Terminal Evaluation Validation form, GEF Independent Evaluation Office

1. Project Data

Summary project data	
GEF project ID	5835
GEF Agency project ID	P159681
GEF Replenishment Phase	GEF-5
Lead GEF Agency (include all for joint projects)	World Bank
Project name	Satellite Monitoring for Forest Management
Country/Countries	Mozambique, Namibia, Zambia
Region	Africa
Focal area	Climate Change
Operational Program or Strategic Priorities/Objectives	GEF Climate Change mitigation Objective 5: promotion of the reduction of GHG emissions from LULUCF
Stand alone or under a programmatic framework	Standalone
If applicable, parent program name and GEF ID	N/A
Executing agencies involved	European Space Agency; Zambia: Forestry Department (ZFD) under the Ministry of Lands and Natural Resources, and National Remote Sensing Centre (NRSC) under the Ministry of Higher Education; Mozambique: National Sustainable Development Fund (FNDS), and Forestry Department (DINAF) under the Ministry of Land and Environment; Namibia: specialized unit within the Namibia Directorate of Forestry, under the Ministry of Agriculture, Water and Forestry
NGOs/CBOs involvement	
Private sector involvement (including micro, small and medium enterprises)[1]	LTS International and University of Edinburgh: secondary executing agencies
CEO Endorsement (FSP) /Approval (MSP) date	12/20/2015
Effectiveness date / project start date	6/1/2016
Expected date of project completion (at start)	6/29/2018
Actual date of project completion	12/30/2020

Project Financing			
		At Endorsement (US $M)	**At Completion (US $M)**
Project Preparation Grant	GEF funding		
	Co-financing		
GEF Project Grant		2	1.313
Co-financing	IA own	0.1	----
	Government		
	Other multi- /bi-laterals	4.345	---
	Private sector		
	NGOs/CBOs		
	Other		
Total GEF funding		2	1.313
Total Co-financing		4.345	---
Total project funding		6.345	---

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[1] Defined as all micro, small, and medium-scale profit-oriented entities, including individuals and informal entities, that earn income through the sale of goods and services rather than a salary. (GEF IEO 2022)

(GEF grant(s) + co-financing)		
Terminal evaluation validation information		
TE completion date	12/18/2020	
Author of TE	World Bank	
TER completion date	12/31/2022	
TER prepared by	Emanuele Bigagli	
TER peer review by (if GEF IEO review)	Ritu Kanotra	

Access the form to summarize key project features here: https://www.research.net/r/APR2023.

2. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF IEO Review
Project Outcomes	S	N/A		S
Sustainability of Outcomes		N/A		ML
M&E Design		N/A		UA
M&E Implementation		N/A		UA
Quality of Implementation		N/A		MS
Quality of Execution		N/A		S
Quality of the Terminal Evaluation Report				MS

3. Project Objectives and theory of change

3.1 Global Environmental Objectives of the project:

The TE does not mention a global environmental objective different from the development objective.

3.2 Development Objectives of the project:

The overall development objective of the project was to make available to project countries improved methods for satellite monitoring of tropical dry forest landscapes and forest degradation assessment, and to develop technical knowledge and capacity for global application in sustainable forest management, including REDD+ (PIR 2020, p. 5).

More in detail, the development objectives of the project were to: (a) improve the global knowledge and capabilities for forest degradation assessment and the monitoring of dry forest landscapes; and (b) support three select partner countries (Mozambique, Namibia, and Zambia) in developing their Earth Observation capacity and skills (TE, p. 1), making improved methods for satellite monitoring of tropical dry forest landscapes and forest degradation assessment available to these countries, with technical knowledge and capacity developed for global application in sustainable forest management, including REDD+ (TE, p. v).

3.3 Were there any **changes** in the Global Environmental Objectives, Development Objectives, or project activities during implementation? What are the reasons given for the change(s)?

The project partner countries were Mozambique and Zambia; towards the end of the project, Namibia was included as a third partner country with the role of independently testing the applicability of the developed methodologies and approaches (TE, p. 5). The targets dates were adjusted in Progress Report 3/20 to reflect the extension of the project. (PIR 2020, p. 8).

3.4 Briefly summarize project's theory of change – describe the inputs and causal relationships through which the project will achieve its long-term impacts, key links, and key assumptions.

