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GEF SUPPORT TO INNOVATION: FINDINGS AND LESSONS

(Prepared by the Independent Evaluation Office of the GEF)

Recommended Council Decision

The Council, having considered the document GEF/E/C.60/02, GEF Support to Innovation – Findings and Lessons, and the Management Response, takes note of the related evaluation recommendations and endorses the management response to address them.

1. **From the outset, the Global Environment Facility (GEF) was expected to be innovative in multiple ways – in its governance, strategies, policies, in its selection of projects and programs – to maximize its impact on global environmental benefits.** Innovation may never have been more important in the GEF than it is today, as developing countries respond to multiple, interconnected threats from COVID 19, debt burdens, and the climate crisis. The GEF is well positioned to contribute towards helping countries in a greener recovery. While the challenges are great, the potential for innovative solutions to global environmental problems may also never have been greater.

2. **This report presents findings of study carried out by the GEF Independent Evaluation Office (IEO) to assess the GEF's efforts and progress in supporting innovation since its inception, the results of innovative interventions, the factors that have influenced innovation in the GEF, and to identify lessons for GEF-8.** Previous IEO performance studies and evaluations addressed elements of innovation; however there has been no systematic assessment of GEF's experience in fostering innovation. In this study, innovation is defined as doing something new or different in a specific context that adds value. In line with recent reports of the GEF's Scientific and Technical Advisory Panel, five innovation types are identified: technology, finance, business models, policy, and institutional.

3. The study focused on a sample of innovations identified through a review of the entire terminal evaluation database of 1,706 closed GEF projects, as of May 2020, and projects nominated by GEF Agencies and the GEF Secretariat to understand the diversity of innovations in completed projects and programs, and to identify factors that influence outcomes in innovative projects. In addition, a quality at entry analysis was carried out on innovation at the design and early implementation stages of ongoing child projects in integrated programs from GEF-6 and GEF-7. These sources of evidence were complemented by interviews with 41 stakeholders and projects managers. The study also gauged stakeholder opinions on innovation in the GEF from a survey on GEF's comparative advantage that was conducted in March 2021, which captured 588 responses from a broad range of internal and external stakeholders. The study also reviewed previous GEF IEO evaluations, GEF strategies, and the literature on innovations in environmental interventions.

Innovation in the GEF – a brief history

4. **Expectations that the GEF will be innovative have been a recurrent theme throughout its history**. The concept of the GEF as a dedicated funding mechanism in response to global environmental problems was innovative in itself. Shortly after the adoption of the GEF Instrument, the 1995 Operational Strategy made reference to "use of innovative technologies and procedures". The GEF was also given guidance to support innovative financing approaches toward ensuring the long-term sustainability of its activities. Even at this early stage, challenges to innovation were recognized in early performance studies, including disincentives within the implementing Agencies for projects that might require more preparation time and face greater risk.

5. **Over time, frequent references were made to innovation in various evaluations and policy documents with respect to GEF's governance (stakeholder engagement), operational modalities (the Small Grants Programme (SGP) the Integrated Approach Pilots (IAPs), and Impact Programs (IPs)), as well as project strategies, designs, and instruments**. The term innovation has consistently

been applied to the support of new technology, financial instruments, removal of policy barriers, new business models, and institutional reforms. The term "innovation" was not only used for actions that were entirely new or untested, but often for approaches for which there was no prior experience in a country or region, or simply in a new circumstance. Changes in the GEF strategy were also sometimes characterized as innovative: for example, the shift from buying down the capital cost of new technologies to more emphasis on market development (scaling up); and replication and greater emphasis on partnerships with the private sector to improve prospects for commercial sustainability. GEF strategic and policy documents, and GEF Independent Evaluation Office (IEO) evaluations have also recognized the important role of the private sector as a source of innovation, and a partner for sustainable financing and scaling up.

6. **The GEF 2020 Strategy highlighted a greater need for the GEF to support innovative and scalable activities to address the drivers of environmental degradation.** The strategy suggested several models for GEF projects, including demonstrating innovative approaches and deploying innovative financial instruments to help de-risk investments by others. The 2020 Strategy also referred to Integrated Approach Pilots as an innovative modality to identify the most effective ways to reach a higher impact and scale while addressing the drivers of environmental degradation. The programming directions for each focal area have also referred to innovative approaches with respect to solutions in the form of new technologies, management practices, policies, strategies, financial tools, and partnerships.

7. **The GEF-7 Strategies and Programming Directions (2018–2022) refer to the GEF's comparative advantage in being an innovator, incubator, and catalyst while actively seeking to effect transformational change.** The focal area strategies include their own plans to foster innovation, and the Impact Programs have been designed to promote support combinations of innovations, achieve breakthroughs, and emphasize the importance of knowledge sharing and cross learning through various platforms.

8. **Discussions of innovation are frequently accompanied by statements about the greater associated risks.** "…the key issue for innovation in the GEF is risk… it is therefore important to question and assess at the strategic level what would be a desirable and acceptable levels of risk in different areas of the investment portfolio. This could involve setting targets for success, recognizing that some innovations will fail." (Scientific and Technical Advisory Panel, 2018). A recent review of the role of GEF and other donor–supported climate finance in World Bank operations concluded that such resources have been critical enablers of risk-taking, piloting and innovating. Some GEF projects approved as demonstrations or pilots were understood to have higher risks; the objective was to test concepts for possible replication and scaling, or, if unsuccessful, to learn from failure. At the other end, projects that introduce commercially proven technologies, financial instruments, or business models new to a country or market have risks of market acceptance and sometimes needed policy reforms, but if implemented with strong country support would not typically be categorized as high risk.

Findings

9. **GEF supports innovation across its portfolio in all focal areas, project sizes and regions, and there is an increasing trend in innovative projects over GEF phases.** The sample portfolio of closed

projects, which was based on clear selection criteria of the presence of innovation in design or results, shows an increasing trend in projects with innovative components over the GEF phases. By focal area, the percentage of innovative projects in the biodiversity and climate change focal areas mirrors the actual composition of the closed portfolio of projects, but a higher percentage of innovative projects were in land degradation and a lower percentage in the chemicals and waste focal area. A higher percentage of global projects were innovative relative to the set of closed projects. In terms of size, the proportion of medium-sized innovative projects is comparable to the overall share of these projects in the overall closed portfolio. Projects under the Small Grants Programme (SGP) were not included in this study, but, as seen from the 2021 joint GEF IEO-UNDP SGP evaluation, there are examples of innovation in the SGP portfolio.

10. **The design of the ongoing projects in integrated programs of GEF-6 and GEF-7 commonly incorporates innovation**. Seventy-seven percent of child projects in the Integrated Approach Pilots (IAPs) indicate at least one innovation type, and all reviewed child projects (n=43) in the Impact Programs (IPs) include at least one innovation type. In addition, the integrated programs incorporate these strategic innovations: (i) incentive funding for country participation, (ii) a competitive selection process amongst countries, and (iii) dedicated funding for a coordination or platform project to act as the knowledge "glue" between selected countries to extend the reach of the impact program beyond selected countries, as well as to ensure that overall delivery of the impact program achieves the ambitions of transformational change central to the GEF-7 Strategy.

11. **On average, for the sample of the closed portfolio of projects, innovation is not necessarily correlated with higher risks for outcomes or sustainability.** Eighty-six percent of projects in the sample of the closed projects have outcomes in the satisfactory range and 71 percent have sustainability ratings in the likely range. In addition to outcomes and sustainability ratings, this study introduced two results variables—value added and transformational change. Value added is defined in terms of positive changes associated with innovation, including changes in environmental and socioeconomic benefits in terms of their quality and/or scale; creating an enabling environment in support of innovations; and generating and sharing knowledge on innovation's success and failure. While 13 percent of projects in the sample of the closed projects achieved the highest levels of value added, the majority of projects reached medium levels, helping generate some environmental and socio-economic benefits, but not necessarily on a large scale, or did not share lessons on innovation broadly beyond their target area. Another results variable used in this study – transformational change – was first used in the GEF IEO Evaluation of Transformational Change in 2017 and refers to "deep, systemic, sustainable change with large-scale impact in an area of a major environmental concern". Not every project is expected to achieve transformational change within its implementation, and in some instances, it might take a series of interventions to achieve fundamental changes in key environmental and economic systems. Nevertheless, 38 percent of projects in the sample achieved full or partial transformation by their completion.

12. **A number of factors influence the effectiveness of innovative interventions supported by the GEF in terms of higher value added and transformational change.** *First*, a critical factor of success of innovative GEF interventions is the utilization of multi-sectoral approaches and economic incentives to achieve environmental gains. In such projects, the focus is on fostering coordination across economic sectors – such as water, transport, energy, or agriculture. Economic incentives for environmental action in GEF's projects are applied at different levels: from community, to country,

to region. *Second*, projects combining innovations of different types typically support better outcome sustainability and scaling up as compared with projects with stand-alone innovations, especially when technological, business, or financial innovations are underpinned by policy and legal frameworks, institution building, and capacity development. *Third*, stakeholder engagement, including communities, private sector, scientists, and the government, is an important driver of success in innovative projects. *Fourth*, innovative projects that are managed adaptively and are guided by flexible design tend to perform better, as they are able to modify their results frameworks, activities, and budgets in response to evidence on success and failure, to adapt to the local context and evolving external conditions. *Fifth*, knowledge and learning activities contribute to better outcomes through pre-intervention analytical work, reducing information and awareness barriers to testing and adoption of innovation during project implementation, and documenting and disseminating lessons to broader stakeholders to support replication and scaling up.

13. A quality-at-entry analysis of the ongoing projects in the GEF-6 and GEF-7 integrated programs shows that several of these factors have been addressed in the design and early implementation --including multisectoral approaches and multistakeholder platforms, and inclusion of program-level knowledge and learning platforms. In addition, the integrated programs show evidence of being designed for transformational change at the program level through program structures and partnership strategies to support the depth of change and scaling up.

GEF's Comparative Advantage on Innovation

14. The GEF's comparative advantage in supporting innovation lies in its established willingness to provide grant funding, bridging the gap between the proof of concept and demonstrated practical applications, and bringing innovations to the point where the risk of investment is low enough for governments, multilateral development banks, or the private sector to consider lending. That the GEF enables innovations which otherwise would not be attempted, emerged as a common view in interviews.

(a) The GEF helps create an enabling policy and regulatory environment in recipient countries and links environmental objectives with economic activities. The GEF supports technological, business, and financial innovations with policy and institutional reforms.

(b) The GEF has a long track record working with a wide range of stakeholders (including communities, businesses, academia, and government) and promotes participatory approaches, often involving stakeholder decision making from the early stages of project design through its implementation. This also has a positive impact on sustainability.

(c) The GEF supports both cutting-edge and well-known technologies, the latter often to help less developed countries in improving productivity and livelihoods while benefiting the environment. Across focal areas, the GEF supports alliances between science, communities, and businesses to achieve sustainable application of advanced technologies and approaches.

(d) The GEF allows for adaptive and flexible project and program management. Compared with other institutions interviewed, the GEF gives the executing and implementing agencies some autonomy to revise the scope and budgets of project components, within limits, as long as they remain consistent with project objectives. However, applying

adaptive management is not always easy and takes time. There is a space for more explicit encouragement of adaptive management in the context of innovative interventions.

(e) Knowledge and learning are essential to understanding the process and outcomes of innovations as well as for scaling up. Communities of practice and knowledge and learning platforms incorporated in some focal areas (IW:LEARN in international waters) and some programmatic approaches (e.g. integrated programs) have been effective in facilitating knowledge exchange. These will play an important role in facilitating exchange between practitioners implementing projects and programs across countries and regions.

Obstacles to Innovation

15. While there are many positive examples of GEF's support to innovation, there have been obstacles to innovation or missed opportunities, where the GEF was well positioned to support innovation but for some reason did not. These obstacles appear to be related to GEF practices in relation to innovative projects. Several interviewees noted that innovative approaches and ideas are sometimes difficult to get approved through the review mechanisms of the GEF, Agencies and Ministries, as these projects are perceived to have higher risk. Hence agencies are more likely to submit projects which have higher chances of approval, discouraging innovation. Innovative projects, that may be associated with more risk, sometimes require more time, efforts in preparation, supervision and implementation. The selection and evaluation criteria for these projects needs greater clarity.

16. Related to the criteria for selecting innovative projects, another obstacle to innovation is that the level of effort involved in preparing and implementing large and small projects remains ostensibly the same, independent of the funding volume. This could potentially discourage innovative projects, especially small pilot projects.

17. While the GEF has been proficient at supporting innovation in its early stages, it has sometimes missed the opportunity to replicate and scale-up successful innovations and pilots. While sustainable financing is one impediment, the limited knowledge sharing and learning from innovative projects has been an obstacle. Rapid dissemination of outcomes through a variety of knowledge platforms and instruments is needed.

Recommendations for Mitigating Obstacles to Innovation

Drawing on the various sources of evidence and interviews, this evaluation recommends the following measures to mitigate some of the obstacles to innovation.

18. Since many innovations involve risks, the GEF Secretariat should continuously monitor the risk across the GEF portfolio. The GEF Council, together with the GEF Secretariat and STAP, should, based on such assessment, identify an acceptable risk tolerance level for the GEF portfolio. This risk tolerance level should be clearly communicated to the Agencies along with clarity on defining an innovative project and the criteria for selection of innovative projects.

19. The GEF should continue to explore and partner with innovation support programs that may mobilize larger sources of risk capital, and should explicitly encourage adaptive, flexible management of innovative interventions. This could include a separate funding window for innovative projects, as well as adaptive management and flexible funding, such as a contingency component.

20. The GEF must require monitoring, mid term reviews, evaluation, and knowledge sharing in all innovative projects, regardless of project size. Regular monitoring and mid-term reviews should be required for innovative projects of all sizes, to allow for learning and adapting as needed in time, and lessons should be captured and shared widely to understand factors underpinning success or failure, prior to scaling up or replication.

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1 CONTEXT AND OBJECTIVES

1. From the outset, the Global Environment Facility (GEF) was expected to be innovative in multiple ways: in its governance, as illustrated by stakeholder engagement; in its strategy, as most recently indicated by the integrated approaches; and, foremost, in its selection of projects, to include demonstration of new technologies, testing of new business models, introduction of policies new to a country or region, and institutional reforms. As a relatively small player in global financial terms, the impact of the GEF's innovative efforts depends on careful monitoring, evaluation of results, a willingness to take risks and learn from failure, and the communication and dissemination of outcomes to public and private decision makers with the ability to replicate and scale up results.

2. Innovation may never have been more important to the GEF than it is today, as developing countries respond to multiple, interconnected threats from COVID-19, debt burdens, and the climate and nature crises. The GEF is well positioned to contribute to the emphasis on greening the recovery and helping countries in building back. While the challenges are great, the potential for innovative solutions to global environmental problems may also never have been greater. Renewable energy technologies are now less expensive than fossil fuels in most markets. Applications of artificial intelligence, satellites, and high-speed data processing are creating new means of tracking and communicating environmentally critical information. The financial sector is increasingly responsive to the need to redirect investments toward sustainability. Collectively, these developments have been termed the "fourth wave of environmental innovation."[1]

1.1 Innovation in the GEF: Background

3. Expectations that the GEF will be innovative have been a recurrent theme throughout its history. The concept of the GEF as a dedicated funding mechanism in response to global environmental problems was in itself innovative. Shortly after the adoption of the GEF Instrument, the 1995 Operational Strategy made reference to "use of innovative technologies and procedures." The GEF was also given guidance to support innovative financing approaches toward ensuring the long-term sustainability of its activities. As noted in the independent evaluation of the pilot phase, "Innovation was to have been a major factor in the selection of GEF activities. In the GEF context, innovation has been liberally interpreted to include any technology that had not been used in any developing country or in the developing country in which the technology was being introduced. This feature should be one of the distinguishing features of the GEF, with further definition, examples, and dissemination."[2] Even at this early stage, challenges to innovation were recognized, including disincentives within the implementing Agencies for projects that might require more preparation time and face greater risk.

4. Over time, frequent references were made to innovation in various evaluations and policy documents with respect to GEF's governance (stakeholder engagement), operational modalities (the Small Grants Programme, the Integrated Approach Pilots (IAPS), and Impact Programs), as well as project strategies, designs, and instruments. The innovative label has been consistently applied to

[1] Environmental Defense Fund, "The Fourth Wave: A Quick History" web page, https://www.edf.org/approach/fourth-wave/quick-history.
[2] GEF, 2003, "Independent Evaluation of the Pilot Phase."

the support of new technology, and almost as consistently with reference to financial instruments, removal of policy barriers, new business models, and institutional reforms. Notably, the term "innovative" was not only used for actions that were entirely new or untested, but often for approaches for which there was no prior experience in a country or region, or simply in a new circumstance. Changes in the GEF strategy were also sometimes characterized as innovative: for example, the shift from buying down the capital cost of new technologies to more emphasis on market development (scaling up); and replication and greater emphasis on partnerships with the private sector to improve prospects for commercial sustainability. The strategic and policy documents and GEF Independent Evaluation Office (IEO) evaluations have also recognized the important role of the private sector as a source of innovation and a partner for sustainable financing and scaling up.

1.2 Innovation and Risk Taking

5. Discussions of innovation are frequently accompanied by statements about the greater associated risks, e.g., the Scientific and Technical Advisory Panel (STAP) 2020 Approach Paper in defining innovation notes "it could be associated with risks and higher likelihood of failure." A 2018 STAP paper asserts that "the key issue for innovation in the GEF is risk… it is therefore important to question and assess at the strategic level what would be a desirable and acceptable levels of risk in different areas of the investment portfolio. This could involve setting targets for success, recognizing that some innovations will fail." Conversely, acceptance of a higher failure rate of completed projects has been cited as a means of achieving greater impact. "Although such approach would increase the number of failures, OPS5 affirmed that internationally 25 percent failure rate was acceptable for innovative interventions and programs" (STAP 2020. Summarizing OPS5).

6. A recent review of the role of GEF and other donor–supported climate finance in World Bank operations concluded that such resources have been critical enablers of risk-taking: Climate-related trust funds have been a source of funding that has enabled greater risk-taking, piloting, and innovation than the World Bank's on-balance sheet funding. Climate-related trust funds remain a vital source of risk-inclined funding to support World Bank strategies, whether through grants or concessional blended finance instruments. Many sectors, technologies, and markets remain beyond the acceptable risk/return profile of private investors, carbon markets, and even development finance institutions. The ability of the World Bank to access a limited pool of capital that is more patient and can bear higher risks has been, and will continue to be, valuable to delivering on the World Bank's climate strategy and goals.[3]

7. Though many projects identified as innovative in this review and more generally in the literature are higher risk than the overall GEF portfolio, there are others that come within the definition of the term but are not typically categorized as high-risk. For example, projects that introduce commercially proven technologies, financial instruments, or business models new to a country or market have risks of market acceptance and sometimes needed policy reforms but if

[3] "World Bank. 2020. Accelerating and Innovating Climate Action: A Retrospective of the World Bank's Experience with Select Climate and Carbon Trust Funds. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/34328

implemented with strong country support would not typically be categorized as high risk. The World Bank and International Finance Corporation (IFC) projects financing energy efficiency introduced a significant new instrument but were never thought to be high risk once public and private banks with a willingness to participate were identified. The measures were all fully proven and commercially available, and by directing funds to existing bank clients the risks of default were expected to be low.[4]

8. Some projects approved as demonstrations or pilots were understood to have higher risks; the objective was to test concepts for possible replication and scaling, or, if unsuccessful, to learn from failure. This philosophy was evident in the 2013 Independent Evaluation Group (IEG) review of the World Bank's partnership with the GEF. The report describes IFC's biodiversity projects as research and development projects and incubators for financially risky approaches to be tested and replicated if successful. Although these have generally been less successful in achieving their particular objectives of developing commercial markets for selected biodiversity services, their lower outcome ratings may reflect the naturally higher failure rate of high-risk ventures.[5]

1.3 Innovation in the GEF: A Brief History from GEF Strategies and Performance Reviews

Findings and observations from previous performance reviews highlight the trajectory of innovation and the progress and challenges in innovation over the various GEF phases.

9. Shortly after the adoption of the GEF Instrument, the 1995 Operational Strategy made reference to "use of innovative technologies and procedures." The GEF was also given guidance to support innovative financing approaches toward ensuring the long-term sustainability of its activities (STAP, 2020). The 1999 study of the GEF's operational performance during GEF 1 (OPS1) "did not have a major focus on technological or scientific innovation, and instead reviewed the replicability of innovation, involvement of private financing; as well as removal of social, policy, cultural, institutional or financial barriers for innovation."

10. The Second Overall Performance Study (OPS2 for 1998–2002) noted a "strong continuing commitment" for innovation in the GEF, especially in the Small Grants Programme and the climate change focal area. It recommended that the GEF speed up recognition of success (and therefore readiness to replicate) and more systematically encourage innovation during project design [references omitted]. OPS2 also noted a general trend in innovative projects shifting from technological development to creating an enabling environment. OPS2 also reported on a variety of financing modalities that the GEF used or intended to use to channel innovations or to lower financial, technology, or policy risks faced by other actors when investing in innovations to benefit the global environment.

[4] The first such project was the China Utility Energy Efficiency Finance Program, approved in 2005. The primary barrier proved to be the lack of familiarity with evaluating the financial benefits of cost-saving energy efficiency improvements among Chinese banks at the time. The project provided training and a partial risk guarantee that was rarely (if ever) required leading to an ex post evaluation that more risk could have been taken. (http://documents1.worldbank.org/curated/en/823071500891138274/pdf/116595-WP-Terminal-Evaluation-of-CHUEE-PUBLIC.pdf)

[5] World Bank IEG, *The World Bank Group's Partnership with the Global Environment Facility* (2013) (par. 5.55)

11. The Third Overall Performance Study of the GEF (OPS3 for 2002–06) observed that innovation and replication were actively promoted as a mechanism for catalyzing greater benefits by the GEF's operational programs but also recognized a tension between proven successful approaches and more innovative ones. The latter involved higher risks, which created choices for the GEF in terms of its priorities. In addition, knowledge sharing was relatively ad hoc, which created a barrier to the promotion and replication of successful innovations.

12. The Fourth Overall Performance Study of the GEF (OPS4 for 2006–10) analyzed innovation as "demonstration of new approaches" and replication as "investment" in scaling up. Consistent with the previous overall performance study, OPS4 confirmed that innovation may affect cost-effectiveness and performance in the short term, as a trade-off for longer-term and broader impacts once the potential for new markets and technologies is demonstrated. OPS4 also concluded that demonstration of new technologies and approaches fails if it is not supported by institutional and market measures; and that demonstration, innovation, and market barrier removal activities fail if there is no follow-up through investment or other measures for scaling up.

13. Innovation was included in four out of the six strategic elements in GEF-5 (2010–14) programming, Strategic elements included: maintaining a focus on innovation, catalyzing (and) supporting cutting-edge technologies and policy reforms with the objective of enabling replication and scaling-up; enhancing engagement with the private sector, including small and medium enterprises, and through the Earth Fund to foster innovation, open and develop markets and demonstrate the potential for strategic partnerships to greater scale of investment

14. An in-depth analysis showed that 93 percent of completed projects resulted in a chance for the broader adoption of their approaches or direct environmental impact. Given this high percentage of projects, OPS5 concluded that the GEF should take higher risks, with potential for higher gains, rather than prioritizing proven successful approaches. Although such an approach would increase the number of failures, OPS5 affirmed that internationally a 25 percent failure rate was acceptable for innovative interventions and programs.

15. The GEF 2020 Strategy (GEF-6)[6] highlighted a greater need for the GEF to support innovative and scalable activities to address the drivers of environmental degradation. The strategy suggested several models for GEF projects, including demonstrating innovative approaches and deploying innovative financial instruments to help de-risk investments by others. The 2020 Strategy also referred to IAPs as the GEF's institutional innovation for identifying the most effective ways to reach a higher impact and scale. In addition, the programming directions for each focal area referred to innovative approaches with respect to solutions in many forms – technologies, management practices, policies, strategies, financial tools, and partnerships.

