Gap Report 2025* (UNEP 2025b) finds that current national climate pledges would place the world on a trajectory of roughly 2.3 – 2.5°C of warming, while existing policies could lead to around 2.8°C of warming, underscoring the large emissions gap between current commitments and pathways consistent with the Paris Agreement goals. At the same time, political momentum appears to be weakening. The *State of Climate Action 2025* report (Schumer et al. 2025) identifies a **widening gap between international climate commitments and their implementation, noting the need for exponential shifts in policy ambition, governance arrangements, and financing structures.**

In this context, subnational entities such as cities and metropolitan regions have emerged as primary drivers of transformational change, accounting for the majority of global emissions and demonstrating capacity for rapid policy innovation through networks such as C40 Cities, United Cities and Local Governments, and ICLEI – Local Governments for Sustainability (Gurney et al. 2022; IPCC 2022). In some cases, the private sector is driving innovation in breakthrough technologies such as AI-powered climate analytics, alternative materials, and carbon

capture solutions, while digital transparency tools, including blockchain, are transforming supply chains (Chen et al. 2025; Vishwakarma et al. 2025).

On the adaptation front, the finance gap is now estimated to be in the range of US\$ 284 – 339 billion per year (UNEP 2025a). An increasing share of climate adaptation funding is channelled to non-grant instruments, for which there remains limited and mixed evidence about their effectiveness in terms of adaptation outcomes (Mazzucato & Vieira de Sá 2025).

Recent evidence shows that **successful adaptation is less about implementing self-standing technical measures and interventions and more about enabling integrated, context-specific implementation**, which needs to be supported by effective and inclusive multilevel governance, adequate levels of technical and institutional capacity, legitimacy, appropriate levels of finance, and sustained coordination across actors and sectors (Brullo et al. 2024; UNEP 2024). Climate change adaptation and mitigation outcomes strengthen when approaches are locally led and combine instruments such as ecosystem-based and nature-based solutions with risk management and development planning (IPCC 2023). This is because these integrated approaches are more likely to generate durable, scalable benefits and ensure wider uptake (Global Center on Adaptation 2024; Mirzabeav et al. 2024; Terton et al. 2024; UNDRR 2024).



Photo: Haris Čalkić

## Land degradation

**Recent assessments increasingly treat drought as a systemic risk multiplier, with compounding and cascading impacts across food, water, biodiversity, and livelihoods, particularly in vulnerable dryland systems** (IPCC 2022; IPBES 2024). Climate change can exacerbate land degradation processes (IPCC 2023). In practical terms, this means restoration investments must be designed to reverse degradation trajectories (soil erosion, declining soil organic matter, vegetation loss, and hydrological dysfunction) and to sustain ecosystem functions and livelihoods in ways adapted to projected future climate scenarios (UNCCD 2025), while tending to cross-sectoral interactions (Tedesco et al. 2023). Evidence shows the concurrence of heat and drought is increasing in many regions, intensifying impacts and raising the performance bar for restoration and land management under more frequent extremes (IPCC 2022; Gebrechorkos et al. 2025).

Land degradation and restoration science increasingly converges on a practical conclusion: many solution pathways are well evidenced, but the binding constraint is scaling and durability under rising climate variability, especially drought.

From a land restoration perspective, this strengthens the case for restoration “bundles” that build resilience to drought. These bundles integrate action on soil cover and organic matter, water

infiltration and retention, vegetation structure and grazing management in rangelands and watersheds, and trees in production landscapes, paired with enabling governance, learning, and monitoring systems that support adoption and maintenance at scale (UNCCD 2024a; Li et al. 2025).

This emphasis on bundled pathways, enabling conditions, and scalability is consistent with the latest Global Land Outlook, which synthesizes practical restoration pathways and the enabling factors required to scale land restoration for recovery and resilience (UNCCD 2022). **Climate-resilient land outcomes often require integrated strategies that combine ecosystem-based (“green”) measures such as soil moisture-conserving agricultural practices with targeted water-related (“grey”) interventions to enhance natural water storage systems.** Integrated packages, rather than siloed interventions, are better suited to addressing coupled land and water risks (Tomalka et al. 2024), as has been recognized across the three Rio Conventions (UNCCD 2024b).



## International waters

Research shows that water cannot be managed in isolation; it requires an integrated, coherent approach across sectors and actors. Recent analyses have sharpened understanding of the role climate change plays in water-related conflict (Turgul et al. 2024), as well as the prospects of future conflict, with some analysts projecting that over 900 million people will live in very high to high conflict risk basins by 2050 under a business-as-usual scenario (de Bruin et al. 2024). **Regions that engage in operational cooperation agreements are better positioned to achieve the Sustainable Development Goals, fostering cooperation and peacebuilding for long-term stability,** than regions where water governance and cross-border cooperation remain underdeveloped (Sahana et al. 2024).