16. The Sixth Comprehensive Evaluation of the GEF (OPS6 2014–18) similarly noted that given the high percentage of completed projects which had outcomes rated in the satisfactory range, the GEF may have "a rather risk-averse, insufficiently innovative project portfolio." The report commented that "the GEF is well placed to take more risks and play a more innovative and

[6] Global Environment Facility (GEF). 2015. "GEF 2020: Strategy for the GEF. Washington, DC."

transformative role." An IEO study on additionality in the GEF noted that 20 percent of a sample of GEF projects considered innovation at the design stage. [7]

17. The GEF-7 Strategies and Programming Directions (2018–22) refer to the GEF's comparative advantage in being an innovator, incubator, and catalyst while actively seeking to effect transformational change. The focal area strategies include their own plans to foster innovation, and the Impact Programs are designed to promote and support more innovation. The Impact Programs are expected to support combinations of innovations, achieve breakthroughs, and emphasize the importance of knowledge sharing and cross-learning through various platforms.[8]

1.4 Objectives, Scope, and Key Questions

18. Previous performance studies of the IEO addressed elements of innovation; however there has been no systematic assessment of GEF experience in fostering innovation. The objective of this study is to assess the GEF's efforts and progress in supporting innovation since its inception, the results of innovative interventions, and the factors that have influenced innovation in the GEF, and to identify lessons for GEF-8.

19. The study focuses on innovations identified through a review of 1,706 closed GEF projects from the terminal evaluation database and projects nominated by GEF Agencies and the GEF Secretariat to understand the diversity of innovations in completed projects and programs and to identify factors that influence the process and outcomes in innovative projects. In addition, a quality at entry analysis was carried out on innovation at the design and early implementation stages of ongoing child projects in integrated programs from GEF-6 and GEF-7.

20. Specifically, the study seeks to address the following questions:

(a) How has the GEF Partnership supported innovation over various GEF phases since it was established?

(b) What factors have influenced the process and outcomes of GEF support to innovation?

(c) What are the lessons and implications for the future to continue supporting innovation in the GEF?

1.5 Defining Innovation

21. In this study, based on the literature and document review, innovation is defined as "doing something new or different in a specific context that adds value." That is:

(a) innovation is new in a specific context

[7] GEF IEO. 2018. An Evaluative Approach to Assessing the GEF's Additionality
[8] GEF. 2018. GEF-7 Programming Directions. GEF/R.7/19. GEF, Washington, DC.

(b) it represents an improvement compared to conventional alternatives (e.g., better quality, scale, sustainability, replicability, or scalability of outcomes

(c) it catalyzes or produces environmental benefits and may also result in socioeconomic benefits related to the target environmental benefits

(d) it could be associated with risks and a higher likelihood of failure.

22. In this study, and based on the literature, innovations result in:

(a) Value addition: positive changes in environmental and related socioeconomic benefits in terms of quality and/or scale; the sustainability, replicability, and scalability of these benefits; creating an enabling environment in support of innovations; and generating and sharing knowledge on innovation success or failure

(b) Transformational change: deep, systemic, sustainable change with large-scale impact in an area of a major environmental concern (GEF IEO 2018).[9]

23. Consistent with recent innovation typologies, five types of innovation are identified: *technology, finance, business models, policy, and institutions:*[10]

(a) *Technological* innovations comprise new products and processes and significant technical changes in existing products and processes

(b) *Innovative financing* includes any financing approach that helps to generate funds by tapping new funding sources or by engaging new partners, including those that enhance the "efficiency" of financial flows by reducing delivery time and/or costs, and makes financial flows more results-oriented

(c) *Business model* innovation refers to the development of new concepts supporting an enterprise's financial viability, including its mission, and the processes for bringing those concepts to fruition

(d) *Policy* innovation refers to an approach, regulation, a practice, or a legislative policy which incorporates or combines a multifaceted approach to achieve its intended outcomes, and could include new regulations or standards

(e) *Institutional* innovation often refers to changes in organizations to facilitate greater effectiveness in the management of global environmental benefits. It can also refer to changes in informal institutions (values, beliefs, customs), and formal institutions (markets, codified rules) which guide the individuals' behavior and their interactions in communities.

[9] GEF IEO. 2018. Evaluation of GEF Support for Transformational Change.

[10] Miller and Swan 2017: A.S. Miller and S.A. Swann, Financing Innovation: Opportunities for the GEF, Washington, DC: STAP GEF, 2017; Toth, F. 2018. Innovation and the GEF: Scientific and Technical Advisory Panel to the Global Environment Facility, Washington, DC

1.6 Methodology

This study uses a mixed-methods approach including a portfolio review and a multi-case design approach based on a purposive sample of projects.

1.6.1 Sources of evidence

24. Terminal evaluations of 1,706 completed projects across GEF phases, in-depth case studies on 17 projects including all related documents, interviews with 41 stakeholders and project managers, review of ongoing child projects of the IAPs and Impact Programs, previous IEO evaluations, GEF strategy and policy documents, and literature on innovations in environmental interventions.

1.6.2 Methodology to determine the sample portfolio of innovative projects and case study projects

25. The entire database of 1,706 terminal evaluations, available as of May 2020, was text mined for keywords on innovation which would reflect a project's explicit support to innovation in its design or outcomes (see Annex I for details). This follows an accepted practice in evaluation methodology in the absence of a clearly defined portfolio of GEF innovative projects. This approach allows us to objectively describe the typology of innovation across the entire GEF portfolio of closed projects and assess innovation results with respect to value addition and transformational change and to identify the factors that influence these results.

26. Based on the text mining exercise, 99 projects were selected and further reviewed for innovation in designs or results. In parallel, the evaluation team sought nominations across the GEF partnership for innovative projects. One hundred and seventy-two nominations were received, and of these 55 projects had terminal evaluations. The remaining are ongoing projects for which results were not available. Twenty-five projects from the nominated list were included in the evaluation.[11] The overall sample was thus a purposeful sample of completed GEF projects that supported innovation. For this sample innovation portfolio, evaluation documents including terminal evaluations, post-completion evaluations, as available, were reviewed to establish a database on their characteristics, objectives, types of innovation, results of the innovation (value added and/or transformational change), and factors that helped or constrained the achievement of results.

The selected sample portfolio includes projects from the various GEF phases is presented in table 1.1.

[11] Eighteen were included in the portfolio, and nine were included in the case studies.

Table 1.1: Sample of innovative projects with terminal evaluations by GEF phase

GEF Phase	All completed GEF projects, #	Selected projects, #	% of Selected within the GEF Phase
0 - Pilot Phase	78	2	3%
GEF – 1	112	5	4%
GEF – 2	301	6	2%
GEF – 3	481	31	6%
GEF – 4	573	39	7%
GEF – 5	156	14	9%
GEF – 6	5	2	40%
TOTAL	**1,706**	**99**	**6%**

27. Case study analysis. For 17 projects an in-depth case study analysis was undertaken to understand the results and the factors influencing innovation.[12] These projects were selected according to the following criteria: (1) presence of innovation according to this study's definition; (2) demonstrated effectiveness and achieved results associated with the innovation, with attention to the availability and quality of evaluative evidence; (3) a purposive sample to illustrate a diversity of innovation types, GEF focal areas and regions. The analysis of case studies was based on document reviews (project implementation forms (PIFs), project proposals, terminal evaluations, post-completion evaluations, as available), and interviews with project implementation staff and client counterparts. Five projects each were from the GEF-5 and GEF-2 periods, four each were from the GEF-4 and GEF-3 periods. The list of cases selected for the study is presented in Annex II.

28. Innovation at the design stage for ongoing projects. An analysis of the innovation types and features in the ongoing child projects related to the IAPs and Impact Programs was conducted as part of the IEO Formative Evaluation of the GEF Integrated Approach to Address the Drivers of Environmental Degradation (IEO, 2021). Thirty-one child projects of the IAPs and 43 child projects of Impact Programs were reviewed, and most of these child projects had innovative components (table 1.2)

[12] Of these 17 projects, several were related and were combined into a single case for the purposes of the analysis; hence, 13 case studies were completed.

Table 1.2: Integrated Approach Pilots and Impact projects by Program (GEF-6 and GEF-7)

IAP/Impact Program	Number of Child Projects
RFS IAP	13
GGP IAP	5
Sustainable Cities IAP35	12
FOLUR impact program	28
Sustainable Cities impact program	8
Amazon Sustainable Landscapes impact program	8
Congo Basin Sustainable Landscapes	7
Dryland Sustainable Landscapes impact program	12

29. GEF Innovative projects identified in other evaluations. Several innovative projects and programs were well documented in other IEO evaluations. These include, inter alia projects under the Cleantech program, the Gold Program, China Energy Efficiency Program, Lighting Africa, the Small Grants Programme, and innovations in projects of the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). Highlights of these innovative projects are reflected in this report. However, it is was impossible to discuss every evaluative project and program the GEF portfolio. The focus has been on synthesis of findings.

1.7 Limitations

30. This study is based on a purposive sample of innovative projects across the GEF portfolio to understand the results and factors influencing innovation. It cannot address the extent to which the GEF has pursued innovation across the portfolio. [13]

31. Since the recently completed Joint GEF-UNDP Evaluation of the Small Grants Programme (SGP) included innovation as one of its evaluation questions, this study did not consider the SGP portfolio and projects in the analysis to avoid duplication but summarizes the relevant findings.

1.8 A brief description of the remainder of the report

32. Chapter 2 describes the sample innovation portfolio including innovation types and the combinations, association between innovation types and results, the role of the private sector, and the main factors that influence the effectiveness of innovative interventions. This section also includes an analysis of innovation in ongoing projects under the integrated programs from GEF-6 and GEF-7.

33. Chapter 3 discusses key design and implementation characteristics that influence value addition and transformational change in innovative projects. Innovative projects from previous evaluations are referenced as illustrative examples but not addressed in depth.

[13] Based on the 2018 IEO study on Additionality, 20 percent of the projects in the sample considered innovation in design.

34. Chapter 4 provides a few thoughts on GEF's readiness to support innovation and presents recommendations for the path ahead.

2 PORTFOLIO ANALYSIS OF INNOVATIVE PROJECTS

35. This chapter presents a description of the sample innovation portfolio including innovation types, the relationship between innovation and results in terms of value added and transformational change, and the main factors that influence the effectiveness of innovative interventions. This section also includes findings from a quality at entry review of innovation in the design and early implementation in the child projects associated with the integrated programs from GEF-6 and GEF-7.

2.1 Structure of the Innovative project sample

2.1.1 Portfolio structure by focal area, replenishment, region, and size

36. The sample of innovative GEF operations included 99 closed projects. Its structure is compared in figure 2.1 to the structure of the overall GEF portfolio of 1,706 closed projects with terminal evaluations (Source: APR 2020 data set). The four breakdowns of the innovation sample – by focal area, replenishment, region, and project size – are shown in figure 2.1.

37. The sample portfolio includes projects from the various GEF phases and is presented in table 1.1 in Chapter 1. By replenishment period, we note that the sample portfolio, which was based on clear criteria of presence of innovation in design or results, has a higher proportion of projects from the GEF-5 and GEF-6 periods, relative to the overall number of terminal evaluations available for these periods. For example, 9 percent of the closed projects in GEF-5 were included in our sample of innovative projects, versus 6 percent in GEF3 and 7 percent in GEF-4. Consistent with the findings from previous performance studies, the sample portfolio shows the increasing trend in innovative projects over the GEF phases.

38. By focal area, the percentage of innovative projects in the biodiversity and climate change focal areas mirrors the actual composition of the closed portfolio of projects. The sample portfolio has, in comparison to the complete set, a higher percentage of innovative projects in land degradation and a lower percentage in chemicals and waste. The share of projects in the sample innovation portfolio is lower in the Latin America and the Caribbean region and higher among global projects relative to the set of closed projects.

39. In terms of size, it is interesting to note that the proportion of medium-sized innovative projects is comparable to the overall share of these projects in the overall closed portfolio (figure 2.1). As a percentage of closed projects within each size category, the proportion of innovative medium-sized (5 percent) and full-sized projects (6 percent) is similar (table 2.1). As noted in the IEO evaluation of medium-sized projects,[14] this modality is often used to test innovations. Projects under the Small Grants Programme are not included in this portfolio, but as seen from the evaluation of the there are several examples of innovative SGP projects (box 2.1)

[14] GEF IEO. 2020. Evaluation of the Role of Medium Sized Projects in the GEF Partnership. (GEF/E/C.59/03).

Box 2.1: Innovation in the Small Grants Programme

Innovation is a fundamental factor of success in the Small Grants Programme (SGP). As in the case of GEF projects, SGP projects support technological innovations. For example, the first commercial biogas unit in Egypt was implemented by the SGP in 1994; the first medicinal herbs in Sinai were developed by SGP in the late 1990s before the Egyptian Environmental Affairs Agency (EEAA) prioritized natural protectorates. The second highest-rated innovation type was institutional innovation. This was attributed to the fact that a large number of projects supported indigenous communities who had had difficulties obtaining legal status. The innovation type which is least observed is policy innovation. This finding could be attributed to the limited time to support policy innovation within the time span of a single SGP grant (lasting up to 18 months), or participants in the SGP may not feel like they have sufficient influence on policy. The SGP's limited ability to incentivize innovation was attributed to the lack of consideration given to the various projects' exit strategies and to its inability to apply a businesslike model to fostering sustainability.

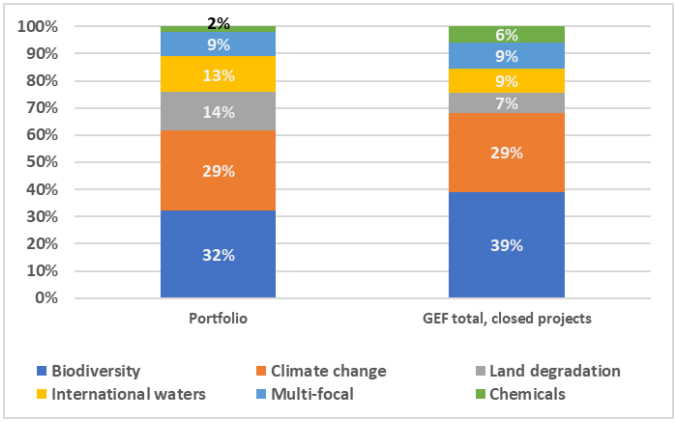
Source: GEF IEO. 2021. Third UNDP-GEF Small Grants Programme Evaluation.

Table 2.1: Sample of innovative projects by project size

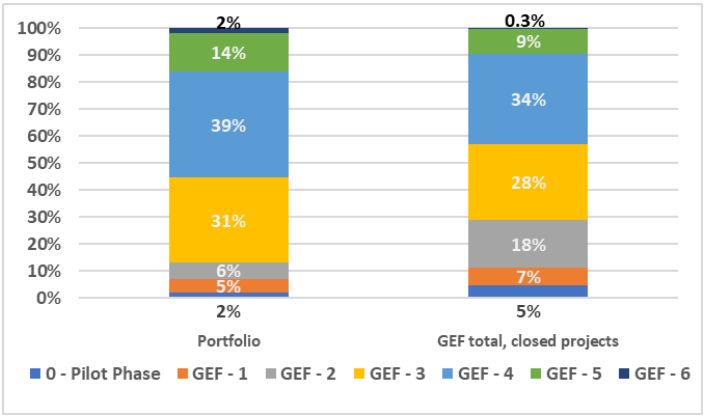
Project size	All completed GEF projects, #	Selected projects, #	% of Selected sample within size category
Full sized	1,098	67	6%
Medium sized	608	32	5%
TOTAL	1,706	99	6%

Figure 2.1: Sample portfolio structure as compared with all GEF closed projects with terminal evaluations

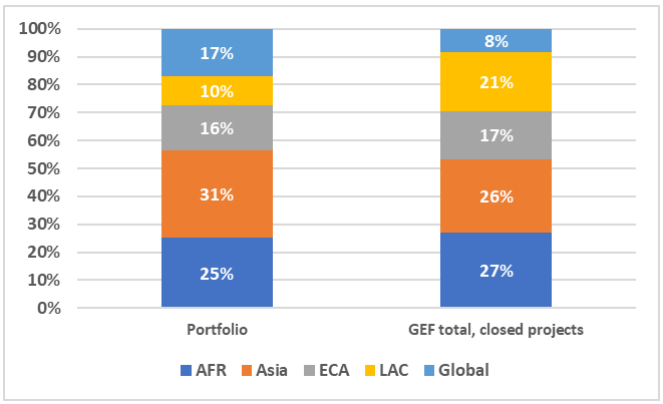
a. By focal area



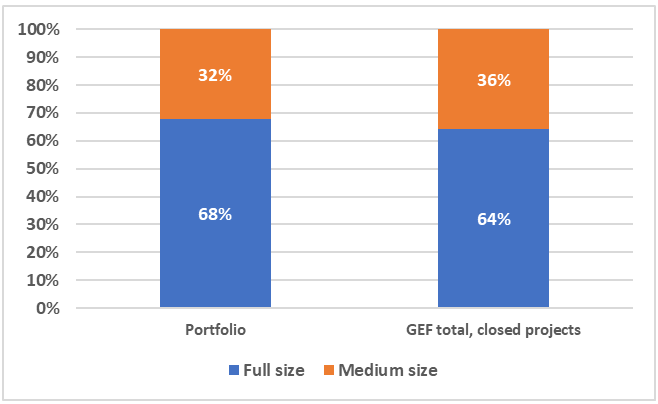
b. By replenishment



c. By region



d. By project size



2.2 Analysis

2.2.1 Innovation type

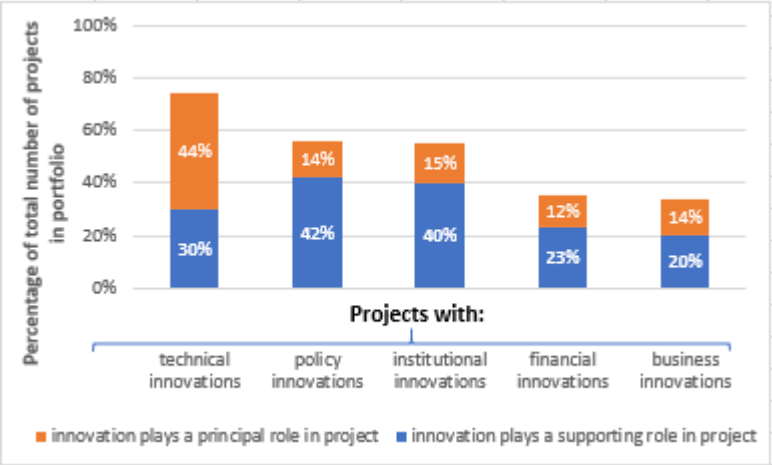
The analysis of the portfolio of closed projects and ongoing child projects associated with the integrated programs assessed the types of innovations.

40. **One of the main characteristics of innovative projects is the type of innovation that the project implements. The types include technical, business model, financial, institutional, and policy innovations.**[15] All projects in the sample of the innovative closed projects (99) were reviewed for the type(s) of innovations they involve and whether each of the identified innovations played a primary or a supporting role in the project. The share of projects with each innovation type and level (primary and supporting) is shown in figure 2.2. Technological innovations are most common in the innovative portfolio (74 percent), as compared with 56 percent of projects with policy innovations,

[15] See definitions of innovations types in Chapter 1.

55 percent with institutional, and 35 percent and 34 percent with financial and business innovations respectively. Furthermore, technological innovations are defined as primary in 44 percent of the projects in the portfolio, compared with much lower numbers for other innovations types: 15 percent for institutional innovations, 14 percent for both business and policy innovations, and 12 percent for financial innovations.

Figure 2.2: Portfolio structure by innovation type



Innovation Types in the Case Study Sample

41. In the case studies selected, technological innovation was present in all cases in a primary or supportive role. Most policy and institutional innovations were reported as playing a supportive role (table 2.2).

Table 2.2: Types of Innovation identified in the case studies

Short case name	GEF ID	GEF Agency	Focal area	Size	Types of innovations				
					Technological	financial	business model	policy	institutional
Armenia EE	3973	WB	CC	FSP	supportive	primary		supportive	supportive
Benin Forests	793 5215	WB	MFA	FSP	primary		supportive		supportive
Brazil SLM	2373	IFAD	LD	FSP	primary	supportive	primary		supportive
Burundi coffee	4631	WB	MFA	FSP	primary		supportive		
China Hai River Basin	1323 5561	WB	IW	FSP	primary			supportive	supportive
China POPs	2926	UNIDO	CW	FSP	primary		supportive	supportive	supportive
Global BGBD	1224 2342	UNEP	BD	FSP	primary				supportive
India SLEM	3470	WB	MFA	FSP	primary	supportive	supportive		supportive
Jordan CCA	4036	IFAD	CC	FSP	primary				
Mexico BRT	1155	WB	CC	FSP	supportive			primary	supportive
Mongolia SLM	5700	UNDP	LD	MSP	supportive	primary	supportive	supportive	
Pacific Tuna / Western and Central Pacific (WCP) Fisheries	530 2131	UNDP	IW	FSP	supportive			supportive	primary
	4746	UNDP/ FAO							
South Africa CAPE	1055	UNDP	BD	FSP	supportive		primary	supportive	Supportive

Source: case study analysis

Innovation Types in Ongoing Child Projects of Integrated and Impact Programs based on Quality at Entry Analysis of Project Designs

42. The child project documents of the *Integrated Approach Pilots* (IAPs) commonly cited innovations, with 77 percent indicating at least one type of innovation (table 2.3). Technological innovations were most common among IAP child projects (52 percent), followed by finance (23 percent), business model (19 percent) and institutional (19 percent). Policy was the least commonly cited innovation (10 percent). Technological innovations frequently included data platforms and analysis systems (e.g., Trase Platform, GEF 9182: Generating Responsible Demand for Reduced-Deforestation Commodities). Some projects incorporated innovative low-emissions technologies and sustainable agriculture interventions. Financial and business model innovations included the development of new financial products and funding mechanisms, and public-private partnerships. Institutional innovation included new practices to support project governance and sustainability interventions in project countries.

43. The most frequently reported innovation at the design stage in the child projects of the *Impact Programs* is institutional innovation (81 percent), which is provided through strengthening capacities for decision-making, supporting multi-stakeholder participation, promoting cross-sectoral planning processes. Innovative technology is mentioned by 37 percent of the child projects, including the use of technologies for production/resources management, access to markets, monitoring of natural resources, traceability, as well as access to communication. Financial innovation (33 percent of projects) refers to financial and private sector engagement, as well as innovative incentive mechanisms, such as payment for agroecological services in the China FOLUR child project (GEF ID 10246). The FOLUR, Amazon, and Congo Basin impact programs emphasize institutional innovation. Innovative technologies financial innovations have been introduced in the *Artisanal Gold Mining Program* (Box 2.2).

44. Promoting sustainable value chains is considered as business model innovation by in the design of 11 child projects. Introducing and piloting an integrated approach is also considered as an innovation by 11 child projects. As stated by the FOLUR child project in Vietnam (Integrated Sustainable Landscape Management in the Mekong Delta of Vietnam, GEF ID 10245), the project aims to move beyond conventional "mainstreaming" approaches focused on individual crops or farming systems, it will address the intersections between markets and value chains, food systems, livelihood systems, farming systems, and landscapes in an integrated and balanced manner.

Table 2.3 Types of innovation reported by child projects in Integrated Approach Pilots and Impact Programs at the design stage

Types of innovation	Technological	Financial	Business model	Policy	Institutional
No. of IAP projects	16	7	6	3	6
Percentage of IAP projects (n=31)	52%	23%	19%	10%	19%
No. of impact program projects	16	14	11	7	35
Percentage of impact program projects (n=43)	37%	33%	26%	16%	81%

Box 2.2: Innovation in the GOLD program

In the artisanal and small-scale gold mining (ASGM) sector, the GEF and others have a long history of technological and miner-formalization efforts that have yielded limited successes in reducing the use of mercury by miners. One major lesson learned from these earlier interventions was that it was difficult for miners, who were generally informal, to switch to non-mercury technologies since banks and other lenders would not provide them with the necessary financing to invest in new the new machinery required. The *GEF GOLD program* is innovative in attempting to address this issue by investing not only in non-mercury technology and formalization efforts but also designing financial mechanisms for miners, training lenders and improving access to formal markets.

Source: GEF IEO 2020. Evaluation of GEF Interventions in the Artisanal and Small-Scale Gold Mining Sector.

2.2.2 Results associated with Innovation – value added and transformational change

45. Eighty-six percent of projects have outcomes in the satisfactory range in the sample of closed innovative projects. Seventy one percent of the innovative project sample had sustainability ratings in the likely range, higher than the overall GEF rating of 62 percent. Thus, the selected portfolio had better outcomes and sustainability ratings relative to the set of all closed projects. It suggests that, on average, for this sample of closed projects, innovation is not necessarily correlated with higher risks to outcomes or sustainability.

46. In addition to outcomes and sustainability ratings, this evaluation introduced two results variables—value added and transformational change (box 2.3). An important question addressed through the portfolio of closed projects was on the association between innovation and transformational change and value added. Further, the analysis also sought to explore the most important factors that support innovation.

Box 2.3: Definitions of results variables associated with innovations: value added and transformation*

The Value-added index, draws on the concept of innovation additionality from the IEO study which presented a comprehensive framework for assessing GEF's additionality (IEO, 2018)**.** It is based on six dimensions of value added attributable to the environmental and/or related socioeconomic benefits of innovations: their quality; scale; replicability/scalability; sustainability; learning/knowledge captured on innovations, and enabling environment created to support innovations.

The Transformation index, draws on the concept of Transformational Change from an IEO study (IEO, 2017) and is based on four dimensions of transformational change:

- Relevance: The innovation addressed a major driver of global environmental benefits.
- Depth of change: The innovation achieved a fundamental change in a system or market identified as a root cause of environmental concern.
- Scale of change: The innovation caused a local, regional, national, or multi-country impact that changed the trajectory of an indicator relevant to a GEF focal area and strategic objectives.
- Sustainability: The innovation's impact is financially, economically, and environmentally sustainable in the long term, following the conclusion of the GEF intervention.

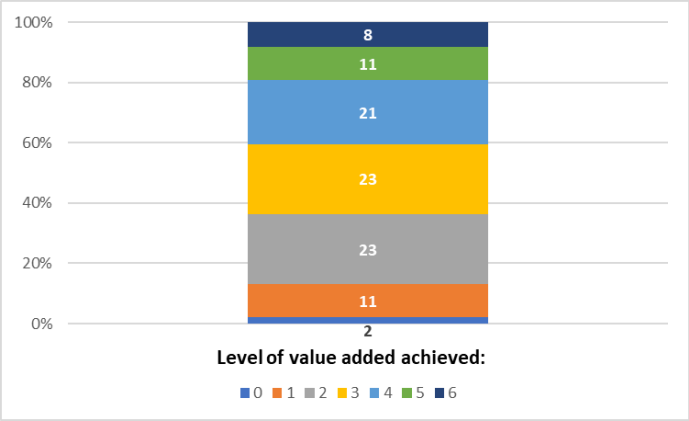
Most innovative projects are expected to generate some value added. For example, even innovations that experienced failure can document lessons and share knowledge with others. In contrast, not every project is expected to achieve transformational change, because by definition it involves a deep, systemic, sustainable impact in an area of a major environmental concern.

*The value-added index was developed based on the literature review, expert interviews, and project document review conducted for this evaluation. The transformation index is based on the GEF IEO Evaluation of GEF Support for Transformational Change (2018).

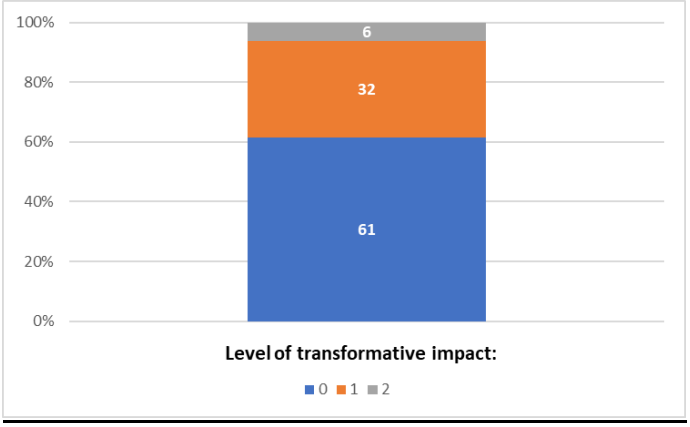
47. The projects in the sample portfolio were analyzed to assess the level of value added by each project and the level of transformational change created by the project. The frequency with which the innovative projects achieve different levels of value added and transformational change is shown in figure 2.3. While 13 percent of projects have achieved the highest levels of value added (levels 5 and 6), majority of projects, 67 percent, have reached levels 2–4. As expected, transformational change is harder to achieve and is realized less frequently: full levels have been achieved in 6 percent of projects, and partial transformation was achieved in 32 percent of projects. Thus, 38 percent of projects in the innovation portfolio achieved full or partial transformational change.

Figure 2.3: Portfolio analysis, by the level of value added and transformational change

a. Value added



b. Transformational change



48. **An example of an innovative project that supported transformational change is the Mexico Rural Development project (GEF ID 3537).** The project sought to strengthen the emerging solar market, promote environmentally sustainable technologies in agribusiness, and lower agricultural GHG emissions. The project focused on environmental sustainability and competitiveness of agriculture through energy efficiency use of renewable energy and biomass technologies. By the project's completion in 2018, 1,842 agribusinesses had adapted 2,286 renewable energy or energy efficiency technologies which resulted in an overall reduction of 6.02 million tons of CO2 emissions, a major contribution to Mexico's international agreements on emissions reductions. The 2015 Law on Energy Transitions allowed private power producers, including agribusinesses, to sell their excess energy production into the grid and 739 recipients of project-supported solar photovoltaic systems and the 419 recipients of project-supported biodigesters experienced these benefits. A solar market has developed. Prior to the project, Mexico's solar market was nascent, with the 2007 Mexican National Climate Change Strategy identifying huge potential for solar market growth. Through the project's demonstration effects and beneficiary demand, the domestic market for energy efficient and renewable energy technologies accelerated, aided by global decreases in the prices of solar panels. Mexico now has significant experience investing in clean energy technology for agribusiness and is sharing its experience with other countries, including China, Uruguay, Uzbekistan, Haiti, and Romania. Staff of the US Department of Agriculture visited the project twice, interested in replicating the model in the US.

49. **An example of an innovative project that added higher value but has not yet achieved transformational change is the Expanding and Diversifying the National System of Terrestrial Protected Areas project in the Philippines (GEF ID 3606).** The project has successfully tested two new modalities for protected area management, including indigenous communities' conservation areas and local conservation areas managed by local government units. As a result, 46 new protected areas were added to the Philippines protected area system, covering 439,485 hectares in 10 Key Biodiversity Areas. The management effectiveness in protected areas increased by 84 percent from the baseline. The project also generated knowledge products, such as operations manuals for local management bodies, monitoring and evaluation protocol, resource management plans, and habitat management plans. The project achieved a moderate level of policy and

regulatory change, including getting approvals for local ordinances which allowed establishment of local conservation areas in three sites. At the same time the Bill for Indigenous Community Conservation Areas hasn't received approval for enactment; consequently, the government had to adopt temporary mechanisms to incorporate indigenous community conservation governance. The lack of approval on the national level is a key risk to sustainability. To support financial sustainability of the protected area system the project, among other activities, piloted payment for environmental services which is likely to continue. However, more work is needed to support livelihood activities in the areas adjacent to protected areas, especially among the indigenous population.

50. While transformation and value added were used as innovation results variables, innovation types, as well as the factors that support the effectiveness of innovations were included as influencing or explanatory variables. The list of factors (box 2.4) was prepared on the basis of the analysis from three sources: (i) literature review, (ii) cases study project document review, and (iii) case study interviews. First, a long list of factors was determined to code the sample portfolio of 99 closed projects. The list was shortened to include those factors that were found in more than 10 percent of the sample were used in the analysis.[16]

[16] The less frequently observed factors were economic and market conditions; political conditions; environmental conditions; social conditions; local implementation capacity; inclusion of marginalized groups.

Box 2.4: Factors that support innovations: definitions and labels used in the charts*

1. Economic incentives. Project uses economic incentives to achieve environmental objectives, including improved income generation, access to markets, tax incentives, and accountability schemes (e.g., resource use agreements).

2. Policy environment. Project involves activities that promote creation of policy and regulatory environment in support of project objectives.

3. Government ownership. Government's commitment to support the project, ownership in relation to project objectives and actions, support from government champions.

4. Private sector participation. Private sector involvement in project implementation.

5. Social participation. Civil-society and/or community participation in project design and/or implementation.

6. Knowledge and learning. Project involves learning and knowledge activities, knowledge exchange, awareness raising, capacity building, training.

7. Adaptive management. The flexibility to adapt project design during project implementation.

8. Expert support. Engagement of technical experts (including research institutions) by the project, expert support to the project on the ground.

9. Scaling up plans. Project uses plans for scaling up or replication, exit strategy, access to finance for sustaining, scaling up or replication.

10. Donor involvement. Donor partnerships, coordination with other donors and partners, linking with other relevant initiatives, interagency coordination.

* Note: the list of factors was designed based on the literature review, expert interviews, and project document review conducted for this evaluation.

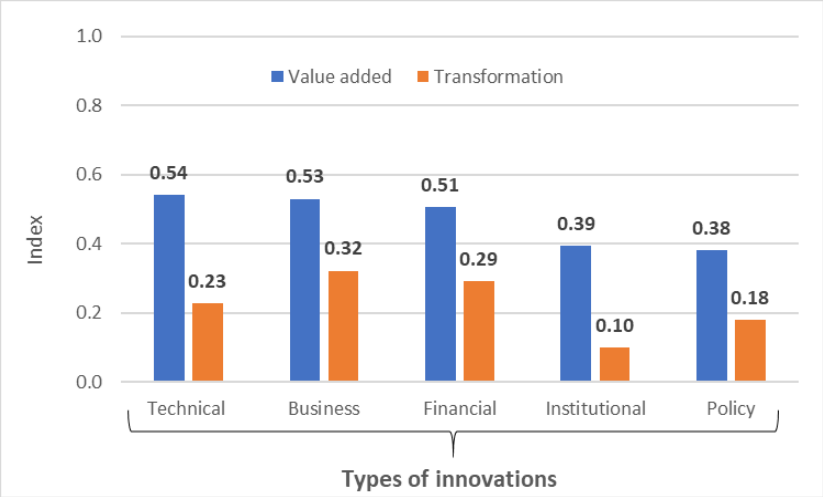
51. **The findings from the sample portfolio demonstrate that innovative projects achieve higher levels of transformative change and/or value addition when: (1) innovations of different types are combined within a project; (2) private sector participation is involved; 3) when projects use economic incentives, and (4) when government ownership is present.**

52. The types of primary innovations adding most value include technical, financial, or business. Policy and institutional innovations play a valuable supporting role, particularly to technical or business innovations (figure 2.4). This conclusion is also supported by case studies wherein projects based on technical innovations achieved transformational change, and this was conditional on the supporting policy and institutional reforms. Transformational change in such projects took place because technical innovations were implemented in the context of related policy change, institutional capacity building, vertical and horizontal institutional integration, and often economic incentives.[17] Case studies also note that primary business innovations or financial innovations lead

[17] Case studies analysis in Chapter 3: (i) *China: Hai Basin Integrated Water and Environment Management Project (GEF ID: 1323) and Mainstreaming Integrated Water and Environment Management (GEF ID: 5561); (ii) Benin Forest and Adjacent Land Management Project (GEF ID 5215); (iii) Sustainable Coffee Landscape Project (GEF ID 4631); (iv) China: Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes (GEF ID 2926).*

to transformation and higher value added when they are implemented together with policy and institutional support, as well as involve economic incentives.[18]

Figure 2.4: The types of innovation adding most value as primary innovations are technological financial, and business



The indices are re-scaled (to the scale from zero to one) simple averages for each group of projects. Value added index is based on six dimensions of value added: quality, scale, replicability, sustainability, knowledge and learning, and enabling environment. Transformation index is based on four dimensions of transformational change: relevance, depth, scale, and sustainability. Projects in the portfolio were assessed and coded using these ten characteristics during portfolio review.

Source of data: portfolio review.

53. Innovative projects achieve higher value added and/or transformational change when different types of innovations are combined. (technological, financial, business, policy, and institutional). Such combinations, where a primary innovation is complemented with other supportive innovations, tend to perform better than standalone (single-type) innovations. This conclusion is fully supported by the case studies (see Chapter 3, section 3.2). Portfolio analysis demonstrates that specific combinations of innovation types – within the same project, or project sequence, or program – that are clearly linked to better innovation outcomes include:

(a) **Technological innovations supported by policy reforms, institutional reforms, or innovative business models.**[19] A technical innovation by itself (with no policy, institutional, or business model support) has only a small positive influence on value added or transformational change. Moreover, when a project promotes technical innovations that are not supported by other innovation types or do not involve economic

[18] Case studies analysis in Chapter 3: *(i) India: Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management (GEF ID 3470); (ii) Brazil: Sustainable Land Management in the Semi-Arid Sertao, GEF ID 2373;* Case study analysis in Chapter 3: *Mongolia land degradation (GEF ID 5700).*

[19] Case study analysis in Chapter 3: (i) *China: Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes (GEF ID 2926), (ii) China: Hai Basin Integrated Water and Environment Management Project (GEF ID: 1323) and Mainstreaming Integrated Water and Environment Management (GEF ID: 5561), and (iii) Mexico City: Introduction of Climate Friendly Measures in Transport project (GEF ID: 1155).*

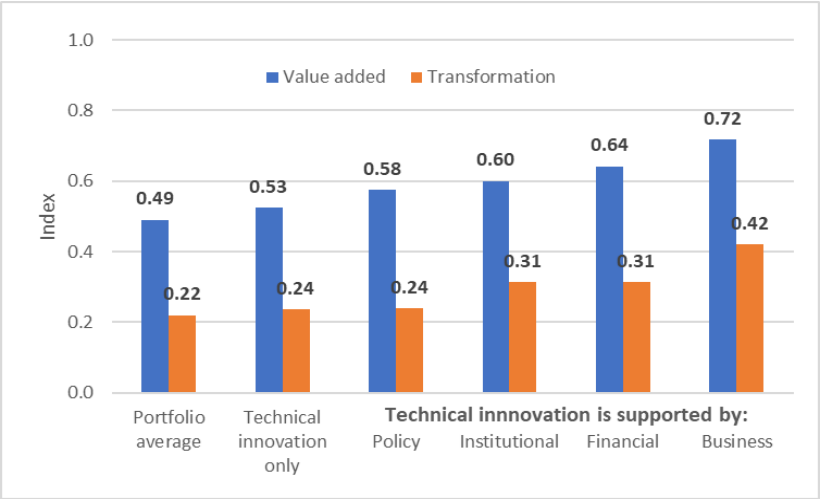
incentives, it might not achieve its objectives in full.[20] On the contrary, when technical innovations are supported by other innovation types, the likelihood of a transformational change and a higher value added increases. (figure 2.5). The *GEF-UNIDO CleanTech Program*, of which several projects were included in this sample portfolio, combined technological innovation with policy and institutional reforms (box 2.5)

(b) **Business innovations combined with policy, institutional, and/or financial innovations.** Project results significantly improve when business model innovations are combined with policy and/or institutional innovation (figure 2.6). In such projects, the primary innovation often relates to building links to markets and creating value chains, while the supporting secondary innovation(s) include the introduction of relevant policies, institutional capacity building, or financial mechanisms to support project sustainability.[21]

Irrigation Technology Pilot Project to face Climate Change Impact in Jordan, GEF ID 4036.

[21] Case study analysis in Chapter 3: (i) *India: Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management (GEF ID 3470)*; (ii) *CAPE Agulhas Biodiversity Initiative, GEF ID 1055; and (iii) Brazil: Sustainable Land Management in the Semi-Arid Sertao, GEF ID 2373.*

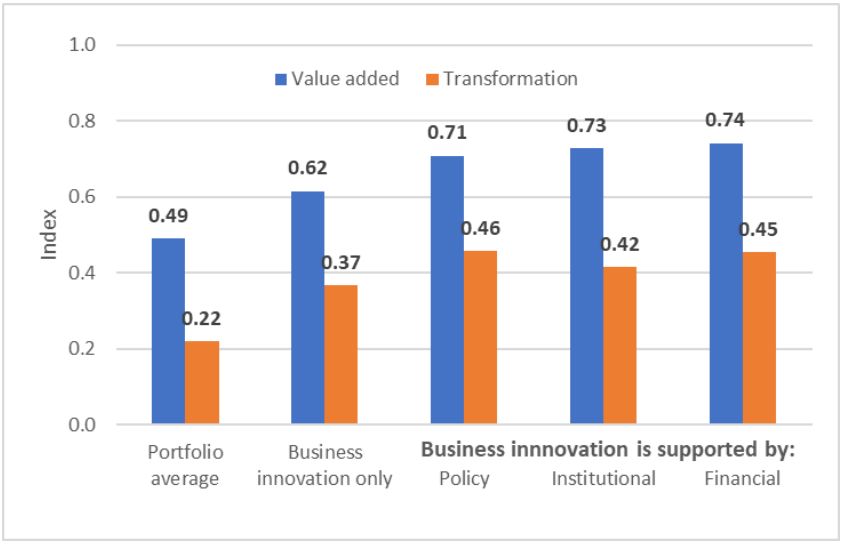
Figure 2.5: Projects with technological innovations achieve better outcomes when supported by other innovation types



The indices are re-scaled (to the scale from zero to one) simple averages for each group of projects. Value-added index is based on six dimensions of value added: quality, scale, replicability, sustainability, knowledge and learning, and enabling environment. Transformation index is based on four dimensions of transformational change: relevance, depth, scale, and sustainability. Projects in the portfolio were assessed and coded using these 10 characteristics during portfolio review.

Source: portfolio review.

Figure 2.6. Business model innovations achieve better results when combined with policy and/or institutional innovations



The indices are re-scaled (to the scale from zero to one) simple averages for each group of projects. Value-added index is based on six dimensions of value added: quality, scale, replicability, sustainability, knowledge and learning, and enabling environment. Transformation index is based on four dimensions of transformational change: relevance, depth, scale, and sustainability. Projects in the portfolio were assessed and coded using these 10 characteristics during portfolio review.

Source of data: portfolio review.

Box 2.5: Innovation in the GEF-UNIDO CleanTech Innovation Programme

The *Global CleanTech Innovation Programme* (GCIP) program established a national platform for an annual competition-based Accelerator to support the adoption of clean technologies in small and medium exercises. The GCIP set out to reduce/mitigate several barriers to a functioning cleantech entrepreneurial ecosystem, including the lack of an enabling regulatory environment, limited access to finance, lack of public awareness regarding market potential of low-carbon innovation technologies, lack of business startups' business planning skills. GCIP was launched in Armenia, India, Malaysia, Pakistan, South Africa, Turkey. Morocco, and Thailand. GEF funding was only between $0.5 million and $2 million complemented by cofinancing on the order of two to eight times the level of the GEF grant. All assisted GCIP startups developed innovations with climate benefits and other environmental and social cobenefits. Select participating startups were able to access capital for their cleantech enterprises ranging from $5,000 to $1.9 million, which helped them address a major hurdle in the commercialization of technology, i.e. access to capital. The projects supported multiple innovations, including technological (e.g. demonstration, deployment, and transfer of clean energy, energy efficiency, water efficiency technologies), policy (introduction of policy and regulatory frameworks in support of cleantech competition, innovations, and acceleration activities in the participating countries), business model (establishing an innovative cleantech ecosystem to support and accelerate clean technology development and adoption).

Sources: Evaluation of the GEF-UNIDO Global CleanTech Programme, 2018, and analysis of the closed cleantech projects as part of the closed innovative projects portfolio review within this study.

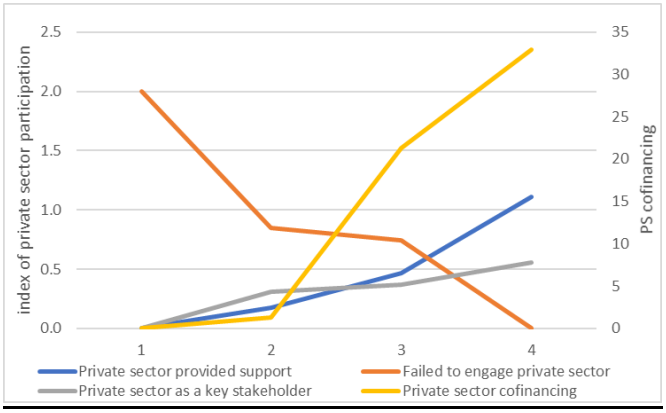
54. Private sector participation is associated with improved innovation results

(a) **As demonstrated in the portfolio analysis, private sector participation in projects is an important factor supporting innovations.** Private sector involvement in innovative projects takes place in different forms: project cofinancing, being a project beneficiary, taking the role of a champion for an environmental cause, or being a part of a multistakeholder partnership formed by the project. Thirty-four percent of the innovative portfolio's projects are characterized by private sector participation. The share of innovative projects with private sector involvement is typically higher when projects include financial and/or business model innovation, which usually requires cooperation with private financial institutions and other business entities.

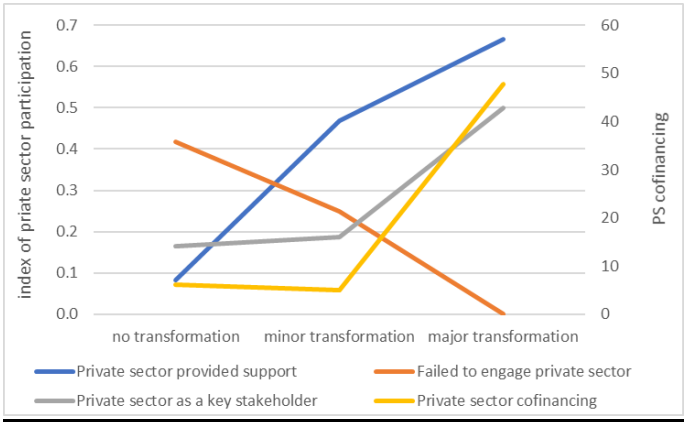
(b) **Private sector participation in innovation projects is associated with a higher likelihood of transformation and a higher value added**. Three types of private sector participation are observed: private sector as a key stakeholder in the project, private sector providing support to project activities, and private sector cofinancing of the project (figure 2.7). When a project fails or finds it difficult to engage the private sector (marked as "failed to engage private sector" in the charts), the results show that it reduces the value added of innovation and decreases the likelihood of transformational change.