Managing water solely for irrigation or sector-specific objectives can further exacerbate pressures on ecosystems, negatively affecting biodiversity and the ecological integrity of freshwater systems. For example, agricultural and industrial uses increase freshwater demand, while pollutants such as per and polyfluoroalkyl substances (Podder et al. 2021) and antibiotics (Ehalt-Macedo et al. 2025) reduce water quality and, consequently,

the amount of freshwater that can be safely used (Wang et al. 2024). **These interlinkages highlight the importance of integrated water resource management and ecosystem-based or nexus approaches, which recognize that water, land, climate, and biodiversity are deeply interconnected.** Although the need for integrated and cooperative governance of international waters is widely acknowledged in both science and policy, the effective implementation of such governance arrangements continues to lag behind Sustainable Development Goal targets (UNESCO 2025).

The entry into force of the Agreement on Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement, also known as the High Seas Treaty), in January 2026 (United Nations 2026), is a significant step forward but also raises new challenges concerning the relationship to other prior governance arrangements (Kim 2024). IUU fishing is a particularly entrenched challenge, yet new technologies have emerged that facilitate tracking IUU fishing and new approaches are being developed to more effectively address its causes and dynamics, including within the broader context of illegal activities and transnational crime (Stefanus & Vervaele 2021; Bethel 2025).

## ANNEX 2. STAP PUBLICATIONS DURING GEF-7 AND GEF-8

This annex provides a short description of each STAP publication issued during the last two GEF replenishment periods, from 2018 to 2026. The categories follow the themes outlined in Section 3 of this report: Transformation, resilience, and durability; innovation and risk; and leveraging evidence for impact.

### Transformation, resilience, and durability



#### Towards principles to guide sustainability transformation, 2026

This information note outlines how STAP's understanding and advice on transformational change have evolved within the GEF, emphasizing the need to address the interconnected crises of climate change, biodiversity loss, and pollution through systems-based approaches. It synthesizes insights from major global assessments to identify key principles that can guide sustainability transformations. The note positions these principles as a framework to support consistent, science-based decision-making across GEF programming.

#### Strengthening source-to-sea approaches in the GEF, 2025

The STAP information note highlights the value of managing environmental systems as a connected continuum, from terrestrial ecosystems to freshwater systems to coastal and marine environments, noting that fragmented governance across these domains limits effectiveness. It reviews the GEF's growing experience with source-to-sea approaches, identifies key barriers to using these approaches, and provides

targeted advice to scale up and operationalize the approaches within GEF programming, emphasizing systems-thinking, improved governance across scales, and stronger alignment of policies and investments.

#### STAP's initial perspective on GEF-9, 2024

This advisory document presents STAP's perspectives and strategic advice for the GEF-9 Replenishment Period. Developed following extensive consultation, the document reviews current global trends, identifies strategies to enhance the GEF's catalytic role in transforming key global systems, and argues that strategic partnerships are essential to delivering transformational change at scale. STAP puts forward seven recommendations for GEF strategy, addressing theory of change, innovation, policy coherence, civil society engagement, market transformation, results frameworks, and adaptive learning.

#### Looking forward to the 7th GEF Assembly, 2022

The STAP report to the Seventh GEF Assembly examines the state of the science around transformational change, identifying entry points through which GEF investments can drive systems transformation in food systems, urban development, energy decarbonization, education and equity, human health, and sustainable economies. The report presents eight recommendations, covering risk frameworks, innovation, policy coherence, co-benefit tracking, knowledge management, inclusion of marginalized groups, and strategic external partnerships.

#### A decision tree for adaptation rationale, 2022

This STAP advisory document provides a step-by-step tool to help GEF project developers establish clear, evidence-based justification for adaptation interventions. It structures the rationale around four elements: current or projected climate hazards; impact on people, ecosystems, or systems; interventions that directly respond to climate risks; and frameworks to track adaptation outcomes. The decision tree helps distinguish genuine adaptation



activities from business-as-usual development, strengthens project coherence, and improves the likelihood of delivering measurable adaptation benefits.

### **Achieving transformation through GEF investments, 2022**

This STAP advisory document focuses on developing transformative investments, recommending that transformative goals be clearly specified, plausible, and linked to credible pathways that deliver durable change at scale. It recommends that the GEF clearly identify which investments are expected to be transformative, rigorously test their ambition, and ensure that project designs provide credible pathways to achieve transformational change. The advisory document also addresses metrics for monitoring transformation.

### **Making GEF investments resilient, 2021**

This STAP policy brief focuses on applying resilience thinking to GEF investments, recognizing that enduring and transformative GEBs must be resilient to future shocks and stresses that could otherwise undermine them. STAP advocates integrating resilience thinking and a scenario-based approach to known future risks into GEF design to strengthen the durability and transformative impact of GEF investments. Through this approach, the GEF can better safeguard its GEBs against future uncertainties and ensure its investments deliver lasting, resilient outcomes.

### **Why behavioral change matters to the GEF and what to do about it, 2020**

This STAP advisory document focuses on the critical role of behaviour change in addressing the root causes of global environmental change. Five case studies, from Brazil, Colombia, Indonesia, Mexico, and Namibia, illustrate how levers of change can be applied in various combinations to drive meaningful behaviour change across a range of environmental challenges. STAP recommends a using checklist of six key issues, with supporting questions, to guide GEF project developers in explicitly embedding behaviour change strategies into project and program design and implementation.