Figure 2.7: Private sector participation in innovative interventions is associated with a higher likelihood of transformation and higher value added

a. Private sector involvement has the greatest influence (as a helpful or constraining factor) on the likelihood of a transformational outcome of the innovative projects



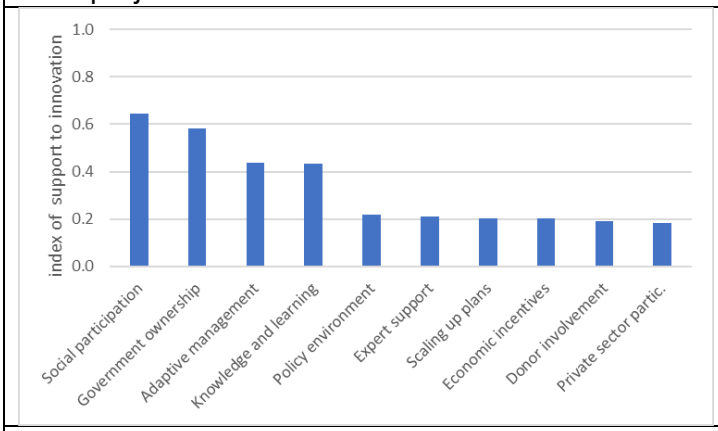
b. Private sector involvement has the greatest influence (as a helpful or constraining factor) on the level of value added by the innovative projects



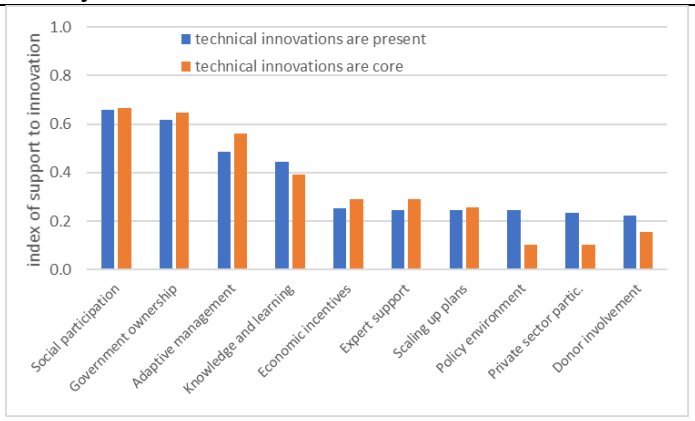
55. **The three main factors that support innovations include stakeholder involvement, government ownership, adaptive management, and knowledge and learning (box 2.3).** The importance of these factors in terms of their support to the portfolio innovations is shown in figure 2.8. The ranking is presented for the entire portfolio and for different innovation types: technical, business model, financial, policy, and institutional. All the factors presented provide important support to the innovations in the projects; however, the level of importance differs. Most important factors across innovation types are social participation, government ownership, adaptive management, and knowledge and learning. The level of importance of other factors differs by innovation type. For example, policy environment is an important factor in projects with financial and policy innovations; Expert support is important in projects with technical, policy, and institutional innovations; Economic incentives and private sector participation are important in projects with technical and business innovations.

Figure 2.8: Importance of factors supporting innovations, by innovation type

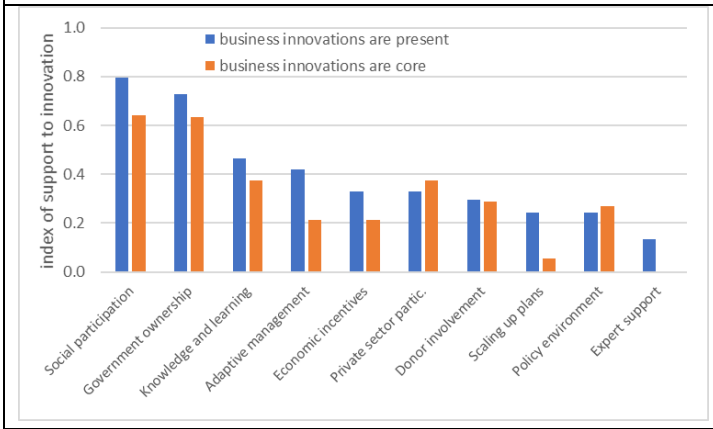
a. All projects



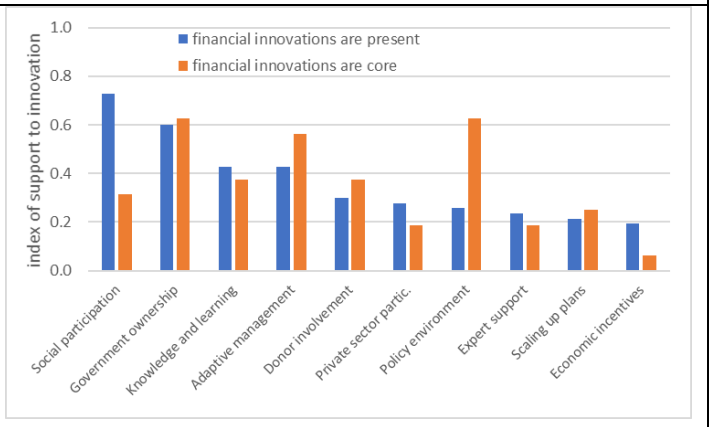
b. Projects with technical innovations



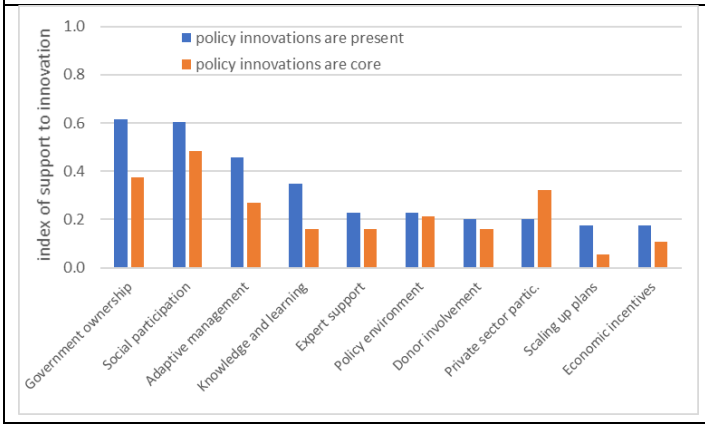
c. Projects with business model innovations



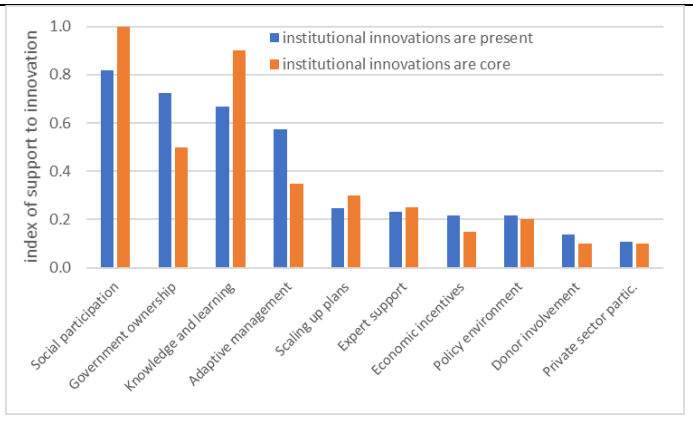
d. Projects with financial innovations



e. Projects with policy innovations



f. Projects with institutional innovations



The index is a scaled simple average of the values of each factor. The values can be: 0 (factor is not present in a project), 1 (factor had a minor supportive impact on the innovations in the project), and 2 (factor had a major impact on the innovations in the project). The indices were re-scaled to fit the range from 0 to 1.

Source: portfolio review of terminal evaluations.

56. In summary, the characteristics of innovative projects that are associated with better results in terms of a greater value-added and a higher likelihood of a transformational change include:

(a) **A combination of innovative approaches where:** (i) innovations of different types (technological, business model, financial, policy, and institutional) are combined in one project;[22] and (ii) economic incentives are used to achieve environmental objectives.

(b) **Stakeholder involvement** including private sector participation, government ownership and championship, and other types of participation.

(c) **Adaptive project management** and flexible project design.

(d) **Knowledge and learning activities** to contribute to the overall goal of an innovative intervention, as well as to disseminate lessons on innovation across the GEF partnership and to broader stakeholders.

These characteristics are discussed in detail in the next chapter, based on the case study analysis and some additional information compiled from the portfolio.

[22] In case study analysis presented in Chapter 3, this also manifests itself in multisectoral approaches.

3 FACTORS INFLUENCING SUCCESS IN INNOVATIVE PROJECTS

57. This chapter discusses factors identified as most important in supporting innovative interventions in achieving success – a higher value added or transformational change from the innovation. Triangulating the findings of closed projects from the portfolio review, the case studies analyzed and interviews, several factors were identified:

(a) A critical factor in the success of innovative GEF projects is the utilization of multisectoral approaches which support innovations in generating economic and environmental value. In such projects, the focus is on fostering coordination across economic sectors – such as water, transport, energy, or agriculture. In some cases, projects are focused on mainstreaming environmental action through policies. The examples provided in this chapter show how combining the environmental objectives with economic sectors' efficiency considerations can push innovative projects and programs forward. Similarly, by supporting economic incentives for environmental action, innovative interventions achieve better results.

(b) Consistent with the conclusions of the portfolio analysis (Chapter 2), this chapter shows that projects combining innovations of different types are correlated with successful outcomes.

(c) Stakeholder engagement is a vital driver of success in innovative projects. By bringing a wide range of stakeholders together to make joint decisions on issues where they have varying interests, the GEF promotes its innovative environmental agenda. The GEF also supports social equity though community-driven participatory approaches.

(d) Innovative projects that use adaptive management and are guided by flexible design tend to perform better, because they are able to modify their activities in response to evidence on success and failure, as well as to adapt to the local context and evolving external conditions.

(e) Knowledge and learning activities contribute to better outcomes, starting from pre-intervention analytical work which can contribute to the innovation design; reducing information and awareness barriers for testing and adoption of innovation during project implementation, and documenting and disseminating lessons to broader stakeholders in support of replication and scaling up.

These factors are discussed in greater detail with specific examples from the portfolio and the case studies.

3.1 Multisectoral approaches and use of Economic Incentives

One key characteristic influencing innovation results, in terms of higher value added and greater likelihood of transformational change, was the use of multisectoral approaches in project designs. Some multisectoral approaches also combine economic incentives with environmental goals.

3.1.1 Multisectoral approaches

58. **The GEF's Innovative projects have often applied multisectoral approaches** to promote innovations that have both environmental and economic value and which incentivize environmental mainstreaming. In these projects, often the technological, business model, or financial innovations are piloted to demonstrate environmental and economic benefits.

59. An example of an innovative and transformational GEF program using a multisectoral approach when technological innovations benefit both the economy (e.g., the water sector and agriculture) and the environment is the China Hai River Basin case. This is a two-phase ongoing program consisting of two projects: *Hai Basin Integrated Water and Environment Management Project (GEF ID 1323) and Mainstreaming Integrated Water and Environment Management (GEF ID 5561).* These two projects supported a technology-based integrated water sector and environment approach to (i) enhance efficient water consumption in the areas with water scarcity, and (ii) increased pollution control in the Hai Basin and consequently in the Bohai sea.[23] The solutions were found in integrated water and environmental planning, specifically in evapotranspiration management system (box 3.1). The project team focused on basin-level water consumption analysis and the estimates for target evapotranspiration (environmentally sustainable consumption, assigned quotas from the target evapotranspiration to various user groups, which necessitated joint decision making by various government departments and interests of nongovernmental stakeholders. Two new targets were added to the evapotranspiration target: the environmental capacity of the river (environmental capacity (EC) target which shows the limit to polluted inflows in the river) and the ecological services of the river target (ES target). The linking of the three interacting targets (evapotranspiration, environmental capacity, and ecological services) was recognized as a multisectoral innovation. The linkage among the three targets was "water." With these targets, a system that supported integrated water and environmental management was set up.

60. After the technological innovations were developed and piloted, with good results,[24] the next stage (included in the second project) was to mainstream the evapotranspiration, environmental capacity, ecological services-based approaches and promote their standardization across the economy through the development of operational manuals and guidelines with the

[23] In the early 2000s, the Hai River was the most polluted river in China, and as such it was featured in the book *The River Runs Black*, by Elizabeth Economy.

[24] The project has dramatically decreased the unsustainable consumption of water and improved its effectiveness, including a 63 percent reduction in overexploitation of shallow groundwater and a 46 percent reduction for deep groundwater in the Hai Basin. The was a progressive decline in county-level pollution, including the three commonly measured contaminants: sewage discharge to rivers in 2010 was 70 percent of discharge in 2005; COD discharge was 38 percent of 2005 discharge; and NH3-N discharge was 41 percent of the 2005 level. The project also achieved a small but measurable reduction in pollutants entering the Bohai Sea, surpassing its reduction targets several-fold.

objective to adjust the existing laws, regulations, rules, and regulatory system to facilitate the implementation of the approaches. In addition, the project added value in terms of breaking the institutional barriers between the sectors (i.e., promoting cooperation between the Water and Environment ministries) and improving vertical integration across government levels, from local to central government.

Box 3.1: What is the Evapotranspiration Management System?

At the time of the implementation of the Hai Basin Integrated Water and Environment Management Project, evapotranspiration was developed as a globally cutting-edge technical approach to water demand management. Traditional approaches to water demand management aim at limiting water abstraction, which does not necessarily lead to reduced water consumption. In Northern China, it was documented that such an approach led to the opposite outcome while water abstraction declined, consumption of water increased because users (farmers) applied available technologies to minimize water outflows from their land, leading to a decline in the aquifers. The evapotranspiration approach to water demand management focuses on water consumption (or evapotranspiration) and registers the difference between water supplied to a farmer, town or factory and the water returned as drainage or other treatable effluent. Restricting consumptive use will always release water for other economic uses, to the environment, or to recharge aquifers. Evapotranspiration management comprises four steps: (i) basin-scale water consumption balance analysis, (ii) calculating, based on sustainability objectives, target evapotranspiration (consumption) for the basin, (iii) dividing the target evapotranspiration among different sectors and industries by weighing and comparing the competing water demands from agriculture, industry, domestic, and social use, as well as environmental needs, and (iv) monitoring and assessing achieved water consumption savings.

61. The challenges this multi-sectoral project had to overcome related mainly to resistance to innovations and the difficulty of attaining cross-ministerial coordination. The most challenging points centered around the technical arguments around the innovations. It took a year to convince the Ministry of Water Resources but finally they accepted the concepts. Second, the accuracy of the water sensing technology was poor at the time, which was another factor. A third difficulty related to the need for the Water Department to cooperate with the Environmental Department, which was not easy because it involved signing a cooperation agreement and sharing data. Without this the project development objectives would not be achieved as three targets were set for evapotranspiration, environmental capacity, and ecological services – and only coordination between the two departments could achieve that.

62. A good example of an innovative and transformative GEF project based on environmental mainstreaming is the Mexico City: *Introduction of Climate Friendly Measures in Transport* project (GEF ID 1155). The project aimed to contribute to developing policies and measures to support a long-term modal shift to climate-friendly transport in Mexico City. This project enabled climate-friendly transport sector approaches in the client country and in the implementing agency (the World Bank). The project helped to incorporate climate change and local air quality goals into transport sector policies, supporting the formulation of the Climate Change Action Plan that was designed with a strong cooperation of transport, environment, and urban development authorities. The climate agenda pushed a variety of transport-climate solutions forward, including advanced

technology for vehicle emission testing; of one of the first methodologies – globally – for monitoring and verification of greenhouse gas emissions from the transport sector; and development of bus rapid transport (BRT) in Mexico City and in other large cities in the country and across the Latin America region. The project received a prize for innovation from Harvard University.

Box 3.2: Multisectoral approaches in ongoing Integrated Programs

The evaluation of the GEF integrated approach applied through GEF-6 *Integrated Approach Pilots* and GEF-7 *Impact Programs* looked at the relevance and coherence in the design, efficiency, and early results from implementation. Overall, the evaluation found that GEF-7 Impact Programs represent an improvement in design over the GEF-6 Integrated Approach Pilots. They demonstrate synergies primarily among biodiversity, climate change, and land degradation focal areas, and the interrelationships with socioeconomic considerations, focusing on urban development, rural livelihoods, and commodity value chains. The GEF's integrated approach is helping countries plan to work across ministries, agencies, and departments.

Source: GEF IEO. 2021. Formative Evaluation of the GEF Integrated Approach to address the Drivers of Environmental Degradation.

3.1.2 Multisectoral approaches combining economic incentives with environmental goals

63. Considering multiple demands on limited resources in developing countries, environmental objectives sometimes compete with other priorities for financing and institutional support. To avoid this, innovative GEF projects often involve interventions that use economic incentives to alter economic activities that have a potential negative impact on natural resources. *This is observed at different levels – community, country, and region.*

64. Two GEF-financed projects in Benin – *Program for the Management of Forests and Adjacent Lands* (GEF ID 793) and *Benin Forest and Adjacent Land Management Project (GEF ID 5215)* – used economic incentives at the *community* level to address the problem of forest ecosystem degradation. The projects were designed to tackle the economic cause of forest degradation – poverty and the lack of options for income generation – taking into account both conservation and economic value of the forest ecosystem, as well as rural poverty. In particular, the case supported demonstration projects to showcase to the local population eco-friendly income generation activities, provided training in sustainable agricultural technologies, and supported the development of a "green" fuelwood sector, addressing the unsustainable and chaotic fuelwood and charcoal production by creating sustainable fuelwood plantations and regulated charcoal markets. Incentivizing communities to become active participants in ecosystem management was critical to counterbalance the lack of government capacity to introduce and enforce regulations.

65. A GEF-financed project in Burundi – *Sustainable Coffee Landscape Project (GEF ID 4631)* – used economic incentives both at the *community* and at the *country* level. It revamped the coffee sector – a strategic export sector – by replacing the traditional (and unsustainable) monoculture of sun-grown coffee, with the shade-grown coffee, which does not require tree removal and has higher market value. The project simultaneously achieved: (i) improved local incomes, enhanced sector productivity, and increased export revenues; and, at the same time, (ii) reversed land degradation and reduced water depletion and biodiversity loss caused by the production of the sun-grown

coffee. At the community level, the project supported demonstration of the techniques of shade-grown coffee – planting the new type of coffee together with a variety of shade-providing trees and income-generating plants (e.g., bananas) – and of its economic and environmental benefits (increased income, reversed land degradation, biodiversity conservation). At the country level, the project promoted marketing and commercialization strategies for the shade-grown coffee, and supported access to high-value sustainable coffee markets through promoting negotiations between local cooperatives and international buyers, and incurring fair trade certification costs, thus leading to increased local incomes and improved country's export revenues combined with environmental benefits.

66. A GEF-financed ongoing *regional* program supporting three projects in the *Pacific Small Island States*,[25] with the fourth project in the pipeline, achieved significant economic benefits for the participating countries – the Pacific small island developing states (PacSIDS) – by helping them to achieve agreements and develop institutions that would guard their legally defined share of income from tuna fishing while achieving tuna conservation objectives. Prior to GEF interventions, the West/Central Pacific region was one of a few tropical oceanic areas where fishing by the world's highly industrialized tuna fleets was completely unregulated. Lack of binding agreements governing cooperation in commercial fisheries at the regional level, and governance issues at the national level, needed to be addressed, The program supported the creation of new policy and institutional arrangements for conservation and management of transboundary oceanic fishery resources: creation of the Western and Central Pacific Fisheries Commission (the Commission) and the preparation and ratification of the Western and Central Pacific Fisheries Convention, bringing it into force in 2004. The program also supported the PacSIDS in adjusting their national legislations to be aligned with the legal requirements of the Convention.

3.2 Creating an enabling environment to support innovation

3.2.1 Policies supporting technological Innovations

67. The GEF often finances technological innovations, which are important both as a means of environmental protection and as a key driver of economic development. Technological innovations are present in 75 percent of the portfolio of innovative projects reviewed (74 out of 99 projects in the innovation portfolio) and in all the case studies. However, it is critical for the sustainability of the project outcomes that technological innovations be supported by good policy and legal frameworks, institution building, and capacity development. Thus, in more than 90 percent of the projects reviewed, technological innovations are supported by policy development and institution building/institutional capacity development.

68. A GEF-financed project in China – *Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes (GEF ID 2926)* – achieved transformational change and high value added through an approach which combined the introduction and testing of technologies to destroy persistent organic pollutants (POPs) with the creation of a supporting policy

[25] (i) Implementation of the Strategic Action Programme) of the Pacific Small Island Developing States, GEF ID 530; (ii) Pacific Islands Oceanic Fisheries Management Project, GEF ID 2131; (iii) Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States (SIDS), GEF ID 4746.

and institutional framework for commercialization and scale-up. This was the first POP destruction project in the country, and it played a catalytic role in promoting two important technologies: (i) treatment of fly ash from municipal waste incinerators in cement kiln and using this to produce building materials and (ii) destruction of the pesticide POPs in cement kilns. The project significantly exceeded its targets by project closure: the pesticide elimination target was exceeded five times; the target of fly-ash dioxins three times; the target of pesticide POPs waste five times; and the target of fly ash 80 times. The terminal evaluation explains that "these higher than expected results were possible because the project successfully engaged the provincial governments in the disposal of POPs pesticides and was able to introduce the technological changes for dioxin elimination at an industrial scale, developments that were made possible by the policy incentives promoted by the project." The project also received significant cofinancing from the private sector.

69. The project was designed using a five-prong integrated approach including: (i) policy and regulatory frameworks, (ii) technology, (iii) institutional capacities, (iv) business models and finances, and (v) information awareness raising. These five aspects were critical for the transformation to an environmentally sound POPs management system. The project also involved support to the mechanisms to ensure mainstreaming, replication, and scaling up of project results. The terminal evaluation states that the "integrated approach made a big difference – changing the culture, the institutions, introducing technologies, capacity in the factories." "The project helped strengthen the policy and regulatory framework which clarified procedures and standards and provided incentives to adopt the new technologies." In particular, the project supported the design of 30 policy instruments (regulations and standards) at the national, provincial, county, and city levels. The project also provided information and raised awareness in communities surrounding contaminated sites and among decision makers – the latter to build the political will to adopt new regulations. The project also developed a database for reporting the information from POP-contaminated sites.

3.2.2 Policies and institution building supporting business innovations

70. Business innovations relate to increasing an enterprise's financial viability, including its mission, and the processes for bringing concepts to fruition. In the case studies analyzed, a common example of business innovation is one that relates to creating or improving supply chains or creating markets. Building links to national and international markets and establishing value chains is often one of the objectives of GEF-funded projects. This is typically done by linking environmentally sustainable practices with market opportunities. The projects often support producers and/or producer associations that introduce biodiversity-friendly production and management practices and enable them to gain or increase access to markets that reward biodiversity-friendly goods and services.[26] The projects also aim to improve the technical capacity of producers to implement such practices, their business management and marketing skills, and help them to identify markets or expand market share of the biodiversity-friendly goods and services.

71. A GEF-financed project in India (with a significant cofinancing from the International Development Association and the Government of India) – *Sustainable Rural Livelihood Security*

[26] See the following cases: (i) Sustainable Coffee Landscape Project, GEF ID 4631; (ii) CAPE Agulhas Biodiversity Initiative (ABI), GEF ID 1055.

through Innovations in Land and Ecosystem Management (SLEM) (GEF ID 3470) – achieved transformational impact before project closure and has made a tremendous impact in terms of innovation, partnerships, technology commercialization, patenting, and capacity building. The project was based on an innovative business model it introduced, the core of which was the consortia approach. It financed competitively selected innovation consortia (with both private and public entities combining markets, business, academia, and rural communities) that focus on agricultural transformation and sustainable rural livelihood security though improving production to consumption systems (value chains) in poor rural areas. The supported activities covered technical, as well as policy and institutional aspects related to land degradation, biodiversity, and climate change. The approach involved three characteristics that made it transformational: (i) economic incentives for all stakeholders included in the consortia: rural communities, businesses, and the scientific community; (ii) policy and institutional support; and (iii) multistakeholder participation: support to technical innovations through collaboration among farmers, private sector, civil society, and public sector organizations.

72. The consortium business model was the main innovation of the project, and institutional and policy support enhanced the scale-up. The project established 23 Business Planning Development Units (BPDUs) to support commercialization of the promoted agricultural technologies by engaging both scientists and entrepreneurs in agribusiness incubation at state and regional levels. These efforts were scaled up at national level by attracting a larger number of private sector stakeholders for commercializing innovations by frontier agricultural science subprojects. Scientists, BPDUs, and the hosting institutions benefited from license fee and royalty incomes, which further encouraged innovations at the institutional level. This business model is supporting market orientation in a sustainable manner and is being mainstreamed and scaled up by the project's execution agency, the Indian Council of Agricultural Research (ICAR). In the context of development of marginal and disadvantaged areas, where the possibility of irrigation expansion was very limited, it was believed that productivity could only be enhanced by technological advancements complemented with institutional and policy support.

73. Economic incentives played an important role in the project's success. Explaining the reasons for the project's achievements, an interviewee said the following: "What helped was that the project followed the venture capitalist approach. It issued a call for an expression of interest, application for grants. This induced competition. We received a lot of proposals." There was a strong involvement of private entrepreneurs due to economic incentives that the project created.[27] The agricultural processing technologies developed by the project were financially attractive to the entrepreneurs, and they purchased licenses to use them. With limited scope for area expansion, enhanced productivity, profitability, and competitiveness were seen as the main sources of agricultural growth and served as an incentive.

74. Policy support was instrumental in achieving scale-up and transformation. Activities initiated under the project have been mainstreamed, and public budget has been allocated to ensure the continuity of tasks that fall under the public good domain. ICAR has mainstreamed, funded, or made commitments to finance reforms as well as research and technology transfer interventions.

[27] A more detailed discussion of private sector involvement can be found in section 3.3 "Stakeholder engagement"

3.2.3 Policies supporting financial innovations

75. Innovative financing broadly includes any financing approach that helps to generate funds by tapping new funding sources or by engaging new partners, including those that enhance the "efficiency" of financial flows by reducing delivery time and/or costs and make financial flows more results-oriented.

76. Financial innovations are important, because they might improve sustainability of project outcomes; their incidence within the GEF's innovation portfolio is relatively low, as compared with the technological, policy, and institutional innovations. While technological innovations are present in 75 percent of the selected portfolio, and institutional and policy innovations are observed in slightly more than one-half of the portfolio, financial innovations are present in one-third of the projects. This might reflect a missed opportunity that is worth realizing: sustainability of project outcomes depends significantly on the availability of the financial mechanisms that help generate funds by tapping new funding sources or by engaging new partners, including those that enhance the efficiency of financial flows by reducing delivery time and/or costs, and make financial flows more results-oriented. Therefore, financial innovations are an important means to support project sustainability.

77. Financial innovations can vary across projects and include, inter alia, blended finance, establishment of environmental funds. Often, projects use or establish an environmental fund. For example, in the *Brazil Sustainable Land Management* (SLM) case (GEF ID 2373) the project successfully introduced an Environmental Incentive Fund (FIA), which became an important arrangement to encourage the implementation of sustainable land use practices. By project closure, 169 FIA-financed projects were approved and implemented. In the *Mexico BRT* case (GEF ID 1155) the project created a new bus operator, Corridor Insurgentes Company (CISA), by bringing together and including in the new BRT system the former private small bus operators, who then constitute three-quarters of the BRT employment. A private trust fund was successfully established for the administration, distribution and investments of the CISA revenues. A different example of financial innovation comes from the IFC's Earth Fund platform and involves the blended finance instrument which enabled pioneering investments.

78. The *Mongolia Land Degradation Project (GEF ID 5700)* promoted an innovative financial mechanism, which supported the introduction of requirements to the private mining companies to compensate ecosystems functions by funding and implementing ecological restoration and conservation activities to offset land degradation. The actual mechanism was the mitigation hierarchy and offsets for land degradation (box 3.3) into the landscape level planning and management. While the main innovation was the financing mechanism (the offsets), it would not have been possible to implement without the supporting policy framework introduced by the project. Related legislation, guidelines, and procedures were developed to create an enabling legal environment to introduce the mitigation hierarchy, offsets, and integrated landscape-level planning.

Box 3.3: Mitigation hierarchy and offsets for land degradation

Sectors such as mining, energy, and manufacturing are increasingly using an innovative framework known as the mitigation hierarchy to reduce their impact on biodiversity and land degradation. A goal of no net loss (NNL) is typically set. The process involves negotiations between government agencies, conservation actors, and developers and is often formalized in an Environmental and Social Impact Assessment. The mitigation hierarchy comprises four levels: (1) avoid impacts on biodiversity, (2) minimize impact by using environmentally friendly technologies, (3) remediate biodiversity loss (e.g., reseed the affected land), and (4) offset: if the previous steps are not possible, **offset the damage done by financing ecosystem restoration/conservation activities in other locations**.

Many regulatory and financial instruments are now in place that aim to balance biodiversity conservation with (sustainable) economic development by requiring the application of the mitigation hierarchy. In particular, 69 countries globally have NNL policies in place or under development.

Adopted from: Arlidge, William et al., 2018. "A Global Mitigation Hierarchy for Nature Conservation." *BioScience*, May 2018, Vol. 68, No. 5.

79. The project was successful in leading to an increase in mining companies' investment in environmental management and offsetting. The project improved the enabling legal and regulatory framework through approved guidelines, regulations, and a unified methodology. The participating mining companies signed Memorandums of Understanding on developing offset plans, and their budgets for environmental management, including offsets, increased above the target of 50 percent.

3.3 Stakeholder Engagement

80. Stakeholder engagement is an important driver of success in innovative projects. Participatory approaches ensure that stakeholders are involved in and support project design and implementation. The following examples illustrate how ownership by different groups – communities, private sector, scientists, and the government – can play a critical role in project success.

3.3.1 Participation through community mobilization and social inclusion

81. Participatory approaches are important when the adoption of innovations depends on community buy-in. They increase awareness and help understand the local needs and cultural specifics. They are a solution in countries where multiple pressures on budgets often push environmental considerations to the end of the budgeting priorities list. When environmental policies are applied top-down, they need to be enforced, which can be resource intensive. However, with a participatory approach, when environmental action is taken on rural communities, the private sector, academia, and the government, limited enforcement may be needed.

82. An innovative approach to forest protection in Burundi (GEF ID 4631) was based on integrating indigenous Batwa community into planning and management of the Bururi Natural Forest Reserve, the first time that local indigenous people were included in forest protection in Burundi. The Batwa households, who previously were landless and depended on the natural resources of the Reserve, using those unsustainably, now have jobs in forest protection in Bururi and bought their own land. The local champion of this approach, Léonidas Nzigiyimpa, received a National Geographic award for involving local communities in biodiversity protection while improving their livelihoods.

83. In the Benin case (GEF ID 793 and 5215), a significant portion of funding was dedicated to developing collective forest ecosystem management with communities as a key stakeholder. It accomplished a transformation from a 'policing approach' to collaboration between the government forestry agencies and the communities. The culture change within local communities was clear by project closure, when 85 percent of project participants have discontinued illegal charcoal making and farming within the forest boundaries.

84. **When communities are not effectively engaged, the application of the best technologies may not yield good project results.** In Jordan – the GEF project *Irrigation Technology Pilot Project to face Climate Change Impact in Jordan (GEF ID 4036)* – targeted poor smallholder farmers; it was designed to test innovative irrigation technologies to support climate change adaptation in agriculture and sustainable and efficient use of water resources**.** The project successfully introduced several water-saving technologies. However, the target group of the poor farmers was effectively excluded from the project, while the technologies were adopted by more affluent farmers. The project failed to consider the scale and cost of technologies vis-à-vis the target population group. In particular, the project had a requirement of a 25 percent beneficiary cofinancing, which was unaffordable for the small-plot farmers. The project also missed an important step: empowerment of local communities and service providers. Also, the project was supposed to finance training of trainers and of farmers, as well as an awareness campaign regarding the installed equipment. However, only a very limited number of training activities took place, and an awareness campaign

was not implemented. Interviewees for this case study noted that "in this project [the beneficiary participation] modalities were not as successful as the technology."

85. In Brazil – *Sustainable Land Management in the Semi-Arid Sertao* (GEF ID 2373) – the poor smallholder farmers were engaged through a grassroots participatory approach. The terminal evaluation notes that "the most salient unexpected results [were] in the strengthening of local social organizations. More active local organizations supported project sustainability and scaling up." The project involved a bottom-up approach to decision making, aimed at preparing development action plans as proposals for financing by the project. The process would start with a local planning meeting held in each participating community, which would prepare the proposals and forward them to the Territorial Committee for approval. The Committees' main role was to be selective, because available financing could not cover all requests, and to decide on the territory-level actions. The Committees' decisions would be the basis for the project's operating plan, submitted to the project management unit. Overall, the highly participatory process employed by the project involved consultations with the beneficiary households, technical assistance organizations (NGOs), social mobilizers, and representatives of government agencies and local governments.

3.3.2 Private sector participation

86. Private sector participation can benefit innovative environmental projects in multiple ways, supporting greater value added of innovations and higher likelihood of transformational change. Mechanisms could include private sector cofinancing, influencing the government to prioritize environmental goals, forming multistakeholder partnerships between private sector and nonprivate entities and communities, and scaling up innovations.

87. A project in South Africa – *CAPE Agulhas Biodiversity Initiative (GEF ID 1055)* – was designed to assist in instituting innovative cross-sectoral approaches to conservation management at the subregional level, through building and strengthening multistakeholder partnerships and assuring better integration with regional development strategies and programs. This project and the projects that followed created international best practice in sustaining conservation through stakeholder participation and cross-sectoral collaboration. One of two main project components was conservation land management in the Agulhas plain.[28] Within this component, first, the project incentivized private landowners to take responsibility for biodiversity protection in exchange for a beneficial tax regime and technical advice regarding best practice in sustainable land management. Next, the project applied a "true" participatory approach putting the private landowners in the driver's seat and letting them design the innovative partnership agreements regarding conservation-related land use.[29] As a result, the project's greatest achievement was bringing together a diverse group of stakeholders toward an integrated vision of landscape conservation.

88. The model of biodiversity protection that the project developed has been mainstreamed, and the process has continued 10 years later. In the words of the interviewees, the project was

[28] The second main component was creating a sustainable flower industry while protecting biodiversity in the Agulhas plain.

[29] See a discussion of how adaptive project management supported a participatory approach in this case in the section 3.5 "Adaptive, flexible program management".

highly successful because of the decision-making power it gave to the private landowners: “The models have survived. That was the first time when the large landowners were incentivized to protect the land.” “Getting [the landowners] engaged at the right time was critical.”

89. In the *Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes*, in China (GEF ID 2926), a significant scale-up of the project outcomes was due to private sector and multistakeholder ownership. The closing of the cement plants in the Beijing area in 2016 due to cement production overcapacity was an important contextual factor that gave cement firms incentives to participate in the scale-up. At this point, the government acted immediately and created policy allowing the cement plants that agreed to include fly ash coprocessing in cement kilns and using it to produce building materials to stay open, thus incentivizing them to scale up the fly ash destruction technology. This made it possible for this relatively small project to mobilize a lot of cofunding. During the project life, the private sector provided a high level of cofinancing, $80 million, which was more than twice the planned cofinancing at project approval. By project closure, large companies in China bought licenses for the technologies introduced by the project and developed business models for technology transfer.

90. In the *India SLEM project* (GEF ID 3470) there was strong involvement of private entrepreneurs, who expressed interest in the agricultural processing technologies developed by the project and purchased licenses to use them, thus supporting sustainability and a scale-up of agricultural value chains supported by the project. The project developed 39 producer companies, 40 of which were linked to entrepreneurs and the private sector to sustain the value chains. The project scaled up entrepreneurship as well as commercialization by setting up 23 Business Planning Development Units (BPDUs), exceeding the target of 5 BPDUs. During four years of operation, BPDUs also provided consultancy by supporting 1,218 entrepreneurs in business incubation, 91 of whom initiated new agribusinesses. It is estimated that these agribusinesses, with their products and services, created almost 220,000 jobs and benefited 140,000 farmers. Four entrepreneurs won national awards for best incubator from the Network of Indian AgriBusiness Incubators. At project closure, 58 project technologies were commercialized to 80 licenses, worth $527,000.

91. The private sector, together with the federal government, provided financing that supported value chain development subprojects (created by the project) in the amount of $317 million. The rural livelihood security subprojects established a sustainability fund of $1.25 million at project closure to maintain the project investments. The sustainability fund and support from other organizations such as banks and insurance companies, as well as self-help groups, producer companies, and farmer groups are likely to sustain potentially viable interventions from the subprojects.

3.3.3 Partnerships with the scientific community

92. GEF supports value added and transformation through the promotion of advanced technologies that are at an early stage and could benefit from further development and pilot testing. In the words of an interviewee with extensive experience working with the GEF partnership, “GEF should find a way to use its targeted innovation funds to bridge the “valley of death” faced by many promising innovations – the interval between the proof of concept and availability of venture capital.”

93. An example of the GEF's support to applied science and to piloting advanced technological innovations is the *Conservation and Sustainable Management of Below Ground Biodiversity*, GEF ID 1224 and 2342. It is a global project with the ambition to recognize the value of the soil biota and connect such knowledge to practical applications which would benefit biodiversity protection, activities to reverse land degradation, and enhance agricultural productivity across seven tropical countries in four regions. While the objective of the Project was the expansion of awareness, knowledge and understanding of below-ground biodiversity (BGBD), some participating countries also reported a positive impact on land use practices, and sustainable and replicable management practices for BGBD conservation were identified and implemented in pilot demonstration sites. The project activities added value to the development of integrated soil fertility management practices, integrated pest management in agriculture and forestry, and organic farming, and proved that sustainable practice is economically competitive with "chemical" farming, i.e., provides simultaneous gains in agricultural production. The outcomes significantly differed across the seven participating countries: more advanced economies generally benefitted from the project, in some cases beyond initial intent as the farmer communities adopted the project technologies and the private sector scaled them up (box 3.4), while in other countries continued financing would be needed to support project outcomes' sustainability. The successful country cases involved strong partnerships with national agricultural research centers, links between those and the local communities, a participatory approach implemented in activities involving local communities, and awareness raising in the communities, with a proper explanation of the methodologies and technologies. Also, there was demand from communities, who were looking for approaches to improve productivity and livelihoods.

Box 3.4: Below-Ground Biodiversity Program: outcomes differ across participating countries

Case of Kenya (a participating country): Benefits included new investments in agricultural industry, technology, and knowledge transfer; improved skills of specialists; new specialists in agriculture and forestry; scientifically enlightened farmers and communities; and strong support in solving gender issues in rural areas. Private companies are now producing biofertilizers, both for the local market and for export to more than 10 countries, mainly in West Africa. With the help of national extension services, the application of these locally produced biotechnologies (mycorrhiza and rhizobia) increased several times.

Case of Mexico (a participating country): Because of limited technical support, by project closure, farmers who were enthusiastic at the start of the project lost interest and eventually returned to traditional land use practices. The main reason was the lack of market incentives to apply innovative biotechnologies.

94. In the Mexico City: *Introduction of Climate Friendly Measures in Transport* project, GEF ID: *1155*, the involvement of the scientific laboratory was critical. The project resulted in solid test protocol for buses that continues to be applied. Data generated through the test has provided valuable information on the performance of alterative bus technologies in the conditions of Mexico City to guide future decision making on technology selection. Data produced on hybrid bus performance has supported a successful approval of a grant to introduce a fleet of hybrid buses into Mexico City. Now (in 2021) the Mexico City government is discussing using only electric buses.

3.3.4 Government ownership

95. **Government ownership is a well-known critical factor for project success.** Examples that show various ways in which government commitment was key to project results include the case of Mexico's project *Introduction of Climate Friendly Measures in Transport (GEF ID 1155)*, where climate change mainstreaming in the transport and urban sectors (the core innovation of the project) would not be achieved without a strong local and federal government commitment, demonstrated by the inclusion of the project in the administration's strategic priorities and sector programs. A key to the project's success was strong support by the secretary of environment and the involvement of the highest city and transport authorities. In Benin's *Forest and Adjacent Land Management case (GEF ID 793 and 5215)*, the policies introduced by the government and its strong commitment to the project allowed for innovative approaches, such as comanagement in forestry, a project-introduced innovation which presented a solution to a persistent problem of forest degradation. In South Africa's *CAPE Agulhas Biodiversity Initiative (ABI) (GEF ID1055),* a dynamic change in the country at the time led to a social approach to conservation by the government and therefore to keen support for the project initiatives which involved job creation for environmental protection and a truly participatory approach when project beneficiaries were incentivized to drive the design of the innovation (a business model for agreement-based conservation). In some cases, government ownership is enhanced through a clear demonstration of technologies (China POPs destruction project).

Box 3.5: Stakeholder Engagement in Ongoing Integrated Programs

Integrated Approach Pilots and *Impacts Programs* have been giving significant attention to stakeholder engagement, including governments, private sector, civil society, as confirmed by the GEF IEO Formative Evaluation of the GEF Integrated Approach to address the Drivers of Environmental Degradation. All three Integrated Approach Pilots have been establishing (or supporting existing) multistakeholder platforms to support sustainability of program outcomes. According to the quality-at-entry analysis, every Impact Program child project has developed a stakeholder engagement plan. The Amazon Impact Program has paid particularly strong attention to participatory approaches, with projects designed in close collaboration with indigenous communities and directors of national protected areas.

Source: GEF IEO. 2021. Formative Evaluation of the GEF Integrated Approach to address the Drivers of Environmental Degradation.

3.4 Adaptive, flexible program management

96. Adaptive program and project management is positively associated with higher likelihood of transformational change and cumulative value added of innovations. Innovative projects tend to lead to better results when the projects have the flexibility to modify results frameworks and activities in response to emerging evidence and to adapt to the local context or evolving external conditions. Innovative interventions in the portfolio and case studies did not necessarily avoid failure, but they were able to achieve better outcomes (in some cases transformational) by promptly revising their course of action in response to emerging evidence on success or failure. For example, in Sierra Leone, the "*Integrating Adaptation to Climate Change into Agricultural*

Production and Food Security" project (GEF ID 3716[30]) piloted several innovative approaches in climate change adaptation. One of the approaches (roof rainwater harvesting for crop irrigation) was discontinued after 20 percent completion, because it was not successful for contextual, technical, and implementation reasons. There were problems with the procured rainwater tanks, and the activity was not well suited in the context of Sierra Leone. The remaining funds were then assigned to other water management activities within the project, such as microcatchment and open-field irrigation projects, which improved moisture retention, soil structure, and nutrient content by reducing topsoil erosion and evaporation.

97. Adaptive management implemented by innovative interventions requires adapting to local contexts, the absence of which resulted in a lower uptake of innovations. For example, "*Testing a Prototype Caribbean Regional Fund for Wastewater Management* (CReW)" (GEF ID 3766[31]) experienced a lower ownership level among Spanish-speaking countries compared to their English-speaking counterparts. One of the main reasons was a general lack of detailed information in Spanish on innovations introduced by the project (including small-scale financing agreements). As a result, the uptake in Spanish-speaking countries was very low. Similarly, the project "*Conservation of Wetland and Coastal Ecosystems in the Mediterranean Region*" (GEF ID 410[32]) did not make a real attempt to produce bilingual briefs on management plans and innovative use of management scenarios that could have been used by interest groups to ensure uptake and implementation.

98. Adapting to stakeholder needs created stronger ownership and, in some instances, helped to overcome initial stakeholder resistance. In South Africa, the *Cape Agulhas Biodiversity Initiative* (GEF ID 1055), the private landholders originally resisted some of the new approaches to conservation management, including contract parks and stewardship agreements. The average length of tenure of landholders in the Agulhas Plain is over 70 years, and some farmers have been on the land for seven generations. When the plan to delineate a large land area with many private land slots as a national park was declared in the newspaper, it caused resentment. The landholders rejected the initial approach to conservation, which included land purchase; agreements with landowners to make their land available as a national park for a specified time period, such as 30 years; and some other prescriptive stewardship arrangements. In response to this reaction, the project coordinator introduced the participatory approach. As a result, the landholders led a participatory design of two types of agreements: management agreements, which were a novel pilot mechanism whereby landowners agree to restrictions on their (mostly productive) land to protect biodiversity in exchange for support to land management; and conservancy agreements between two or more landowners to protect the environment.

99. **Adapting to evolving external conditions through changes in results frameworks and activities benefits projects.** In Kazakhstan, the project "*Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply*" (GEF ID 1149[33]) was originally designed to rely on two large pilot projects (energy efficiency rehabilitation of the district heating utility in Kokshetau and creation of a municipal Energy Service Company in Almaty) that could not be implemented because of

[30] 3716 – a portfolio project
[31] 3766 – a portfolio project
[32] 410 – a portfolio project
[33] 1149 – a portfolio project.

external financial factors outside the project's control, including bankruptcy of the district heating facility. After two years of weak project implementation performance, the new project manager in consultation with local experts decided to refocus the activities from the originally planned large supply-side projects to small-scale building-level energy-efficiency projects. As a result, the project implemented 17 pilots that disseminated energy efficiency technology, and demonstrated new local level financing schemes based on the revolving principle that heat cost cash savings are accumulated and used for financing of subsequent energy efficiency improvements. The project initiated and promoted institutional and policy changes and secured financing for energy efficiency retrofits in housing and municipal infrastructure through the National Program on Modernization of Housing and Municipal Infrastructure.

100. **Innovative interventions can implement adaptive management formally (on a large scale) and informally (incrementally).** The formal approach may involve hypothesis testing in project design and implementation, and formal project reviews and restructuring to adapt the design and implementation. Informal processes take place incrementally, on an ongoing basis in response to M&E and other information available to the project team and stakeholders. The *Benin Forest and Adjacent Land Management projects* (GEF IDs 793 and 5115) used the mid-term review as a basis for restructuring of the original project (GEF ID 793) and preparing the additional financing phase (GEF ID 5115). Among other changes, the initiative removed activities on land tenure, and additional resources were allocated to creation of additional sustainable rural wood markers and fuel-wood plantations to cover the entire project intervention area, which was essential for the long-term viability of the resource. The Benin projects also adapted their activities less formally and shifted to a full plantation approach because the enrichment of natural forests was ineffective.

101. According to stakeholders interviewed for this study, the GEF Agencies and project teams have relative flexibility when restructuring projects or reassigning funds within the same project, based on the emerging evidence and evolving context. However, this is not always easy, and it takes time. The study team learned about a project in Botswana that had difficulty restructuring and reallocating funds, as a solar powered desalinization plant with an innovative financing solution could not be implemented for more than a year, because the supplier was not able to provide the technology due to travel restrictions caused by COVID-19. The project discovered that reorienting resources was a very slow process. According to interviews, the GEF needs to be more proactive in communicating the importance of adaptive management, including the ability to revise results frameworks and activities. Mid-term reviews and mid-term evaluations need to encourage learning from pilots and innovations.

3.5 Knowledge, learning, capacity, and awareness building activities

102. **Knowledge and learning, capacity, and awareness building activities play an important role in supporting innovative interventions.** These activities are positively associated with greater value added of innovation and greater likelihood of transformational change, while their absence or poor planning and implementation are constraining factors that decrease the likelihood of positive results of innovative interventions. Knowledge and learning activities can contribute to the design of innovation during pre-intervention activities; they should be part of the overall theory of change of an innovative project or program by contributing to the overall goal of the intervention and by responding to specific barriers (e.g., in adoption of an innovation), to help target beneficiaries that

face a particular challenge. Knowledge and learning activities also contribute beyond a specific intervention by generating learning about innovative approaches that may be applicable across the GEF partnership and to broader stakeholders, by disseminating lessons and supporting scaling-up of innovations.

103. **Pre-intervention activities.** Preparing an innovative project or program may require more efforts compared to an intervention that only includes well-established, well-known approaches. Pre-intervention activities help fund knowledge and analytical work to test and identify approaches that may work better in specific circumstances and help identify barriers to address. This includes drawing on previous lessons and experience. The innovative nature of planned interventions may limit the availability of applicable lessons from other projects and programs or organizations.