### **Achieving enduring outcomes from GEF investment, 2019**

This STAP advisory document focuses on securing the durability of project outcomes and impacts, setting out a framework of principles built around four core themes: engaging the right stakeholders; building incentives for key actors; incorporating diversity and flexibility in project design and implementation; and underpinning all of these practices with a systems-thinking approach. These principles aim to equip the GEF and its partners with a structured approach to ensuring that project outcomes and GEBs are sustained long after project completion.

## **Integration**



### **Why drought matters for the global environment, 2024**

This STAP information note examines drought as an escalating global crisis driven by climate change, with consequences for ecosystems, biodiversity, food security, and human livelihoods. It outlines how the GEF addresses drought through land degradation programs, drought-smart management, and climate adaptation funds, including the Least Developed Countries Fund and the Special Climate Change Fund, to build resilience and reduce vulnerability. The note synthesizes scientific evidence on drought, explores its implications for GEF objectives, and highlights priority actions for prevention and mitigation.

### **Agrivoltaics, 2024**

This STAP advisory document focuses on agrivoltaics as an emerging, innovative solution to the land-use competition between food and energy production, combining solar systems with agricultural production on the same land. The advisory document maps the



benefits of agrivoltaic systems against GEF work areas and provides practical advice on how the GEF could support the implementation and scaling of agrivoltaic systems in partner countries, positioning agrivoltaics as a transformational opportunity to deliver durable GEBs.

#### **Delivering climate change adaptation benefits in GEF Trust Fund projects, 2024**

This STAP advisory document examines how investments addressing biodiversity, climate, water, chemicals, and land management can better capture climate adaptation co-benefits. Drawing on an analysis of 37 projects, the document assesses how climate change is characterized within project designs and whether adaptation benefits could be delivered without compromising environmental outcomes. STAP offers concrete recommendations to strengthen project design and more systematically integrate and maximize climate adaptation benefits across GEF Trust Fund investments.

#### **The GEF and the blue economy, 2022**

This STAP advisory document addresses the growing international attention to blue economy opportunities and critically examines the underlying assumptions, trade-offs, and risks these investments entail. It offers a framing to ensure that investments pursued under the blue economy banner are consistent with the GEF's mandate and targeted to contribute to system transformation in GEF-8 and beyond. It suggests priorities for investment within the categories of governance and policies, financial leverage, innovation and learning, and multi-stakeholder dialogue.

#### **How to design circular economy projects, 2021**

This STAP advisory document focuses on the circular economy as a paradigm shift in resource use, building on three previous STAP circular economy reports to provide guidance on how the GEF can plan, design, and implement effective circular economy projects. The report emphasizes the importance of understanding resource systems – including their components, actors, and interactions with external factors such as government policies, sociocultural influences, and financial incentives – as a foundation for designing projects that can effectively transform resource systems towards circularity.

#### **Nature-based solutions and the GEF, 2020**

This STAP advisory document focuses on nature-based solutions, synthesizing recent literature and presenting an analysis of 30 GEF projects alongside complementary analyses by the Wildlife Conservation Society and the Gordon and Betty Moore Foundation. Developed from workshops convening over 40 experts from philanthropies, academia, non-governmental organizations, the GEF Secretariat, GEF agencies, and STAP, the report aims to strengthen the GEF's understanding and application of nature-based solutions to deliver durable GEBs at scale.

#### **Delivering multiple benefits through the sound management of chemicals and waste, 2020**

This STAP advisory document highlights how the mismanagement of persistent organic pollutants, mercury, and ozone-depleting substances drives biodiversity loss, climate change, land degradation, and water pollution, while undermining human health, food security, and gender equality. The report shows how sound chemical management offers a powerful opportunity to deliver multiple co-benefits across the GEF's entire portfolio and beyond. It provides advice on designing chemicals and waste projects that address interlinkages, capture multiple benefits, and catalyse the transformative changes needed to advance broader sustainability objectives.

#### **STAP's initial perspective on GEF-8, 2020**

This STAP advisory document provides a science and technology review of global environmental trends, reinforced by lessons from the COVID-19 pandemic. Looking ahead, STAP proposes a three-pronged strategy: ensuring GEF investments are efficient, transformative, and durable in delivering GEBs; building a more integrated and coherently transformational portfolio; and leveraging the GEF's convening power to help reshape global economic systems towards environmentally sustainable development through partnerships, better investor information, and stronger policy incentives.



### **Integration: To solve complex environmental problems, 2018**

This STAP advisory document explores the science of integration, underscoring its importance to the GEF and offering recommendations to enhance integration in GEF project design. It outlines a set of actionable guidance, including applying systems-thinking, developing a clear rationale and theory of change, sequencing interventions logically, prioritizing knowledge management with adequate funding, engaging stakeholders effectively, and allowing flexible project preparation. These recommendations aim to strengthen holistic design and implementation, improving the likelihood of delivering durable GEBs.

### **A future food system for healthy human beings and a healthy planet, 2018**

This STAP advisory document addresses the mounting challenge of increasing food production to meet a growing global population, emphasizing the need to elevate the sustainability of current agrifood systems in both the short and long term. The report highlights the potential of circular economy approaches as a central strategy for addressing these challenges and achieving more sustainable outcomes across food systems. It concludes with practical advice for the GEF on applying these insights to support transformational and durable environmental benefits.

### **Social foundations of transformation**



### **Social resilience for system transformation, 2025**

This STAP information note focuses on the role of social resilience and collective action as prerequisites for transformational change, synthesizing evidence from behavioural and social sciences. It identifies seven institutional and psychological foundations that enable communities to withstand shocks, adapt, and steward natural resources over time: social cohesion, anchor institutions, resilient livelihoods, women's empowerment, well-being, care, and hope and agency. By intentionally integrating these foundations into project design, the GEF can enhance equity, inclusion, and the long-term effectiveness of its investments.





### **Strengthening GEF support for Indigenous Peoples: Issues of governance, project design, financial access, and livelihood benefits, 2025**

This STAP information note synthesizes insights from consultations with Indigenous Peoples and a review of selected GEF projects that impact or benefit Indigenous Peoples. Drawing on this evidence base, the report presents targeted recommendations to enhance the effectiveness of GEF engagement with and support for Indigenous Peoples across its programming. The recommendations aim to ensure that GEF investments better reflect the rights, knowledge, and priorities of Indigenous Peoples while maximizing the delivery of durable GEBs.

### **Citizen science, 2024**

This STAP background note focuses on the potential of citizen science to deliver GEBs, highlighting its capacity to raise community awareness, promote social learning and behaviour change, and engage Indigenous Peoples, local communities, and diverse ways of knowing in GEF programming. It illustrates the benefits and opportunities of enhancing public engagement through citizen science and describes key types of citizen science, as well as barriers and challenges in its use. The report notes that a whole-of-society approach that harnesses citizen science can strengthen transparency, accountability, and inclusivity in environmental decision-making.

### **Alternative livelihoods, 2024**

This STAP background note focuses on alternative livelihood approaches in GEF projects and clarifies the various types of livelihood interventions. Drawing on a review of scientific literature and selected GEF projects, the paper identifies persistent challenges to alternative livelihood interventions, emphasizing the need for more effective long-term monitoring and evaluation of the causal links between alternative livelihood interventions and the achievement of GEBs. The report provides practical advice on improving alternative livelihood intervention design and enhancing the likelihood of achieving durable GEBs across the GEF Partnership.

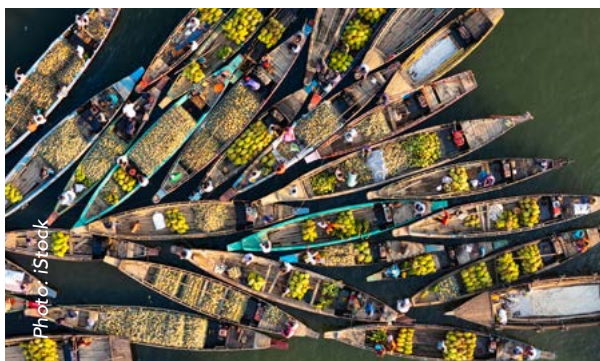
### **Community-based approaches, 2024**

This STAP information note focuses on community-based approaches and their long history in GEF programming, highlighting their proven capacity to deliver positive environmental outcomes alongside socioeconomic co-benefits such as improved food security, water access, educational attainment, and increased incomes. While community-based approaches have demonstrated significant potential, they are not a universal remedy and may not be suited to all contexts. The information note provides practical guidance on when to use community-based approaches and key principles for designing and implementing them effectively to maximize GEBs.

### **Multi-stakeholder dialogue for transformational change, 2020**

This STAP advisory document focuses on the principles and practices of effective multi-stakeholder dialogue as a tool for addressing GEF priorities, with particular emphasis on leveraging multi-stakeholder processes to build regional and global coalitions for transformational change. It highlights the critical role of private sector actors, including multinational corporations, industry associations, and private financial institutions, in driving the systemic change needed to deliver GEBs. The document provides practical guidance for designing and implementing multi-stakeholder processes at regional and global scales.

## Innovation and risk



### **Fostering cooperation and managing conflict in GEF transboundary water projects, 2024**

This STAP information note (and subsequent policy brief) examines three decades of GEF investment in transboundary water cooperation. The note presents a conceptual framework linking transboundary water management to cooperation and conflict dynamics and explores the impact on future GEF investments. The note identifies priority action areas to strengthen the GEF's approach to international waters, with the goal of interrupting cycles of water-related conflict and promoting virtuous cycles of cooperation and shared environmental and social benefits.

### **Clarifying risks in GEF projects, with a focus on innovation risks, 2024**

This STAP advisory document provides guidance to GEF agencies and countries on conducting consistent, robust risk analyses for projects and programs, following the GEF Council's adoption of a risk appetite statement. It addresses two key areas requiring clarification: (i) distinguishing between the nature of risk, mitigating measures, and residual risk, and (ii) describing and assessing the new dimension of "innovation risk". The advisory document covers basic risk concepts, the implications of the GEF's high appetite for innovation risk, and practical examples of completed risk tables to assist project developers and reviewers.