104. The project "*Watershed Approach to Sustainable Coffee Production in Burundi*" (GEF ID 4631) was built on the recommendations of the Rapid Strategic Environmental and Social Assessment of the coffee sector reform that had been conducted at the government's request during the project preparation. The assessment looked at the entire coffee value chain and highlighted the need to replace the traditionally produced sun-grown coffee with a higher market value and sustainably produced shade-grown coffee. The project also benefited from the previous experience of the GEF Agency (the World Bank) in agropastoral productivity and the coffee sector in Burundi, as well as its global knowledge from Latin America and other regions on multi-crops. Therefore, the pre-intervention activities (the environmental and social assessment) and the knowledge and experience of the World Bank in the country and globally were sources of innovation. In addition, an exchange visit to see successful shade-grown practices in Colombia prior to the project convinced the Ministry of Agriculture of Burundi of viability of this approach. The World Bank team also organized study tours to Ethiopia, where the conditions were similar (slopes).

105. During implementation, Knowledge and learning activities are most helpful when they contribute toward reducing information and awareness barriers to change and respond to stakeholder needs. In the *Western and Central Pacific Fisheries projects* (GEF IDs 530, 2131, 4746) knowledge management and capacity building activities have been aimed at improving oceanic fisheries management governance and supporting decision making. The fishery monitoring, data management, scientific research, and surveys undertaken by the projects have significantly added to understanding of the transboundary oceanic fish resources and related ecosystems of the target region, which in turn has contributed to more informed decision making at international, regional, and national levels aimed at improved oceanic fisheries management and conservation. A recent example of knowledge activities includes research in Oceanic Fisheries Climate Change and associated effects, which contributed to the development of the Western and Central Pacific Fisheries Commission (WCPFC) Resolution on climate change.

106. **Knowledge and learning activities also contribute beyond a specific intervention, by generating learning about innovative approaches that can be applicable across the GEF partnership and to broader stakeholders, by disseminating lessons and supporting scaling up of innovations.** Impact evaluations and targeted studies help document innovation results; knowledge sharing (in-person and online) supports dissemination and adoption of innovative approaches by others. When an innovative initiative is part of a larger initiative with established knowledge sharing mechanisms (e.g., communities of practice), it facilitates real-time exchange and learning. As

observed by the GEF IEO Evaluation of Knowledge Management (2020),[34] learning and knowledge platforms incorporated in some programmatic approaches (Integrated Approach Pilots, Impact Programs, GOLD program, the Coastal Fisheries Initiative Program), and some focal areas (international waters) and cross-cutting themes (gender) support knowledge exchange.

107. In some instances, knowledge sharing and dissemination activities continue after the innovative project completion, especially if there is an institutional partner that takes ownership. In Armenia, five years after the *Energy Efficiency Project* (GEF ID 3973), the project's executing agency – the Renewable Resources and Energy Efficiency Fund (R2E2 Fund) – continues sharing its experience and providing trainings on energy service agreements to interested parties in Europe and Central Asia, including in the Balkans: Bosnia and Herzegovina, Kosovo, Macedonia, and Montenegro.

108. In *Brazil SLM* (GEF ID 2373), South-South cooperation was actively used for dissemination and replication of methods on sustainable use of natural resources with governments, indigenous organizations, and farmers from Cape Verde, São Tomé and Príncipe, Senegal, Kenya, and seven countries in South America. Due to South-South collaboration, one of the important project's innovations (the agro-ecological cotton initiative) was replicated in Paraguay and Mozambique.

109. When a project is part of a larger initiative with established knowledge sharing mechanisms, it facilitates cross-project, cross-Agency, cross-country learning on innovation, and thus supports the GEF-partnership and broader stakeholder learning. The projects in the *Western and Central Pacific Fisheries* case (GEF IDs 530, 2131, 4746) and the Hai Basin case (GEF IDs 1323 and 5561) participate in IW:LEARN, a knowledge management initiative of the GEF international waters focal area. The big emphasis is on in-person and online knowledge exchange via biannual conferences, trainings, regional and global dialogues, and project twinning. This almost real-time exchange is useful and supports adoption and replication of innovative approaches across the portfolio of the participating projects.[35] As one of the interviewees put it, "An important way forward for the GEF is finding mechanisms where the innovations that GEF is supporting on similar topics learn fast from each other in a community of practitioners – so you are finding solutions to scale up faster."

[34] GEF IEO. 2020. Evaluation of Knowledge Management in the GEF (2020). GEF/E/C.59/04. GEF, Washington, DC.
[35] GEF IEO. 2020. Evaluation of Knowledge Management in the GEF (2020). GEF/E/C.59/04.

110. Table 3.1 includes a summary of the various factors influencing innovation in the case study

Table 3.1: Characteristics observed in innovation case studies

Short case name	GEF ID	FACTORS											
		MULTI-DIMENSIONAL APPROACHES						STAKEHOLDER ENGAGEMENT				ADAPTIVE MANAGEMENT	KNOWLEDGE AND LEARNING
		Multi-sectoral approaches	Economic incentives and environmental goals	Combinations of innovation types				Community engagement	Private sector participation	Science and advanced technologies	Government ownership		
				technological supported by policies	business supported by policies	business supported by institution bldg.	financial supported by policies						
Armenia EE	3973		✓				✓		✓		✓		✓
Benin Forests	793 5215	✓	✓			✓		✓	✓		✓	✓	
Brazil SLM	2373	✓	✓			✓		✓		✓	✓	✓	✓
Burundi coffee	4631	✓	✓	✓				✓	✓		✓		✓
China Hai River Basin	1323 5561	✓	✓	✓				✓		✓	✓	✓	✓
China POPs	2926		✓	✓	✓	✓			✓	✓	✓	✓	
Global BGBD	1224 2342									✓	✓	✓	✓
India SLEM	3470	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓
Jordan CCA	4036	✓									✓	✓	
Mexico BRT	1155	✓	✓	✓					✓	✓	✓		✓
Mongolia SLM	5700	✓	✓	✓	✓		✓	✓	✓		✓		✓
Pacific Tuna / Western and Central Pacific (WCP) Fisheries	530 2131 4746		✓	✓						✓	✓		✓
South Africa CAPE	1055	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	

Source: case study analysis

projects. Government ownership was present in all projects. Economic incentives combined with environmental goals, multisectoral approaches, adaptive management and knowledge and learning were other prevalent factors. More importantly, each case had several of these factors supporting innovation.

4 GEF's Readiness to Support Innovation: Conclusions and Recommendations

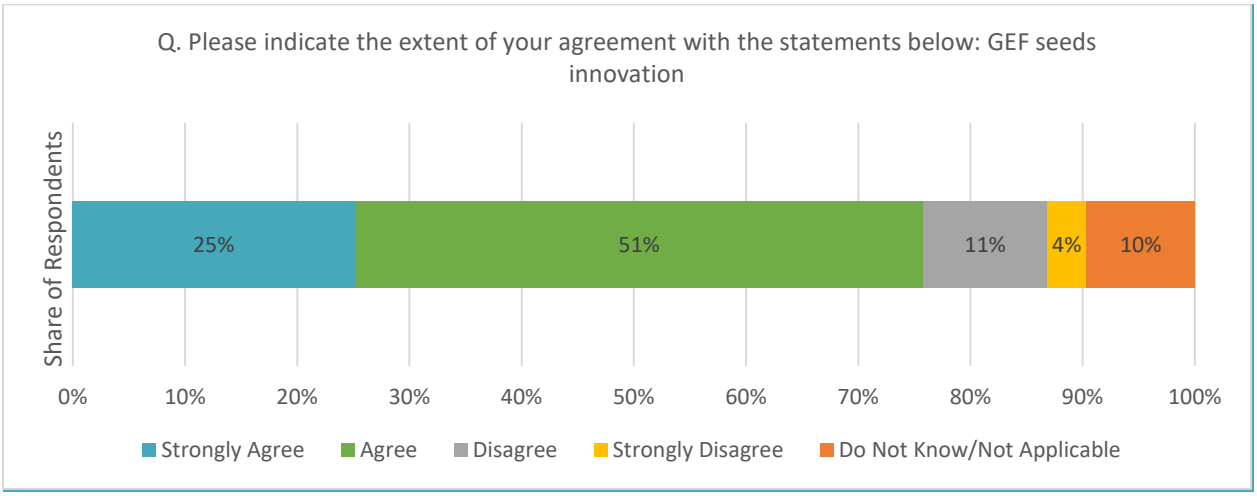
111. Earlier chapters provide evidence on support provided by the GEF over the past three decades in encouraging innovation, and discuss factors associated with successful outcomes in terms of a higher value added or transformational change. However, with a fast-changing external environment, would the previous strategies still be effective? Looking to GEF-8 and beyond, how ready is the GEF to support the growing demands and opportunities for innovation? This chapter discusses opportunities for the GEF in innovation based on the GEF's comparative advantage and the challenges that will need to be addressed.

4.1 The GEF's position in the environmental finance space in supporting innovation

112. The GEF is recognized as an innovative institution in the environmental and climate finance space through balancing the pursuit of innovation, risk, and performance in its selection of projects, and in preparing the ground for other donors to scale up its successful pilot projects. The GEF as an institution is innovative because of its unique position in the environmental governance space, being the only institution that simultaneously serves several major multilateral environmental conventions. Capitalizing on this ability to synergize between the conventions is where the GEF can innovate and support transformational change. According to an interviewee, "If the GEF doesn't live and kill that space other players won't be able to."

113. According to a survey conducted by the IEO in March 2021, when asked to assess the statement "GEF seeds innovation," 25 percent of respondents strongly agreed and 51 percent agreed, while 11 percent disagreed and 4 percent strongly disagreed, suggesting overall moderate agreement (figure 4.1).[36]

Figure 4.1: The GEF Seeding Innovation



[36] A survey conducted in March 2021 as part of the GEF IEO Assessment of the Strategy, Comparative Advantage, and Governance of the GEF Partnership which captured 588 responses from a broad range of stakeholders, including the GEF Secretariat, GEF Agencies, country operational and political focal points, Scientific and Technical Advisory Panel members, civil society and indigenous peoples organizations, and multilateral environmental convention representatives, among others.

114. By and large, the GEF provides a framework to enable key stakeholders to work together and experiment with creative solutions to long-standing and emerging issues. The general dynamic is that the demand for innovation is driven by local needs and commitments to international conventions. The ideas to address these needs and demands tend to emerge from local and international scientific institutions, as well as from the GEF Agencies. These ideas are proposed to the GEF as one of the few available sources of funding to support experimentation, piloting, and – in specific cases – the eventual scaling-up and replication of successful innovations. As noted by several interviewees, the original ideas of innovations in GEF projects are then further developed through a long-term dialogue with governments, expert discussions, and consultations with a wide range of stakeholders – including the grassroots-level beneficiaries, – often applying participatory approaches to empower people to innovate and to increase the sustainability of project outcomes.

115. The GEF has supported innovation at various levels – at the strategic level, at the institutional level, and through projects and programs. In projects, innovations may be technological, financial, business model, policy, and institutional, and are often combined to achieve value added and transformational change. At the strategic level, the Integrated Approach Pilots and Impact Programs were innovative in their approach to addressing the drivers of environmental degradation and driving transformational change at large scale involving multiple agencies based on their comparative advantage, countries based on relevance and ownership, and a broad spectrum of stakeholders (box 4.1). At the institutional level GEF processes have proven to be innovative. For example, GEF safeguard policies were instrumental in influencing GEF Agencies improve their policies. The Indigenous Peoples Advisory Group (IPAG) was a novel approach. In the case of results monitoring, GEF's recent innovations include the use of geospatial approaches in M&E. GEF policies on gender, safeguards, and stakeholder holder engagement have evolved over time to be consistent with good practices.

Box 4.1: Integrated Programs: A Strategic Innovation

The *Integrated Approach Pilots* (IAPs) and *Impact Programs* introduced in GEF-6 and GEF-7 build on the unique position of the GEF as the institution that serves major multilateral environmental agreements and is able to address multiple environmental challenges through an integrated approach. The IAPs and Impact Programs focus on objectives of multiple conventions and help countries and GEF Agencies bridge between sectoral silos to address drivers of environmental degradation.

According to the Formative Evaluation (IEO, 2021), the integrated programs show evidence of being designed for transformational change at the program level, including their programmatic structure and partnership strategies as key factors to support the depth of change and scaling up. For example, innovations are expected to be scaled through the global coordination project in the Drylands Sustainable Landscapes Impact Program. For the Food Systems, Land Use and Restoration Impact Program, transformation is dependent on having a critical mass of countries so as to have a leverage effect on buyers and producers to green value chains. The GEF plays a key role in this process by helping to build partnerships with actors, including private companies, who work across the project countries.

The knowledge platforms are an important innovative feature of the integrated programs. According to the Formative Evaluation, these platforms have been effective in sharing best practices and facilitating exchange among child projects. The lessons from the GEF-6 knowledge platforms include the importance for the platforms to maintain closer partnerships with their child projects, provide technical assistance, and use regional clustering.

Source: GEF IEO 2021 Formative Evaluation of the GEF Integrated Approach to Address the Drivers of Environmental Degradation

116. Overall, the GEF is perceived to be less bureaucratic and more supportive of innovation than many other institutions that finance environmental action. The GEF's efforts on integration across focal areas placed the GEF ahead of other comparable funds. At the same time, interviewees pointed to positive examples for the GEF to learn from, including the Climate Investment Funds' collaborative model and the opportunities it provides for scaling up; the flexibility of the Swiss State Secretariat for Economic Affairs (SECO) which provides a contingency budget at approval and allows relocation of funding within the same project during implementation.

4.2 Looking ahead: Opportunities, Comparative advantage, obstacles and recommendations for mitigation

4.2.1 Opportunities: Building on the GEF's experience

117. The value and importance of innovation is often taken for granted and only understood in the context of objectives discussed by proponents. One frequently asserted rationale is the absence of technologies able to meet global environmental needs. The GEF has supported numerous projects based on this opportunistic approach, in the early days as already noted focused primarily around renewable energy technologies including concentrating solar power plants, photovoltaics, and wind power (box 4.2). More recent examples include the use of big geodata, drones, and

satellites to enhance tracking and research supporting conservation objectives.[37] This rationale is particularly relevant to projects that identify solutions to overcome limited capacity and resources in poor countries.[38] The importance of innovative technology for addressing climate change was a central point in the International Energy Agency's *Energy Technology 2020* report, which concluded that half the global greenhouse gas emission reductions required to achieve net zero by 2050 – a pathway increasingly considered necessary to limit warming to the Paris goals – depends on technologies not commercially available today.[39] According to the United Nations Conference on Trade and Development (UNCTAD), "frontier technologies" currently constitute a $350 billion market and may grow to $3.2 trillion by 2025.[40]

[37] J. Tsui, "Here's How Technology is Helping Save Endangered Wildlife," March 30, 2020, https://thegef.medium.com/heres-how-technology-is-helping-save-endangered-wildlife-aa07486efcb6; Anupam Anand, 2020, https://idev.afdb.org/sites/default/files/documents/files/eVALUation%20Matters%20Magazine%20Q2-2020%20%28EN%29.pdf, p.42; "Earth Observation and the GEF: a STAP Document," GEF/STAP/C.57/Inf.06, December 2019, https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.STAP_.C.57.Inf_.06_Earth%20Observation%20and%20the%20GEF.pdf

[38] Another example is the UNDP-GEF project, "Climate Information for Resilient Development in Africa" based on the potential for use of smartphones and low-cost weather stations to provide enhanced weather and climate information for dramatically lower cost than widely used radar systems. UNDP, *A New Vision for Weather and Climate Services in Africa* (2016), A new UNCTAD report addresses the risks that technological innovation will exacerbate inequalities, creating technology "haves and have nots." UNCTAD (2021), *Catching Technological Waves: Innovation with equity,* https://unctad.org/system/files/official-document/tir2020_en.pdf http://www.thegef.org/sites/default/files/publications/WeatherAndClimateServicesAfrica.pdf.

[39] https://www.iea.org/reports/energy-technology-perspectives-2020.

[40] UNCTAD (2021), *Catching Technological Waves: Innovation with equity,* https://unctad.org/system/files/official-document/tir2020_en.pdf

Box 4.2: GEF support for emerging technologies

The GEF has a long history of supporting innovative technologies premised on learning curves and driving down production costs through economies of scale and innovation. The GEF was one of the first funders of concentrated solar power (CSP), approving large grants for four World Bank projects in India (which ultimately did not materialize), Mexico, Morocco, and Egypt between 1996 and 2004. Of the many aims of these projects one central theme was to buy-down capital costs to accelerate the commercialization of CSP technology. Even though each project was significantly delayed and the India project canceled, the learning from these projects was valuable in providing the World Bank and the GEF with experience on how to best bring down production costs.[41]

Following a review of this experience, STAP recommended in 2004 that the GEF largely abandon the effort to buy-down first costs and instead to "play more of a facilitating role, for example, by entering into more partnerships with the private sector. And more attention should be paid to developing supportive policy and regulatory frameworks which reduce the cost of energy services…" The definition of who to partner with, and what these "partnerships" should look like remained less clear. As recommended by STAP, more recent GEF support for new technologies has largely been in the form of projects addressed to removing barriers to financing, testing new business models, and reforming policies.[42]

118. **Policy reforms are often described as innovative based on the introduction of regulations and/or institutions new to a country**.[43] One frequently cited example is a 2007 GEF medium-sized project to work with the Government of Uruguay to create a favorable policy environment for wind energy. "Key elements of the program were a competitive bidding system for large-scale [renewable energy] development and a feed-in tariff for smaller-scale systems. Incentives were also included to reward early actors. Starting with virtually no wind power at all, the country became a global leader and repeatedly exceeded its targets; the country now aims to generate 38 percent of its electricity from wind by the end of 2017."[44] Another very different example is the Ethiopia Sustainable Land Management Program which used an inclusive, community-based approach and addressed the need for land tenure reforms.[45] $21.9 million from the GEF and the Least Developed Countries Fund were the foundation for a subsequent World Bank loan of $500 million.[46]

[41] World Bank (2020), Accelerating and Innovating Climate Action: A Retrospective of the World Bank's Experience with Select Climate and Carbon Trust Funds, 48.

[42] Miller and Swan 2017: A.S. Miller and S.A. Swann, Financing Innovation: Opportunities for the GEF, Washington, DC: STAP GEF, 2017:

[43] Ibid

[44] Ibid

[45] GEF Interview with Karin Kemper, "Laying the Foundation for Innovation at Scale," Feb. 2, 2021, https://www.thegef.org/news/laying-foundation-innovation-scale

[46] World Bank press release, June 13, 2019, https://www.worldbank.org/en/news/loans-credits/2019/06/13/ethiopia-climate-action-through-landscape-management-program-for-results. The World Bank project also includes an innovative pay-for-results approach that expands on the relationship with small farmers in the earlier GEF project.

119. **Innovative financial instruments are often promoted as a means of increasing impact and thereby promoting market transformation.** This has been of increasing interest with the growth of green investing and the prospect of attracting large private investments through use of GEF funds for de-risking projects. Hence, the Non-Grant Instrument Program in GEF-7 with $136 million in part to "demonstrate innovative application of financial mechanisms, business models, partnerships and approaches that may be broadly adopted and can be scaled up." A primary rationale has been the potential for attracting large private investment by provision of GEF support as guarantees or other forms of de-risking. In GEF-6, $91.2 million in GEF funding attracted $1,689 million in cofinancing.[47] The increasing opportunity and benefits of this financial partnering were the subject of a recent report by a GEF Implementing Agency, IFC. The report lays out principles for IFC's expanded commitment to blended finance, including a clear articulation of the contributions of the project to development; minimizing concessionality; and an expectation of eventual commercial sustainability.[48]

120. **The potential for financial leverage and partners has steadily increased with the growth in environmental and social–related investments in the financial community, expanding the opportunity for GEF even further.**[49] Despite the pandemic-induced economic decline, interest in investments linked to sustainability grew dramatically in 2020.[50] In the United States, sustainability-labeled funds attracted $51.2 billion in 2020, more than double the previous calendar-year record of $21.4 billion set in 2019. Meanwhile, much larger sums were committed to such funds in Europe -- about 81 percent of the $1.65 trillion of global assets in sustainable funds. Financing has also become increasingly available for early-stage clean energy technology, the focus of Breakthrough Ventures founded by Bill Gates. In early 2021 the fund was able to attract an additional $1 billion from investors.[51]

121. **The financial world has also been a source of innovation with respect to financial instruments, business models, and strategy**. Because of their reduced need to focus on financial returns, international financial institutions and donor governments have been key sources of support for blue, resilience, and sustainability-linked bonds, sometimes with payments tied to performance. The same players have helped develop pay-go business models to serve poor households.[52] This longer-term perspective has also been a driver for incubators designed to

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[47] GEF, "Non-Grant Instruments", https://www.thegef.org/topics/non-grant-instruments. This

[48] IFC, *Using Blended Concessional Finance to Invest in Challenging Markets* (2021)

[49] Private capital for environmental and social investments is still primarily in developed countries, but more is going to emerging markets with philanthropic support. New funds with dedicated social and environmental objectives are being announced all the time: Rockefeller Brothers Fund Impact Investments (some emerging market investments); Venture Builder; (Africa solar business support); Global Innovation Fund; Global Climate Tech Platform; and One Acre Fund.

[50] To date it appears few environmental, social, and governance (ESG) funds accept environmental and social returns *in lieu of* financial returns, as opposed to seeking both. For a discussion of this issue from a fund that gives primacy to social returns, see J. Novogratz, *Manifesto for a Moral Revolution* (2020).

[51] L. Stiffler, Gates-led Breakthrough Energy Ventures raises another $1B for investing in climate innovation, GeekWire, Jan 19, 2021, https://www.geekwire.com/2021/gates-led-breakthrough-energy-ventures-raises-another-1b-investing-climate-saving-innovation/

[52] IRENA, "Pay as you go models: Innovation Landscape Brief" (2020), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jul/IRENA_Pay-as-you-go_models_2020.pdf?la=en&hash=7A2E7A7FF8B5BAB7748670876667628A39DE40D5

identify and nurture promising business concepts from an early stage. The recent GEF Challenge Program for Adaptation Innovation embodies this approach, because it supports sustainable innovation ecosystems for micro, small, and medium enterprises. At this early stage, relatively modest financial support can provide critical capacity building and mentoring as the basis for scaling and subsequent larger investment. The World Bank InfoDev and IFC TechEmerge programs are examples of this approach, while the multidonor-supported Climate Innovation Lab is more narrowly focused but noteworthy for projects that attract subsequent financial support – since 2014, more than $2 billion.[53]

122. **Yet another rationale for innovation is the need to respond to new problems or to new scientific understanding of problems.** The developing country debt burden due to the pandemic-induced decline in economic activity has created both challenges and opportunities; a challenge insofar as environmental goals are secondary to short-term economic concerns, an opportunity insofar as international financial assistance is tied to measures to "green" the recovery.[54] The need for transportation and storage of some vaccines at very low temperatures highlights the continuing problem of energy for development in many poor countries.[55]

123. The focus on wildfires, flood control, and other impacts of climate change has become much more pressing with the recent increase in extreme weather events and recognition of the likelihood such disasters will occur with greater frequency due to climate change. Enhancing resilience to such disasters requires multiple forms of innovation, including technology (e.g., changes in building materials), policy reforms (building codes, insurance regulation), and public education.[56]

124. Another example is the concern with respect to "novel entities," technology-critical elements used in green and emerging technologies.[57] These technology-critical elements can provide substantial global environmental benefits, e.g., batteries for electric cars and storage of power to enhance the reliability of solar and wind power systems. However, their mining, processing, and disposal can conflict with GEF objectives. technology-critical elements therefore reflect the reality that innovation can have costs as well as benefits.