### **Environmental security: Achieving durable outcomes in fragile and conflict-affected situations, 2024**

This STAP policy brief focuses on the critical challenge of achieving durable GEBs in fragile and conflict-affected situations. Drawing on insights from a workshop co-convened with the GEF Secretariat,

STAP identifies six key entry points for effectively integrating guidance on fragile and conflict-affected situations into GEF program and project design to increase the likelihood of enduring environmental outcomes. The policy brief highlights opportunities to strengthen GEF engagement in fragile and conflict-affected situation by communicating risk appetite, supporting flexible and adaptive management, and enabling learning and exchange through existing platforms and technical assistance.

### **Leveraging innovation for transformational change, 2023**

This STAP advisory document focuses on the need for a more systematic approach to innovation within the GEF. It outlines five sequential practices to strengthen innovation across the GEF: prioritizing problems, aligning ambitions, embracing diversity, designing for scale, and enabling learning. The report recommends four priority actions: adopting a risk appetite framework, using targeted funding windows, strategically integrating innovation into program design cycles, and building knowledge management systems to position GEF investments at the cutting edge of innovation.

### **Risk appetite and the GEF, 2022**

This STAP advisory document focuses on the relationship between innovation and risk in the context of the GEF's ambition to drive transformational change including in food, energy, and urban systems. Achieving systems change at the required pace and scale demands greater innovation, which inherently entails higher uncertainty and a greater likelihood of failure than conventional approaches. The report recommends that the GEF develop a risk appetite statement and corresponding framework, in consultation with the GEF Council and the GEF Partnership, to better manage and embrace the risks associated with transformational innovation.

### Note on development of risk appetite framework at the GEF, 2022

This STAP policy brief, a companion to STAP's advisory document Risk appetite and the GEF, distils key insights gathered from consultations with GEF agencies and external organizations on developing a risk appetite statement and framework. It presents three core findings: the need for consistent leadership to foster a risk management culture, the importance of a structured development and rollout process, and a set of strategic choices around risk categorization, measurement, and accountability.

### Innovation and the GEF, 2019

This STAP advisory document focuses on addressing key cross-cutting issues, including defining a risk appetite, cultivating innovation in project design, encouraging adaptive implementation, and facilitating the exchange of lessons learned to embed a culture of innovation across the GEF Partnership. It advises the GEF to achieve greater investment outcomes per GEF dollar by identifying creative uses of innovative solutions and engaging a wider range of partners to promote policy and institutional reform that support GEBs.

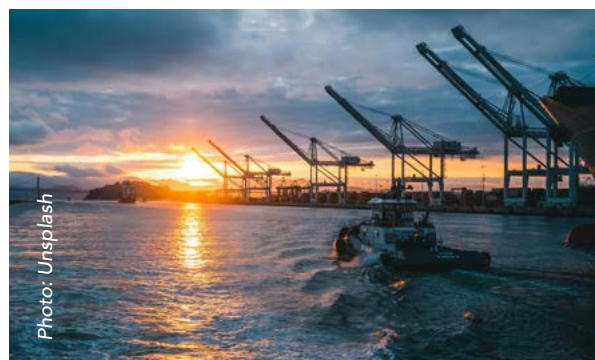
### STAP guidance on climate risk screening, 2019

This STAP advisory document proposes a common standard for climate risk screening of GEF projects, based on the scientific literature, building on past STAP work. The advisory document suggests that, at a minimum, each agency should use a risk screening process that includes four steps (hazard identification, assessment of vulnerability and exposure, risk classification, and a risk mitigation plan) and ranks risks on a clearly defined scale, using the best available data.

### Environmental security: Dimensions and priorities, 2018

This STAP advisory document establishes environmental security as a foundational rationale for GEF investment. It underscores that environmental security cuts across all GEF focal areas, making its explicit consideration essential to delivering durable GEBs. The report identifies four dimensions particularly relevant to the GEF and sets short- and long-term recommendations to enhance the positive links between environmental health and human security while minimizing associated risks.

## Engaging policy and markets



### STAP Information Note #1 on blended finance, 2024

This STAP information note focuses on blended finance as a critical mechanism to mobilize private capital at the scale required for transformational environmental impact. Drawing insights from literature, case studies, and project screening, the paper highlights the potential for a more systematic classification of intervention types and contexts to better identify which approaches are most amenable to different blended finance instruments. It concludes by identifying four key issues to frame an agenda for further investigation.

### STAP Information Note #2 on blended finance: Some considerations for project design, 2024

Building on STAP's first information note on blended finance, this note addresses how blended finance projects must integrate the finance logic and the GEB logic. STAP proposes three key considerations that examine how these design logics interact and converge, arguing that treating them separately risks undermining the effectiveness of investments. These considerations are recommended for inclusion in calls for blended finance projects to help bridge the gap between financial objectives and the delivery of durable GEBs.

### Policy coherence in the GEF, 2023

This STAP advisory document focuses on policy coherence as a critical mechanism for safeguarding the durability of GEBs generated by GEF projects, ensuring that misaligned policies do not undermine or negate environmental investments. It outlines eight activities the GEF could pursue across its operational levels to assess and strengthen policy coherence interventions. It also provides recommendations for evaluating projects under



the GEF's policy coherence competitive window, reinforcing a strategic vision that balances environmental objectives with countries' broader economic and social goals.

#### **Framing policy coherence for the GEF, 2022**

This STAP policy brief focuses on policy coherence as a means of integrating environmental objectives into domestic policymaking to ensure that GEBs generated by GEF projects are not undermined by misaligned policies that allow leakage, reduce GEB durability, or promote environmentally damaging behaviours. The brief defines what good policy coherence means for the GEF and explores ways to operationalize and synergize its approaches. It also provides a range of practical tools that can be deployed at different operational levels, drawing on existing frameworks.

#### **Natural Capital Approaches: Lessons Learned, 2022**

This STAP policy brief synthesizes findings from a review of countries' experiences implementing techniques that integrate diverse disciplines to assess and account for natural assets and ecosystem services. It finds that uptake among GEF agencies and policymakers in partner countries remains insufficient to generate transformational and durable changes, with key barriers including limited access to data and guidance and lack of capacity to employ cutting-edge tools. STAP proposes solutions to overcome these barriers, including building capacity among key stakeholders in partner countries and GEF agencies.

#### **The circular economy and climate mitigation, 2021**

This STAP advisory document explores how the circular economy, centred on keeping resources in use, maximizing their value, and recovering materials at the end of life, can serve as a powerful lever for climate action while delivering broader environmental and socioeconomic benefits. The document presents 14 circular climate interventions across key sectors, including agriculture, plastics, textiles, electronics, and construction, supported by case studies. Building on prior STAP work on plastics and food systems, the report offers recommendations for embedding circular principles into GEF-8 programming, enabling policy and economic incentives, and leveraging partnerships to scale innovation and attract finance for wider adoption.

#### **Plastics and the circular economy, 2018**

This STAP advisory document examines the growing environmental and health crisis posed by plastic pollution, spanning climate change, marine ecosystems, biodiversity, and chemical contamination and critically evaluates the circular economy as a proposed solution to the linear "make, use, dispose" model that drives it. While highlighting successful examples of circular approaches, the advisory document cautions that a truly comprehensive solution must also reduce demand. The document concludes with targeted advice to the GEF on the strategic role it can play in tackling global plastic pollution.

## Harnessing technology



### Emerging technologies and the GEF, 2026

This STAP advisory document focuses on guiding the GEF in engaging with emerging technologies to maximize GEBs. It synthesizes current evidence and expert insights to navigate the opportunities, risks, and trade-offs associated with technological innovation in relation to the GEF mission of delivering GEBs and the GEF's aspiration to help catalyse systems transformation. The report addresses key dimensions of governance, safeguards, and institutional readiness needed to ensure that emerging technologies contribute effectively and responsibly to environmental sustainability. It presents considerations to help the GEF strategically integrate technological innovation into its investments to support transformation.

### Artificial intelligence and the GEF: STAP's early thoughts, 2025

This STAP information note focuses on the transformative potential of AI in accelerating the delivery of GEBs across all GEF focal areas. The note explores opportunities for leveraging AI in project design, monitoring, evaluation, and knowledge management, drawing on examples of AI use across the GEF Partnership and networks, while also highlighting critical environmental, social, and governance risks associated with its rapid advancement. The information note concludes with cross-cutting implications and targeted advice to guide the GEF in responsibly and effectively adopting AI to deliver GEBs and facilitate transformational change.

### Harnessing blockchain technology for the delivery of global environmental benefits, 2019

This STAP advisory document focuses on blockchain technology as a novel entity with potential applications for delivering GEBs. The advisory document provides an accessible explanation of blockchain technology, exploring how it could be leveraged to support the GEF's environmental objectives while also identifying key challenges and barriers to its adoption. The document concludes with targeted recommendations to the GEF on how best to harness blockchain technology to advance its mission of delivering durable GEBs.

### Technology critical elements, 2020

This STAP advisory document examines the dual nature of technology critical elements, which are indispensable to green and emerging technologies such as renewable energy, energy storage, and electronics, yet carry significant risks of ecosystem damage and harm to human health through their extraction and release into the environment. The report reviews the benefits and costs associated with technology critical elements and identifies practical solutions for managing their environmental and health impacts. It concludes with recommendations for how the GEF can incorporate technology critical element risk management into its investments while capitalizing on the opportunities these materials offer to advance sustainable development.

### Earth observation and the GEF, 2019

This STAP advisory document focuses on Earth observation technology, examining its potential applications and recommending how the GEF could harness it to support the delivery of GEBs. It provides an overview of Earth observation technology, while an accompanying technical guide offers a more detailed explanation of the underlying principles, data sources, platforms, and case studies. Together, these resources aim to equip the GEF and its partners with the knowledge needed to effectively integrate Earth observation tools and data into their programming and decision-making.