125. **Advances in scientific understanding are also identifying both new problems and solutions of relevance to the GEF.** One example of the former is the increasing appreciation of the scale and impact of microplastics in the ocean, a problem known for some time, but, based on recent

[53] https://www.climatefinancelab.org/climate-finance-impact-investments/
[54] K. Georgieva and R. Shah, "How Governments Can Create A Green, Job-rich Global Recovery," Dec 4, 2020, IMF Blog, https://blogs.imf.org/2020/12/04/how-governments-can-create-a-green-job-rich-global-recovery/
[55] "Covid-19: Cold chain logistics will be big challenge in vaccinating 135 crore Indians," Indian Express, December 5, 2020, https://indianexpress.com/article/india/covid-19-coronavirus-vaccine-cold-chain-logistics-india-challenge-7053354/
[56] See, e.g., Zurich North America, "California Fires: Building Resilience from the Ashes" (December 2019), https://www.zurichna.com/-/media/project/zwp/zna/docs/kh/wildfire/california-wildfire-report.pdf
[57] GEF STAP, "Technology Critical Elements and the GEF" (November 2020), https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.C.59.STAP_.Inf_.03_Technology%20Critical%20Elements%20and%20the%20GEF.pdf

research, much more serious than had been thought.[58] A possible opportunity created by ongoing science is the effort to save damaged coral reefs by transplanting coral fragments, a process previously done on a small scale but now being applied to the Great Barrier Reef.[59] Animal science research has identified the potential for using seaweed as a dietary additive for cows that can dramatically reduce their methane production.[60]

126. **Finally, innovation can be closely related to experimentation and learning.** The 2013 IEG review of the World Bank's partnership with the GEF has the following relevant observation regarding IFC's biodiversity projects, describing them as "research and development projects and incubators for financially risky approaches to be tested and replicated if successful. Although these have generally been less successful in achieving their particular objectives of developing commercial markets for selected biodiversity services, their lower outcome ratings may reflect the naturally higher failure rate of high-risk ventures."[61]

127. **Growing opportunities for partnerships with innovation support programs.** Many multilateral development banks and development finance institutions, including GEF Agencies, have some dedicated entity for higher-risk, early-stage investment projects. While their objectives, selection criteria, and thematic focus vary, they offer growing opportunities for partnerships with access to larger public and private resources for replication and scaling. Selected examples include: IFC TechEmerge, EBRD early innovation facility, ADB Ventures, IDB Lab, AfDB SCAF, IsDB Transform Fund. Among bilateral development agencies, such programs are also increasing as in BMZ IKI, GIZ ProClima, USAID (PACE), UK CDC, Dutch Good Growth Fund.

128. Philanthropies and environmental organizations have also become more actively engaged in support for early-stage technology with promise for achieving significant environmental benefits. ClimateWorks is one of many U.S. foundations that devote some of their resources to "mission investing, making investments in addition to grants to promote their objectives."[62] While energy and climate change have received the largest share of investment, there are also initiatives addressed to biodiversity and ocean conservation, including TNC's NatureVest; Conservation International CI Ventures; and WWF Impact Ventures. A U.S. environmental organization, the Environmental Defense Fund, has a program they call the Fourth Wave, to identify and support new technologies of environmental benefit.[63] RMI (formerly the Rocky Mountain Institute) organized an international competition to develop a climate-friendly residential cooling system that can be manufactured at scale for an affordable price.[64] Within the nonprofit community, there are also

[58] P. Lindeque et al, "Are we underestimating microplastic abundance in the marine environment? A comparison of microplastic capture with nets of different mesh-size," Environmental Pollution, Oct 2020, https://doi.org/10.1016/j.envpol.2020.114721
[59] K. Warne, "Can New Science Save Coral Reefs?" National Geographic, Nov 29, 2018, https://www.nationalgeographic.com/environment/article/great-barrier-reef-restoration-transplanting-corals
[60] J. Mernit, "How Eating Seaweed Can Help Cows to Belch Less Methane," *Yale 360,* July 2, 2018, https://e360.yale.edu/features/how-eating-seaweed-can-help-cows-to-belch-less-methane
[61] World Bank IEG, *The World Bank Group's Partnership with the Global Environment Facility* (2013) (par. 5.55)
[62] https://www.climateworks.org/programs/mission-investing/
[63] https://www.edf.org/approach/fourth-wave
[64] https://www.globalcoolingprize.org

funds with broader social and development objectives such as the Global Innovation Fund and One Acre Fund with portfolios that include GEF relevant projects.

129. **Innovation in M&E.** New technologies and the analytical methods, such as geospatial approaches, are also enhancing the quality of M&E, which can further improve GEF operations and oversight. Big data and artificial intelligence are also improving predictive modeling, and large-scale forecasting is enabling both better project design and more informed M&E. One example is projects to help farmers increase their productivity through drone observations regarding the quality of soil, the presence of pests, and nutrient deficiencies on farms – measures that may be of increasing relevance in adaptation to climate-driven changes in precipitation and temperature extremes.[65] In the Western and Central Pacific fisheries case,[66] one of the main technological innovations was strengthening the vessel monitoring systems and their use for monitoring, control, and surveillance, employing a satellite-based geospatial vessel tracking platform. This platform was the world's largest international satellite–based vessel tracking program at the time of project closure (*Pacific Islands Oceanic Fisheries Management Project*, GEF ID 2131).

4.2.2 The GEF's comparative advantage in supporting innovations

130. As the experience above highlights, the GEF's comparative advantage in supporting innovation lies in its established willingness to provide grant funding, bridging the gap between the proof of concept and the demonstrated practical applications and bringing innovations to the point when the risk of investment is low enough for the governments, multilateral development banks, or the private sector to consider lending. Some interviewees noted the connection between the GEF's support to such projects and its track record in driving transformative change. Several interviewees from the GEF's Implementing Agencies mentioned that most innovative projects within their agency started with a GEF project. Some pointed out that the GEF enables innovations which otherwise would not be attempted.

(a) The GEF helps create an enabling policy and regulatory environment in recipient countries and links environmental objectives with economic activities. The GEF supports technological, business, and financial innovations with policy and institutional reforms.

(b) The GEF has a long track record working with a wide range of stakeholders (including communities, businesses, academia, and government) and promotes participatory approaches, often involving stakeholder decision making from the early stages of project design through its implementation. This also has a positive impact on sustainability.

(c) The GEF supports both cutting-edge and well-known technologies, the latter often to help less developed countries in improving productivity and livelihoods while benefiting the environment. Across focal areas, the GEF supports alliances between science,

[65] B. Okpe, Integrating Big Data Analytics and Artificial Intelligence into Monitoring and Evaluation in a Fast-Changing Development Landscape, *eVLAUation Matters,* second quarter 2020, 33–41, https://idev.afdb.org/sites/default/files/documents/files/eVALUation%20Matters%20Magazine%20Q2-2020%20%28EN%29.pdf

[66] GEF IDs 530, 2131, 4746.

communities, and businesses to achieve sustainable application of advanced technologies and approaches.

(d) The GEF allows for adaptive and flexible project and program management. Compared with other institutions interviewed, the GEF gives the executing and implementing agencies some autonomy to revise the scope and budgets of project components, within limits, as long as they remain consistent with project objectives. However, applying adaptive management is not always easy and takes time. There is a space for more explicit encouragement of adaptive management in the context of innovative interventions.

(e) Knowledge and learning are essential to understanding the process and outcomes of innovations as well as for scaling up. Communities of practice and knowledge and learning platforms incorporated in some focal areas (IW:LEARN in international waters) and some programmatic approaches (e.g. integrated programs) have been effective in facilitating knowledge exchange. These will play an important role in facilitating exchange between practitioners implementing projects and programs across countries and regions.

4.2.3 Obstacles to Innovation and mitigation strategies

131. While there are many positive examples, there have been obstacles to innovation or missed opportunities, where the GEF was well positioned to support innovation but for some reason did not. These obstacles appear to be related to GEF practices in relation to innovative projects. Several interviewees noted that innovative approaches and ideas are sometimes difficult to get approved through the review mechanisms of the GEF, Agencies and Ministries, as these projects are perceived to have higher risk. Hence agencies are more likely to submit projects which have higher chances of approval, discouraging innovation. Innovative projects, that may be associated with more risk, sometimes require more time, efforts in preparation, supervision and implementation. The selection and evaluation criteria for these projects needs greater clarity.

132. Related to the criteria for selecting innovative projects, another obstacle to innovation is that the level of effort involved in preparing and implementing large and small projects remains ostensibly the same, independent of the funding volume. This could potentially discourage innovative projects, especially small pilot projects.

133. While the GEF has been proficient at supporting innovation in its early stages, it has sometimes missed the opportunity to replicate and scale-up successful innovations and pilots. While sustainable financing is one impediment, the limited knowledge sharing from innovative projects has been an obstacle to learning from previous failures and successes. Rapid dissemination of outcomes through a variety of knowledge platforms and instruments is needed.

4.3 Recommendations for Mitigating Obstacles to Innovation

Drawing on the various sources of evidence and interviews, this evaluation recommends the following measures to mitigate some of the obstacles to innovation.

134. Since many innovations involve risks, the GEF Secretariat should continuously monitor the risk across the GEF portfolio. The GEF Council, together with the GEF Secretariat and STAP, should,

based on such assessment, identify an acceptable risk tolerance level for the GEF portfolio. This risk tolerance level should be clearly communicated to the Agencies along with clarity on defining an innovative project and the criteria for selection of innovative projects.

135. The GEF should continue to explore and partner with innovation support programs that may mobilize larger sources of risk capital, and should explicitly encourage adaptive, flexible management of innovative interventions. This could include a separate funding window for innovative projects, as well as adaptive management and flexible funding, such as a contingency component.

136. The GEF must require monitoring, mid term reviews, evaluation, and knowledge sharing in all innovative projects, regardless of project size. Regular monitoring and mid-term reviews should be required for innovative projects of all sizes, to allow for learning and adapting as needed in time, and lessons should be captured and shared widely to understand factors underpinning success or failure, prior to scaling up or replication.

Annex I: METHODOLOGY TO DETERMINE THE SAMPLE PORTFOLIO OF INNOVATIVE PROJECTS AND CASE STUDY PROJECTS

Determining the Sample Portfolio of Innovative Projects

The entire database of 1,706 terminal evaluations, available as of May 2020, was text mined in R for keywords on innovation which would reflect a project's explicit support to innovation in its design or outcomes. This follows an accepted practice in evaluation methodology in the absence of a clearly defined portfolio of GEF innovative projects. This approach allows us to objectively describe the typology of innovation across the entire GEF portfolio of closed projects and assess innovation results with respect to value addition and transformational change and to identify the factors that influence these results.

The key words and word combinations were identified from the literature on innovation and GEF document review. The initial list of key words: pilot*; innov*; new_technolog*; experiment*; improv_product*; improv_institut*; new_law*; new_institut*; frontier*; new_product*; improv_technolog*; new_market*; improv_legal*; new_model*; patent*; improv_market*; forefront*; improv_process*; new_legal*; new_partner*; improv_law*; new_process*; improv_model*; improv_organiz*; new_organiz*; new_bill*; new_organis*; improv_organis*; improv_bill*; diffus_model*; diffus_technolog*; demonst*; improv_partner*; diffus_institut*; new_polic*; diffus_process*; diffus_market*; diffus_partner*; diffus_organis*.

The list was refined based on the feedback provided by internal and external peer reviewers during the IEO quality assurance process for this study. The list was also refined based on the initial screening of the results of the text mining to reduce the level of noise to make sure the list generates projects that explicitly supported innovation in its design or outcomes. The final list of key words: new_approach*; new_bill*; new_institut*; new_law*; new_legal*; new_market*; new_model*; new_organis*; new_organiz*; new_partner*; new_polic*; new_process*; new_product*; new_technolog*; innov*; demonst*; diffus_approach*; diffus_institut*; diffus_market*; diffus_model*; diffus_organis*; diffus_partner*; diffus_process*; diffus_technolog*; experiment*; forefront*; frontier*; patent*.

This search identified 1486 terminal evaluations with at least one mention of key words. To narrow down the list the list, the team selected 100 closed projects with the highest number of key words. Each of these projects were reviewed by the team to identify innovation. Out of 100, 1 project was not used for further analysis as it did not involve innovations – the terminal evaluation was referring to the project as not innovative and having missed opportunities to innovate. Thus, the overall sample of closed projects selected for the review is 99.

Comparison of the sample of innovative projects with the universe (all completed GEF projects with terminal evaluations, available as of May 2020)

By replenishment:

GEF Phase	All completed GEF projects, #	Selected projects, #	% of Selected within the GEF Phase
0 - Pilot Phase	78	2	3%
GEF – 1	112	5	4%
GEF – 2	301	6	2%
GEF – 3	481	31	6%
GEF – 4	573	39	7%
GEF – 5	156	14	9%
GEF – 6	5	2	40%
TOTAL	**1,706**	**99**	**6%**

By focal area:

Focal Area	All completed GEF projects, #	Selected projects, #	% of Selected within focal area
Biodiversity	**666**	**32**	**5%**
Climate change	**496**	**29**	**6%**
Chemicals*	**104**	**2**	**2%**
International waters	**155**	**13**	**8%**
Land degradation	**125**	**14**	**11%**
Multi-focal	**160**	**9**	**6%**
TOTAL	**1,706**	**99**	**6%**

*Chemicals includes Chemicals, POPs, and ODS focal area projects

By size:

Project size	All completed GEF projects, #	Selected projects, #	% of Selected sample within size category
Full sized	1,098	67	6%
Medium sized	608	32	5%
TOTAL	1,706	99	6%

By region:

Region	All completed GEF projects, #	Selected projects, #	% of Selected within Region
AFR	461	25	5%
Asia	449	31	7%
ECA	291	16	5%
LAC	364	10	3%
Global	141	17	12%
TOTAL	1,706	99	6%

Projects nominated by GEF Agencies and GEF Secretariat

In parallel, the evaluation team sought nominations across the GEF partnership for innovative projects. One hundred and seventy-two nominations were received, and of these 55 projects had terminal evaluations. Each of these projects were reviewed by the team to identify innovation. The remaining are ongoing projects for which results were not available. Twenty-five projects from the nominated list were included in the evaluation: eighteen were included in the portfolio based on the procedure for selection of the sample portfolio of closed projects; and nine were included in the case studies using the selection criteria for case studies.

Nominated projects and projects selected for case studies and sample portfolio review

GEF Phase	All nominated projects, #	Nominated and have terminal evaluation, #	Nominated and selected for the portfolio review and/or case study, #	Selected for case studies and/or portfolio review; % of nominated with terminal evaluation
GEF - 2	8	8	2	25%
GEF - 3	10	9	3	33%
GEF - 4	24	17	5	29%
GEF - 5	54	18	13*	72%
GEF - 6	47	3	2**	67%
GEF - 7	29	0	0**	0%
Grand Total	172	55	25	45%

*Some case studies consisted of several projects that have been implemented as a sequence or as a part of a program. Two ongoing projects (GEF ID 4746 and 5561) were part of case studies in which other projects have terminal evaluations.

** Please note that only projects with available evaluative evidence were the main focus of the sample portfolio review and case studies. Innovations at the design stage of the ongoing projects was analyzed as quality-at-entry review of child projects related to GEF-6 and GEF-7 Integrated Approach Pilots (IAPs) and Impact Programs (IPs). Altogether 31 IAP child projects and 43 IP child projects were analyzed.

Selection of case studies

For 17 projects an in-depth case study analysis was undertaken to analyze the results and the factors influencing innovation These projects were selected from the sample portfolio and projects

nominated by GEF Agencies and GEF Secretariat using the following criteria (1) presence of innovation according to this study's definition; (2) demonstrated effectiveness and achieved results associated with the innovation, with attention to the availability and quality of evaluative evidence; (3) a purposive sample to illustrate a diversity of innovation types, GEF focal areas and regions. The analysis of case studies was based on document reviews (project implementation forms (PIFs), project proposals, terminal evaluations, post-completion evaluations, as available), and interviews with project implementation staff and client counterparts. Five projects each were from the GEF-5 and GEF-2 periods, four each were from the GEF-4 and GEF-3 periods. The list of cases selected for the study is presented in Annex II.

Annex II: CASES SELECTED FOR THE STUDY

Table A: List of cases selected for the study*

Short case name	GEF ID	Project title	GEF Agency	Focal area	Size	Country/ countries	Years (CEO approval/ endorsement – project completion)		GEF grant**	Cofinancing	
										promised	actual
									(USD mln.)		
Armenia EE	3973	Armenia Energy Efficiency Project	WB	CC	FSP	Armenia	2012	2016	1.91	8.84	9.5
Benin Forests	793	Program for the Management of Forests and Adjacent Lands	WB	MFA	FSP	Benin	2006	2013	6.3	16.35	18
	5215	GGW: Forests and Adjacent Lands Management Project					2013	2018	5.56	46.45	11.04
Brazil SLM	2373	Sustainable Land Management in the Semi-Arid Sertao	IFAD	LD	FSP	Brazil	2005	2013	6.243	9.2	9.4
Burundi coffee	4631	Watershed Approach to Sustainable Coffee Production in Burundi	WB	MFA	FSP	Burundi	2013	2018	4.2	20.8	
China Hai River Basin	1323	Hai River Basin Integrated Water Resources Management	WB	IW	FSP	China	2004	2010	17.35	112.99	
	5561	GEF Mainstreaming Integrated Water and Environment Management					2016	2021	9.5	95	
China POPs	2926	Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes	UNIDO	CW	FSP	China	2009	2018	10.19	32.1	79.9
Global BGBD	1224	Conservation and Sustainable Management of Below Ground Biodiversity (BGBD), Phase I	UNEP	BD	FSP	Global: Brazil, Cote d'Ivoire, India, Indonesia, Kenya, Mexico, Uganda	2002	2007	5.296	9	4.863
	2342	Conservation and Sustainable Management of Below Ground Biodiversity (BGBD), Phase II					2006	2010	4.007	4.197	6.644
India SLEM	3470	SLEM/CPP: Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management	WB	MFA	FSP	India	2009	2014	7.34	88	
Jordan CCA	4036	TT-Pilot (GEF-4) DHRS: Irrigation Technology Pilot Project to face Climate Change Impact	IFAD	CC	FSP	Jordan	2009	2018	2.15	5.52	6.12
Mexico BRT	1155	Introduction of Climate Friendly Measures in Transport	WB	CC	FSP	Mexico	2002	2009	6.125	1	3.8
Mongolia SLM	5700	Land Degradation Offset and Mitigation in Western Mongolia	UNDP	LD	MSP	Mongolia	2015	2019	1.29	5.28	4.43
Pacific Tuna / Western and Central Pacific (WCP) Fisheries	530	Implementation of the Strategic Action Programme (SAP) of the Pacific Small Island Developing States	UNDP			Regional: Cook Islands, Fiji, Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Samoa	2000	2005	12.29	8.1184	
	2131	Pacific Islands Oceanic Fisheries Management Project				Regional: Cook Islands, Fiji, Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Palau, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Samoa	2005	2011	11.644	79.09	136.4
	4746	Implementation of Global and Regional Oceanic Fisheries Conventions and Related Instruments in the Pacific Small Island Developing States (SIDS)	UNDP/ FAO	IW	FSP	Regional: Cook Islands, Fiji, Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Palau, Solomon Islands, Tonga, Tuvalu, Vanuatu, Samoa	2014	2021	10	84.934	
SA CAPE	1055	CAPE Agulhas Biodiversity Initiative (ABI)	UNDP	BD	FSP	South Africa	2003	2010	3.227	8.56	29.97

***Sources of information: GEF IEO APR 2020 dataset for completed projects; GEF Portal – for ongoing projects (GEF IDs 5561, 4746).**

****GEF Grant amount includes project preparation grant but excludes associated Agency fees**

Annex III: SAMPLE PORTFOLIO OF CLOSED INNOVATIVE PROJECTS

GEF ID	Project Name	Lead Agency	Country	Region	Size	Trust Fund	Focal Area	Phase	Project Start (APR2020)	Project Completion (APR2020)	GEF Project Preparation Grant (million USD) (APR2020)	GEF Project Grant (million USD) (APR2020)	Cofinancing Promised (million USD) (APR2020)	Cofinancing Actual (million USD) (APR2020)
61	Biodiversity Protection	WB	Ecuador	LAC	FSP	GET	BD	Pilot Phase	1994	2000	0.32	7.2	1.5	0.37
357	Institutional Support for the Protection of East African Biodiversity	UNDP	Regional	AFR	FSP	GET	BD	Pilot Phase	1992	1996		10		
142	Global - People, Land Management, and Environmental Change (PLEC)	UNEP	Global	Global	FSP	GET	BD	GEF - 1	1998	2002	0.1	6.176	4.82	
260	Southern Africa Biodiversity Support Programme	UNDP	Regional	AFR	FSP	GET	BD	GEF - 1	2000	2007	0.022	4.48	4.84	4.84
261	Capacity Building for the Rapid Commercialization of Renewable Energy	UNDP	China	Asia	FSP	GET	CC	GEF - 1	1999	2006	0.025	8.802	18.851	
406	Regional - African NGO-Government Partnership for Sustainable Biodiversity Action	UNDP	Regional	AFR	FSP	GET	BD	GEF - 1	1998	2003	0.214	4.33	7.12	7.476
410	Conservation of Wetland and Coastal Ecosystems in the Mediterranean Region	UNDP	Regional	Asia	FSP	GET	BD	GEF - 1	1999	2006	0.162	13.273	26.32	20.57
6	Hydrogen Fuel Cell Buses for Urban Transport	UNDP	Brazil	LAC	FSP	GET	CC	GEF - 2	2002	2015		12.27	9.17	6.6
15	Programme for Phasing Out Ozone Depleting Substances	JOINT	Tajikistan	ECA	MSP	GET	Chem	GEF - 2	2000	2006	0.17	0.9	0.19	0.24
776	Conservation and Sustainable Use of Medicinal Plants in Arid and Semi-Arid Ecosystems	UNDP	Egypt	AFR	FSP	GET	BD	GEF - 2	2002	2010	0.17	4.117	4.77	3.36
855	Establishment of the Nuratau-Kyzylkum Biosphere Reserve as a Model for Biodiveristy Conservation	UNDP	Uzbekistan	ECA	MSP	GET	BD	GEF - 2	2001	2007	0.025	0.725	0.66	0.65
1224	Global (Brazil, Cote d'Ivoire, India, Indonesia, Kenya, Mexico, Uganda) - Conservation and Sustainable Management of Below Ground Biodiversity, Phase I	UNEP	Global	Global	FSP	GET	BD	GEF - 2	2002	2007	0.273	5.023	9	4.86

2342	Conservation and Sustainable Management of Below Ground Biodiversity, Tranche 2	UNEP	Global	Global	FSP	GET	BD	GEF - 2	2006	2010		4	4.197	6.644
1024	Ecosystems, Protected Areas and People	UNEP	Global	Global	MSP	GET	BD	GEF - 3	2003	2006	0.025	0.975	4.61	4.22
1025	In Situ/On Farm Conservation and Use of Agricultural Biodiversity (Horticultural Crops and Wild Fruit Species) in Central Asia	UNEP	Regional	ECA	FSP	GET	BD	GEF - 3	2006	2014	0.38	5.72	6.15	14.65
1045	Biodiversity Protection in North Vidzeme Biosphere Reserve	UNDP	Latvia	ECA	FSP	GET	BD	GEF - 3	2004	2009	0.25	2.661	10.74	59.67
1053	Sustainable Management of Globally Significant Endemic Ruminant Livestock of West Africa	UNDP	Regional	AFR	FSP	GET	BD	GEF - 3	2007	2015	0.495	10	36.586	39.2
1055	CAPE Agulhas Biodiversity Initiative (ABI)	UNDP	South Africa	AFR	FSP	GET	BD	GEF - 3	2003	2010	0.079	3.148	8.56	29.97
1148	In-Situ Conservation of Kazakhstan Mountain Biodiversity	UNDP	Kazakhstan	ECA	FSP	GET	BD	GEF - 3	2005	2012	0.253	2.77	19.55	32.71
1149	Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply	UNDP	Kazakhstan	ECA	FSP	GET	CC	GEF - 3	2006	2011	0.262	3.3	7.18	54.879
1229	EBRD/GEF Environmental Credit Facility (formerly entitled Slovenia: National Pollution Reduction Project)	WB	Slovenia	ECA	FSP	GET	IW	GEF - 3	2006	2008	0.087	9.9	48.91	58.44
1254	Integrating Watershed and Coastal Area Management (IWCAM) in the Small Island Developing States of the Caribbean	UNEP	Caribbean	LAC	FSP	GET	IW	GEF - 3	2005	2011	0.608	13.783	98.27	5.7
1258	Enhancing Conservation of the Critical Network of Sites of Wetlands Required by Migratory Waterbirds on the African/Eurasian Flyways.	UNEP	Global	Global	FSP	GET	BD	GEF - 3	2006	2010	0.35	6	6.195	5.033
1268	Effective Management of the National Protected Areas System	UNDP	Zambia	AFR	FSP	GET	BD	GEF - 3	2005	2012	0.334	6	35.168	38.7
1323	CN - GEF-Hai Basin Integr. Wat. Env.Man.	WB	China	Asia	FSP	GET	IW	GEF - 3	2004	2010	0.35	17	112.99	
1361	Generation and Delivery of Renewable Energy Based Modern Energy Services in Cuba; the case of Isla de la Juventud	UNEP	Cuba	LAC	FSP	GET	CC	GEF - 3	2005	2014	0.325	5.3	10.704	7.45