### **Novel entities, 2018**

This STAP advisory document focuses on novel entities, broadly defined as technologies, innovations, or materials introduced into the environment by humans that could have positive or negative disruptive effects on Earth's systems. Key challenges for the GEF are determining which new technologies offer the greatest potential to increase GEBs while minimizing adverse impacts and identifying the most effective strategies and time frames for capturing those benefits. The report identifies emerging technological advances relevant to the GEF's work and proposes a structured approach to addressing them.



### **From rain to rivers: A systems approach to the global hydrological cycle in GEF programming, 2026**

This STAP advisory document focuses on the relevance of the hydrological cycle to the GEF, highlighting why addressing the challenges in global water and atmospheric moisture flows is critical to delivering durable GEBs and advancing policy coherence. It presents recommendations to the GEF on the importance of managing the global hydrological cycle to protect and restore ecosystems critical to atmospheric flows through a systems transformation approach.

### **Delivering durable change by breaking lock-in: Case studies of antimicrobial resistance and lithium-ion batteries, 2026**

This STAP information note examines structural drivers that "lock in" harmful practices and that must be addressed to achieve transformative, durable change. "Lock-in" refers to the interplay of economic, social, technological, and political

dynamics that maintain and reinforce a particular socio-technological path, including maintenance of the status quo. The paper examines the challenges of lock-in and potential responses, drawing on two case studies: antimicrobial resistance and waste lithium-ion batteries. Understanding structural drivers is essential for identifying appropriate entry points to break the lock-in of harmful practices.

### **Proactive Drought Management for Global Environmental Benefits, 2026**

This STAP advisory document focuses on the land – water – biodiversity – climate nexus, noting that drought should be understood as a systemic rather than merely a climatic risk. It calls for integrating proactive drought risk governance into GEF investments, emphasizing land – water coherence and ecosystem-based resilience as critical strategies to safeguard GEBs amid rising drought stress. The report outlines recommendations on how the GEF can better position itself to address these interconnected challenges through an integrated approach.

### **Tackling IUU fishing: Strategic opportunities for the GEF to safeguard marine ecosystem, 2026**

This STAP information note on IUU fishing examines the underlying drivers that enable harmful practices to persist and undermine the delivery of durable GEBs in marine and freshwater ecosystems. It outlines practical recommendations to address IUU fishing, including strengthening data and monitoring systems to improve transparency and traceability, and reinforcing governance frameworks for prevention, detection, and enforcement. These recommendations provide a structured approach to help the GEF and its partners tackle IUU fishing more effectively in support of sustainable fisheries and ocean health.

### **Considerations for biodiversity conservation in the Anthropocene, 2025**

This STAP information note examines what it means to protect biodiversity and sustain ecosystem services in the Anthropocene, where human-driven changes are transforming ecosystems at scales and speeds that challenge traditional conservation practices. It outlines three priority actions for the GEF: safeguarding climate refugia to anchor biodiversity persistence, strengthening ecological connectivity through large conservation mosaics,

and designing restoration efforts around future climate realities. Together, the priority actions offer a forward-looking framework to enhance resilience and maintain GEBs in a rapidly changing world.

**A Summary of definitions, guidelines, and tools on ecosystem-based approaches for watershed management, 2024**

This STAP information note consolidates key definitions and guidelines on ecosystem-based management to promote uniform understanding and application across GEF projects. The note summarizes the core definitions of ecosystem-based approaches, highlights relevant guidelines that project designers can draw on, and offers examples of additional STAP guidance to support the design and implementation of these approaches. The note serves as a practical reference tool to strengthen and standardize the application of ecosystem-based management throughout the GEF project cycle.

**A typology of climate change adaptation benefits: Exposure, sensitivity, and adaptive capacity, 2022**

This STAP policy brief addresses the growing gap between climate adaptation financing needs in developing countries and the fragmented, incremental nature of current adaptation action, arguing that transformational change requires clearer adaptation rationales grounded in a shared framework. To fill this gap, STAP proposes a typology of adaptation benefits designed to clarify intended project outcomes while providing enough structure to meaningfully connect priorities, actions, and results across individual projects and broader portfolios.

**Local commons for global benefits: Indigenous and community-based management of wild species, forests and drylands, 2019**

This STAP advisory document argues that strengthening community rights over land and natural resources is a promising, evidence-based pathway to simultaneously advance biodiversity conservation, climate change mitigation, and land degradation objectives. The report highlights principles and design characteristics that have emerged for establishing robust governance of local commons. It identifies a significant opportunity for the GEF to drive transformational change by

restoring, strengthening, or establishing inclusive community-based governance of traditional commons to advance GEBs.

**Guidelines for land degradation neutrality, 2019**

This STAP advisory document outlines the core aim of land degradation neutrality, ensuring there is no loss of healthy, productive land at the national level, and explains how achieving it requires carefully estimating the cumulative impacts of land-use decisions while strategically counterbalancing anticipated losses through targeted rehabilitation and restoration of degraded land. Recognizing the complexity of translating this objective into practice, the report offers practical guidance to help project developers design interventions that meaningfully contribute to land degradation neutrality goals within the same land type.

**Learning and knowledge management**



**Real-time monitoring, evaluation, and learning (MEL) in GEF-9: A Joint Information Note from STAP and the IEO based on four case studies, 2025**

This STAP information note focuses on best practices and approaches in monitoring, evaluation, and learning. Developed in collaboration with the GEF IEO, it illustrates key principles of effective monitoring, evaluation, and learning through four case examples spanning conservation markets, food systems, wildlife programs, and snow leopard recovery. The report highlights the GEF's continued progress in establishing rigorous monitoring, evaluation, and learning practices and offers insights to further strengthen its culture of learning, including a deeper exploration of the critical links between adaptive learning and durable outcomes.



### **Knowledge management and learning, 2022**

This STAP policy brief focuses on the need for a transformative vision of knowledge management and learning that treats knowledge management as an integral part of the GEF's core business rather than a separate process, arguing that this vision requires a theory of change to guide the development of a new knowledge management and learning strategy. The policy brief outlines five pathways to achieve this vision: governance and leadership; durable learning; empowerment and exchange; design and application; and tracking and adaptation.

### **Understanding South – South cooperation for knowledge exchange, 2021**

This STAP policy brief focuses on South – South cooperation as a mechanism for knowledge exchange within the GEF and its agencies, examining experiences and lessons learned from both the GEF and other institutions. It reviews what has been achieved through South – South cooperation, identifies key challenges, and draws on this evidence base to inform recommendations for GEF programming. Overall, the brief seeks to strengthen the GEF's approach to South – South cooperation and knowledge exchange to enhance the effectiveness and impact of GEF investments across partner countries.

### **Managing knowledge for a sustainable future, 2018**

This STAP advisory document focuses on the science of knowledge management and its critical importance to the GEF, presenting that knowledge management should be systematically embedded into the project cycle from the outset rather than treated as an afterthought or optional activity. The advisory document recommends integrating knowledge management at key stages of the project cycle and underscores the need for more easily searchable project documentation to facilitate the compilation of lessons learned, the comparison of strategies, and stronger links between practitioner and academic research.

## **Effective project and program design**



### **Simple Future Narratives: Brief and Primer, 2023**

This STAP advisory document focuses on the use of future narratives as a practical tool for designing resilient and durable GEF projects, highlighting the importance of considering key drivers of change, such as population growth, conflict, climate change, and migration, to avoid project outcomes that are short-lived, less resilient, or potentially damaging to the environment and people. The report provides step-by-step guidance on developing these simple narratives in a GEF context, offering practical tips and approaches that closely align with the baseline and system description components of the GEF design template.

### **Incorporating co-benefits in the design of GEF projects, 2023**

This STAP advisory document builds on STAP's earlier advice, providing guidance on incorporating co-benefits into project design to maximize the broader positive impacts of GEF investments. The report identifies the range of potential co-benefits that can result from GEF projects and suggests practical ways to track and measure them using existing indicators drawn from multilateral environmental agreements and the Sustainable Development Goals. The document offers a structured approach to ensuring that co-benefits are systematically recognized, designed for, and monitored across GEF projects and programs.



### **Refining the tracking of co-benefits in future GEF investments, 2022**

This STAP policy brief emphasizes that co-benefits are not merely ancillary “add-ons” but integral outcomes of well-designed GEF interventions. It argues that systematically identifying and incorporating co-benefits, such as improvements in livelihoods, health, resilience, and ecosystem services, can enhance project effectiveness, sustainability, and stakeholder support. The report provides conceptual framing and practical guidance for integrating co-benefits into project design, including early-stage identification, alignment with global frameworks, and the use of existing indicators to track outcomes.

### **STAP guidelines for screening GEF projects, 2022**

The STAP guidelines for screening GEF projects establish a structured quality assurance framework for assessing the scientific and technical soundness of project concepts at an early stage of the GEF project cycle, with the aim of strengthening design before full development. The guidelines are aligned with the Project Identification Form and are operationalized through a set of 12 key questions that examine the overall coherence of projects, the robustness of their rationale and problem analysis, and the clarity of their theory of change, including identification of drivers, risks, and GEBs.

### **Enabling elements of good project design: A synthesis of STAP guidance for GEF project investment, 2021**

This STAP advisory document synthesizes lessons from STAP guidance into eight practical design principles that can strengthen the quality, coherence, and impact of GEF projects. It highlights that projects should be grounded in strong problem diagnosis, systems-thinking, and a clear theory of change, while addressing root causes, risks, and stakeholder dynamics from the outset. The report also stresses the importance of integration across sectors, adaptive management, and learning, noting that applying these elements can “de-risk” project and program design and improve the likelihood of sustained GEBs.

### **Theory of change primer, 2019**

This STAP advisory document provides guidance on designing, articulating, and applying a robust theory of change, emphasizing it as a core tool for navigating complexity and achieving transformational outcomes. It defines a theory of change as a structured explanation of how and why desired change is expected to occur, mapping causal pathways from activities to outcomes and GEBs, while making explicit the underlying assumptions, risks, and enabling conditions. The primer outlines steps grounded in systems-thinking, evidence, stakeholder engagement, and support for learning and adaptation.

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