1609	Renewable Energy Enterprise Development - Seed Capital Access Facility	UNEP	Global	Global	FSP	GET	CC	GEF - 3	2008	2018	0.3	8.4	54.62	22.35
2052	Sustainable Management of Inland Wetlands in Southern Africa: A Livelihoods and Ecosystem Approach	UNEP	Regional	AFR	MSP	GET	LD	GEF - 3	2005	2009	0.025	0.975	1.1448	1.21072
2108	Philippines Sustainable Energy Finance Program	WB	Philippines	Asia	FSP	GET	CC	GEF - 3	2009	2015		5.3	28.53	
2257	Demonstration for Fuel-Cell Bus Commercialization in China (Phase II)	UNDP	China	Asia	FSP	GET	CC	GEF - 3	2007	2012		5.767	12.86	12.85
2354	Forest Protection and Reforestation	WB	Kazakhstan	ECA	FSP	GET	LD	GEF - 3	2007	2015		5	58.8	58.8
2356	BR GEF-Sao Paulo Riparian Forests	WB	Brazil	LAC	FSP	GET	LD	GEF - 3	2005	2011		7.8	11.77	14.02
2373	Sustainable Land Management in the Semi-Arid Sertao	IFAD	Brazil	LAC	FSP	GET	LD	GEF - 3	2007	2013	0.3	5.943	9.2	9.4
2377	Sustainable Land Management in the High Pamir and Pamir-Alai Mountains - and Integrated and Transboundary Initiative in Central Asia Phase I	UNEP	Regional	ECA	FSP	GET	LD	GEF - 3	2007	2012	0.65	3	6.6974	6.69309
2444	Biodiversity Conservation and Rural Livelihoods Improvement	WB	India	Asia	FSP	GET	BD	GEF - 3	2011	2018	0.33	8.14	22.88	3.17
2589	Institutionalizing Payments for Ecosystem Services	UNDP	Global	Global	FSP	GET	BD	GEF - 3	2007	2011	0.457	5.317	12.03	13.54
2634	Guangxi Integrated Forestry Development and Biodiversity Conservation	WB	China	Asia	FSP	GET	BD	GEF - 3	2007	2012		5.25	199.35	354.27
2648	Capacity Building for the Implementation of the National Biosafety Framework	UNEP	Tunisia	AFR	MSP	GET	BD	GEF - 3	2007	2014		0.9	0.92	0.68
2740	CACILM CPP: Achieving Ecosystem Stability on degraded land in Karakalpakstan and the Kyzylkum Desert	UNDP	Uzbekistan	ECA	MSP	GET	LD	GEF - 3	2007	2012	0.05	1	2.665	1.075
2743	CACILM CPP: Demonstrating Sustainable Mountain Pasture Management in the Susamyr Valley, Kyrgyzstan	UNDP	Kyrgyz Republic	ECA	MSP	GET	LD	GEF - 3	2007	2013	0.025	1	0.989	0.423
2822	Support the Implementation of the National Biosafety Framework	UNEP	Mauritius	AFR	MSP	GET	BD	GEF - 3	2007	2011		0.4	0.208	0.208
2950	Lighting the "Bottom of the Pyramid"	WB	Regional	AFR	FSP	GET	CC	GEF - 3	2007	2013		5.4	6.75	

3012	Support the Implementation of the National Biosafety Framework	UNEP	Tanzania	AFR	MSP	GET	BD	GEF - 3	2007	2012		0.8	0.614	0.67375
3356	CPP Namibia: Sustainable Land Management Support and Adaptive Management (CPP NAM SLM SAM)	UNDP	Namibia	AFR	FSP	GET	LD	GEF - 3	2007	2012	0.25	7	34.35	
2184	SIP: Stimulating Community Initiatives in Sustainable Land Management (SCI-SLM)	UNEP	Regional	AFR	MSP	GET	LD	GEF - 4	2009	2014	0.025	0.9	0.948	
2615	National Grasslands Biodiversity Program	UNDP	South Africa	AFR	FSP	GET	BD	GEF - 4	2008	2013	0.35	8.3	37.262	112.462
2632	MENARID: Participatory Control of Desertification and Poverty Reduction in the Arid and Semi Arid High Plateau Ecosystems of Eastern Morocco	IFAD	Morocco	AFR	FSP	GET	MFA	GEF - 4	2009	2015	0.35	5.998	19.089	22.32
2751	SFM Rehabilitation and Sustainable Use of Peatland Forests in South-East Asia	IFAD	Regional	Asia	FSP	GET	MFA	GEF - 4	2009	2014	0.34	4.3	10.799	23.24
2806	Promoting Payments for Environmental Services (PES) and Related Sustainable Financing Schemes in the Danube Basin	UNEP	Regional	ECA	MSP	GET	BD	GEF - 4	2009	2014	0.025	0.96	1.35	2.94
2926	Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes	UNIDO	China	Asia	FSP	GET	Chem	GEF - 4	2009	2018	0.23	9.96	32.1	79.9
2951	Energy Efficiency Financing	WB	China	Asia	FSP	GET	CC	GEF - 4	2008	2016		13.5	580.1	1427
3028	SFM Safeguarding and Restoring Lebanon's Woodland Resources	UNDP	Lebanon	Asia	MSP	GET	LD	GEF - 4	2008	2014		0.98	1.28	13.43
3138	Applying an Ecosystem-based Approach to Fisheries Management: Focus on Seamounts in the Southern Indian Ocean	UNDP	Global	Global	MSP	GET	IW	GEF - 4	2009	2013	0.05	0.95	5.64	5.974
3223	WB/GEF POL: Shanghai Agricultural and Non-Point Pollution Reduction project (SANPR) - under WB/GEF Strategic Partnership Investment Fund for Pollution Reduction in the LME of East Asia	WB	China	Asia	FSP	GET	IW	GEF - 4	2010	2015	0.21	4.79	29.89	25.09
3309	Participatory Planning and Implementation in the Management of Shantou Intertidal Wetland	UNEP	China	Asia	MSP	GET	IW	GEF - 4	2007	2011		0.4	0.52	0.52
3373	SIP: Watershed Management	WB	Madagascar	AFR	FSP	GET	LD	GEF - 4	2011	2014	0.325	5.9	34.4	28.8

3396	SIP: Improving Policy and Practice Interaction through Civil Society Capacity Building	UNDP	Regional	AFR	FSP	GET	LD	GEF - 4	2013	2015	0.08	1.74	3.6	
3445	SFM: Integrated Community-based Forest and Catchment Management through an Ecosystem Service Approach (CBFCM)	UNDP	Thailand	Asia	FSP	GET	MFA	GEF - 4	2012	2017	0.06	1.76	12.56	
3457	Global Market Transformation for Efficient Lighting	UNEP	Global	Global	FSP	GET	CC	GEF - 4	2010	2015	0.2	5	12	12.068
3470	SLEM/CPP: Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management	WB	India	Asia	FSP	GET	MFA	GEF - 4	2009	2014		7.34	88	
3517	Catalyzing Sustainability of Thailand's Protected Area System	UNDP	Thailand	Asia	FSP	GET	BD	GEF - 4	2012	2016	0.09	3.36	14.2	16.47
3537	Mexico Rural Development	WB	Mexico	LAC	FSP	GET	CC	GEF - 4	2010	2018		10.5	157.8	348.952
3541	TT-Pilot (GEF 4): Phase Out HCFCs and Promotion of HFC-free Energy Efficient Refrigeration and Air-Conditioning Systems in the Russian Federation Through Technology Transfer	UNIDO	Global	ECA	FSP	GET	MFA	GEF - 4	2011	2018	0.18	18	40	45.42
3606	Expanding and Diversifying the National System of Terrestrial Protected Areas	UNDP	Philippines	Asia	FSP	GET	BD	GEF - 4	2010	2015		3.5	7.5361	5.627
3608	PRC-GEF Partnership: Sustainable Development in Poor Rural Areas	WB	China	Asia	FSP	GET	MFA	GEF - 4	2010	2015	0.28	4.27	154.9	152.57
3627	SFM: Promotion of Sustainable Forest and Land Management in the Vietnam Uplands	IFAD	Vietnam	Asia	MSP	GET	MFA	GEF - 4	2010	2013	0.1	0.65	4.98	5.83
3628	MENARID: Cross Cutting M & E Functions and Knowledge Management for INRM within the MENARID Programme Framework	IFAD	Regional	Asia	MSP	GET	LD	GEF - 4	2010	2014	0.06	0.7	1.6	1.01
3645	MENARID: Reducing Risks to the Sustainable Management of the North West Sahara Aquifer System (NWSAS)	UNEP	Regional	AFR	MSP	GET	IW	GEF - 4	2010	2015	0.04	1	2.23	2.26
3682	Developing an Experimental Methodology for Testing the Effectiveness of Payments for Ecosystem Services to Enhance Conservation in Productive Landscapes in Uganda	UNEP	Uganda	AFR	MSP	GET	BD	GEF - 4	2010	2014	0.03	0.87	1.2324	1.3935

3689	Adaptation to the effects of drought and climate change in Agro-ecological Zone 1 and 2 in Zambia	UNDP	Zambia	AFR	FSP	LDCF	CC	GEF - 4	2012	2015	0.1	3.8	9.804	0.77
3716	Integrating Adaptation to Climate Change into Agricultural Production and Food Security	IFAD	Sierra Leone	AFR	FSP	LDCF	CC	GEF - 4	2012	2017	0.1	2.7	8.63	0.15
3766	Testing a Prototype Caribbean Regional Fund for Wastewater Management (CReW)	IDB	Regional	LAC	FSP	GET	IW	GEF - 4	2011	2017	0.38	20	251.7	600.003
3807	Project for Ecosystem Services (ProEcoServ)	UNEP	Global	Global	FSP	GET	BD	GEF - 4	2010	2015	0.07	6.3	19.62	25.92
3811	International Commission on Land Use Change and Ecosystems	UNEP	Global	Global	MSP	GET	BD	GEF - 4	2008	2010		1	1	1.1
3900	MENARID: GEF IW LEARN: Strengthening IW Portfolio Delivery and Impact	UNEP	Global	Global	FSP	GET	IW	GEF - 4	2011	2014	0.22	4.095	5.205	5.205
3907	Technology Needs Assessments	UNEP	Global	Global	FSP	SCCF	CC	GEF - 4	2009	2013		8.18	2.86	2.86
3932	Mainstreaming Biodiversity in Silvo-Pastoral and Rangeland Landscapes in the Pockets of Poverty of Jordan	IFAD	Jordan	Asia	MSP	GET	BD	GEF - 4	2013	2017	0.08	1	3.3	3.3
3973	Armenia Energy Efficiency Project	WB	Armenia	ECA	FSP	GET	CC	GEF - 4	2012	2016	0.09	1.82	8.84	9.5
4036	TT-Pilot (GEF-4) DHRS: Irrigation Technology Pilot Project to face Climate Change Impact	IFAD	Jordan	Asia	FSP	SCCF	CC	GEF - 4	2012	2018	0.15	2	5.52	6.12
4037	TT-Pilot (GEF-4): Overcoming Policy, Market and Technological Barriers to Support Technological Innovation and South-South Technology Transfer: The Pilot Case of Ethanol Production from Cassava	UNIDO	Thailand	Asia	FSP	GET	CC	GEF - 4	2012	2018	0.1	2.6	31.62	31.7
4092	WB/GEF POL: Huai River Basin Marine Pollution Reduction	WB	China	Asia	FSP	GET	IW	GEF - 4	2012	2015		5	32.83	40.9
4254	Mitigation Options of Greenhouse Gas (GHG) Emissions in Key Sectors in Brazil	UNEP	Brazil	LAC	FSP	GET	CC	GEF - 4	2013	2018	0.05	4.18	11.993	14.4556
4257	The GEF Earth Fund: IFC Earth Fund Platform	WB	Global	Global	FSP	GET	MFA	GEF - 4	2008	2014		30	90	1028
4368	Promoting a Value Chain Approach to Climate Change Adaptation In Agriculture in Ghana	IFAD	Ghana	AFR	FSP	SCCF	CC	GEF - 5	2012	2017	0.1	2.5	8.99	0.07

4488	Green Energy Schemes for Low-Carbon City in Shanghai, China	WB	China	Asia	FSP	GET	CC	GEF - 5	2013	2018		4.345	251.66	
4514	Greening the COP17 in Durban	UNIDO	South Africa	AFR	MSP	GET	CC	GEF - 5	2011	2012		1	1.35	1.46
4690	Capturing Coral Reef and Related Ecosystem Services (CCRES)	WB	Regional	Asia	FSP	GET	IW	GEF - 5	2013	2018		4.5	55.62	
4856	Oceans Finance Facility to Finance Effective Management and Transitional Reform of OceanicFisheries. N.B. Retitled at PPG stage to: Ocean Partnerships for Sustainable Fisheries and Biodiversity Conservation - Models for Innovation and Reform (P128437)	WB	Global	Global	FSP	GET	MFA	GEF - 5	2014	2018	0.35	9.17	80	56.53
5110	LME-EA: Applying Knowledge Management to Scale up Partnership Investments for Sustainable Development of Large Marine Ecosystems of East Asia and their Coasts	WB	Regional	Asia	MSP	GET	IW	GEF - 5	2013			1	1.25	
5145	GEF UNIDO Cleantech Programme for SMEs	UNIDO	Armenia	ECA	MSP	GET	CC	GEF - 5	2013	2016		0.55	2.6	
5146	Cleantech Program for SMEs in Malaysia	UNIDO	Malaysia	Asia	MSP	GET	CC	GEF - 5	2013	2017		0.99	3	2.27
5218	Cleantech Programme for SMEs in India	UNIDO	India	Asia	MSP	GET	CC	GEF - 5	2013	2016		1	3	0
5505	GEF UNIDO Cleantech Programme for SMEs in Turkey	UNIDO	Turkey	ECA	MSP	GET	CC	GEF - 5	2013	2018		0.99	2.95	0.1
5508	Transforming the Global Shipping Industry Reducing Emissions from international maritime transport through improved Energy Efficiency	UNDP	Global	Global	MSP	GET	IW	GEF - 5	2015	2018	0.1	1.9	11.876	17.1
5515	GEF UNIDO Cleatech Programme for SMEs in South Africa	UNIDO	South Africa	AFR	MSP	GET	CC	GEF - 5	2013	2018		1.99	6	
5553	GEF UNIDO Cleantech Programme for SMEs in Pakistan	UNIDO	Pakistan	Asia	MSP	GET	CC	GEF - 5	2013	2018		1.37	4	4
5700	SLM Offset in Western Mongolia	UNDP	Mongolia	Asia	MSP	GET	LD	GEF - 5	2015	2019		1.29	5.28	4.43
9112	The Ten Island Challenge: Derisking the Transition of the Caribbean from Fossil Fuels to Renewables	UNDP	Regional	LAC	MSP	GET	CC	GEF - 6	2016	2019	0.05	1.776	304.55	

9329	Scaling up the SE4ALL Building Efficiency Accelerator (BEA)	UNEP	Global	Global	MSP	GET	CC	GEF - 6	2016	2017		2	8.27	7.22009

Annex IV: LITERATURE REVIEW

Background and Definition

The essential role of innovation in preserving the environment and in the context of sustainability was recognized in the seminal Club of Rome's "Limits to Growth" report (Meadows et al. 1972, referenced in Horbach et al. 2018). Since then the research on eco-innovation has evolved substantively stemming from various policy, business, and academic disciplines ranging from environmental policy, environmental economics, evolutionary economics, industrial ecology, the corporate environmental strategy literature among others.

While many definitions of eco-innovation exist (see, for example, Kemp and Pearson 2007; Schiederig et al. 2011; Tariq et al. 2017), the distinctive feature of eco-innovation is the environmental performance. Essentially, eco-innovation is any innovation that leads to reduction in the use of natural resources, decrease in the release of the harmful substances across the whole lifecycle, and a wider change with systemic implications for the economy and society in relations to the environmental benefits (Eco-Innovation Observatory 2011).

The literature uses several terms to describe innovations that produce environmental impacts: "green", "eco", "environmental", and "sustainable". Some authors distinguish between the first three terms and the "sustainable" innovation, as the former embrace the ecological and economical aspects of sustainability, while the latter also includes social aspects (Horbach 2018; Diaz-Garcia et al. 2015; Schiederig et al. 2012.). At the same time, other authors use all four terms interchangeably (Tariq et al. 2017).

There are several characteristics that distinguish eco-innovation from general innovation. Rennings (2000), identified three such characteristics: *the double externality problem, the regulatory push/pull effect, and the increasing importance of social and institutional innovation*. First, the double externality problem implies that in addition to knowledge externalities faced by general innovations, eco-innovations face the negative externality of pollution. The double externality reduces incentives for development and adoption of eco-innovation, and therefore requires coordination between innovation and environmental policy measures. Next, the regulatory push/pull effect means that the regulatory framework has a strong impact on eco-innovation compared to traditional technological innovations (such as microelectronics and telecommunications). Lastly, Rennings notices that social innovations (e.g. changes in lifestyle and consumer behavior), as well as institutional innovations (ranging from local networks to global organizations) are increasingly important forms of eco-innovation in view of the global environmental challenges (Rennings 2000).

Horbach et al. (2012) in their analysis of one of the most well-known definitions of eco-innovation by Kemp and Pearson (2007) identify the following important characteristics of eco-innovation: 1) it is based on a subjective view of innovation (i.e. innovation is new to the organization/user (developing or adopting it), and therefore the *emphasis is on the adoption and diffusion*; 2) it considers implemented innovations, rather than planned activities (i.e. it *emphasizes the results rather than the motivation*). This approach avoids the discussion whether the innovation was initiated/adopted as a result of environmental motivation – it does not matter of the initial motivation for the uptake is environmental. (Carlillo-Hermosilla et al. 2010); 3) it relates

environmental impacts to the state of the art (i.e. it *results in improved environmental outcomes compared to the relevant conventional alternatives*).

Rationale for supporting innovation: market failure and system failure perspectives

Traditionally, in discussing the rationale for the public and international support for innovation, the literature examines market failures, such as the inefficient allocation of resources in markets when innovators fail to capitalize the benefits of innovations due to the public good nature of knowledge and environment (Chamsuk 2018). Therefore, fostering innovation implies the need to address market failures though support measures, such as market instruments that put a price on environmental externalities, as well as support for knowledge exchange and cooperation (OECD 2011).

At the same time, innovation can be viewed from the system perspective, where innovation is situated in conditions that enable and hinder the creation, storage, and transfer of technologies, practices, products, and services (Chamsuk 2018). In this case, the rationale for the support for innovation may stem from the need to address system failures that reduce the overall effectiveness of the innovation effort. For example, Arnold (2004, quoted in OECD 2011) identified the following types of system failure:

- Capacity failures (such as managerial deficits, or lack of learning or technical knowledge to use the externally generated innovation)
- Institutional failures (failures to reconfigure universities and research centers to ensure their effective work within the innovation system)
- Network failures (problems in interactions between actors in the innovation system)
- Framework failures (deficiencies in regulatory framework and in other background conditions, such as cultural and social values).

Mazzucato (2016, 2017) argued that successful public support for innovation should address both market and system failures.

Innovation Types

While there are many different types of eco-innovations, their classifications can be grouped by the scale of change and by the object of change.

First, the literature distinguishes innovation by the *scale of change*. Carillo-Hermosilla et al. (2010), OECD (2011), Eco-Innovation Observatory (2011; 2012) distinguish between *incremental and radical (or systemic) innovation*. Incremental innovations lead to gradual modifications in the existing systems. In contrast, radical innovations generate discontinuous changes and seek to replace existing components of a system or replace the entire system. Although some authors identify

disruptive as a special type of innovations [67], the literature often uses disruptive and radical (systemic) innovations interchangeably (Horbach et al. 2018; OECD 2011; Kemp 2011).

Second, innovations can be classified by the *object of change*. Kemp and Pearson (2008) identified the following types: environmental technologies; organizational innovation for the environment; products and service innovation offering environmental benefits (including financial products); green system innovations (e.g. biological agriculture, and renewable-based energy system). Miller and Swan (2017) in their paper "Financing Innovation: Opportunities for the GEF", analyzed five domains of innovation: technology, finance, business models, policy, and institutions.

Drivers/Barriers

The analysis of drivers and barriers for development, adoption, and implementation of eco-innovations is one the most frequent themes in the literature (Horbach et al. 2018; Diaz-Garcia et al. 2015). However, the studies are often inconclusive, due to lack of evidence, and due to diversity of factors that affect innovation.

In general, there is a consensus that some drivers are more important in fostering eco-innovation compared to other innovations. Some of these are: public policies, cooperation, and internal capabilities of organizations that adopt eco-innovation (del Rio et al. 2016).

There is an agreement in the empirical studies *that policy and regulation* are prominent drivers of eco-innovation, as they help overcome the double externality problem, foster development and adoption of eco-innovations (Horbach 2008; Horbach 2012; del Rio et al. 2016; Diaz-Garcia et al. 2015). OECD (2011) concluded that support for environmental and green innovation requires a comprehensive approach that considers the full spectrum of policies from creation, to diffusion, to application of knowledge that cover both the supply and demand sides. With regards to effectiveness of policies and regulations in driving environmental innovation, the literature concludes that policy interventions are more effective when designed in a mix of policy instruments (see Diaz-Garcia et al. 2015).

Cooperation and information flows play an important role in fostering eco-innovations. Involvement in networks, knowledge transfer mechanisms provide essential support for diffusion and adoption of eco-innovations (del Rio et al. 2016; Diaz-Garcia et al. 2015).

Internal characteristics of organizations that adopt innovation (such as top-level leadership commitment to environmental issues, organizational strategy, organizational resources and capabilities) tend to affect the innovation process (del Rio et al. 2016, Diaz-Garcia 2015). Access to finance, including functioning venture capital markets is important, especially for SMEs (OECD 2011).

There is a mixed evidence of the *market demand* and market-based instruments as drivers of eco-innovation. The role of the market demand varies depending on the type of eco-innovation and

[67] For example, Smith (2009, quoted in OECD 2011) defines disruptive innovations as the ones that change "how things are done or specific technological functions are fulfilled, without necessarily changing the underlying technological regime itself". An example of such innovation is the change from incandescent to fluorescent lighting.

levels of consumer environmental awareness (del Rio et al. 2016). Kemp and Pontoglio (2011) also found that the use of traditional market instruments (such as pollution taxes and emissions trading systems) is more effective in stimulating incremental innovations, but less so for radical/systemic innovations.

Closely linked to the market demand are *external pressures* from equipment and input suppliers, financial institutions, competitors, civil society organizations (Diaz-Garcia et al. 2015; del Rio et al. 2016).

Radical innovations depend on complex and interrelated drivers compared to incremental innovations, as the former aim for a system-level change (OECD 2011; Carillo-Hermosilla et al. 2010) Radical innovations often require institutional framework changes, as well as adaptation at the supply and demand side; they require longer period of development and investment; and require involvement of many actors (Kemp 2011).

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