Problems: 1) Dry forests often fail to appear in national forest cover statistics and forest management objectives, because of (i) the lack of scientific, reliable figures on extent and condition of tropical dry forests, due to the fact that dry forests have insufficient economic potential and value and have been relatively less studied; and (ii) available and established Earth Observation methodologies generally focus

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on humid and evergreen types of tropical forests. 2) lack of capacities and skills in tropical dry forest countries, to exploit Earth Observation data for forest monitoring and assessment. 3) There is no globally accepted approach to enable the assessment of tropical dry forests, due to unresolved technical challenges driven by seasonal or soil humidity variations on remote sensing signals.

Objectives: (1) elaborate and verify state of the art methodologies for the combination of satellite derived information and in-situ assessments for large area forest resource and change mapping, including development and demonstration of standard and scalable approaches for optimized data collection and analyses that can support National Forest Monitoring Systems (NFMS) and Measuring, Reporting and Verification (MRV) systems which are compliant with the requirements of UNFCCC and the IPCC guidelines for estimating emissions and removals of greenhouse gases. (2) Address technical difficulties (e.g. assessment of forest degradation, elaboration of accurate information on dry tropical forests) as well as develop consistent and transferrable accuracy assessments and confidence intervals associated with the forest extent, forest type and forest change mapping. (3) Further develop and expand the innovative and targeted methods and techniques that use the latest satellite Earth Observation data to produce accurate and validated forest information, including historical forest information for a set of reference years, at a minimum mapping unit (MMU) of 1 hectare. (4) Enhance methodologies to improve the uptake of Earth Observation (EO) in client countries' forest sectors. (5) Develop and validate interoperable and scalable methodologies to address more complex information requirements (e.g. above ground biomass estimation, biodiversity indicator elaboration) for which there are no agreed or validated approaches at present.

Strategy: 1) Development of a detailed workplan and of an assessment of global and national requirements for dry forest and forest degradation products, current technical capabilities and gaps in meeting these requirements, and capacity in satellite EO forest monitoring in the project partner and SSKE partner countries; 2) Design new satellite Earth Observation methods to address identified gaps; 3) Implementation and Validation of satellite Earth Observation Methods; 4) Development of global knowledge products for tropical dry forest monitoring and forest degradation assessment, and capacity building and South-South knowledge exchange.

4. GEF IEO assessment of Outcomes and Sustainability

Please refer to the GEF Terminal Evaluation Review Guidelines for detail on the criteria for ratings.

The outcome ratings (relevance, effectiveness, efficiency, and overall outcome rating) are on a six-point scale: Highly Satisfactory to Highly Unsatisfactory. The sustainability rating is on a four-point scale: Likely to Unlikely.

Please justify the ratings in the space below each box.

4.1 **Relevance and Coherence**	S

The TE does not rate relevance and coherence, and this review rates it as Satisfactory. The project was aligned with GEF and country priorities, and was well designed, although with some minor flaws.

This project was aligned with GEF climate change mitigation Objective 5 related to the promotion of the reduction of GHG emissions from LULUCF with a cross-reference to the GEF cross-cutting program of Strategic Forest Management (SFM), and was fully in line with the general criteria of the GEF programming strategy for the utilization of the resources set-aside for climate change (PIF, p. 14; GEF/C.39/Inf.10, p. 1).

As for project design, the choice of project countries was largely based on the existing opportunities. The choice of three southern African countries made project implementation easier from a logistical standpoint, and allowed to use only one tool calibration; however, it did not allow to test the tools in tropical dry forest scenarios that differ from southern African forest and woodlands (TE, p 36). Also, the choice of Namibia as third partner country was done in the final year of project implementation, leaving little time for direct engagement and assistance (TE, p. 37). Finally, contrary to expectations, the earth observation methodologies developed are neither suited for basic users nor for non-IT skilled forestry officers; for this reason, they are better placed with remote sensing specialists than with non-specialist forestry officers (TE, p. 37). However, even in this case, the project design did not consider the need to have strong skills in place in Linux and Python, which in reality are not well developed in these countries (TE, p 37).

4.2 **Effectiveness**	S

The TE does not rate effectiveness, and this review rates it as Satisfactory. The project achieved all ex-ante targets and, thus, made expected level of contributions to global environmental benefits.

The numeric targets were established in the first progress review in January 2019, and targets dates were adjusted in Progress Report 3/20 to reflect the extension of the project (PIR 2020, p. 8). Based on the information included in the Final PIR 2020 (p. 7), the project achieved 3 of the 4 ex-ante targets, and over-achieved the other, related to the number of existing operations informed (target: 2, actual: 3). The project took longer than expected to develop its earth observation methodologies and tools. To some extent, this can be attributed to the implementation arrangements, although other external factors played a role, including the lack of sufficient technical skills at national level to exploit the developed methodologies, the inadequacy of existing Earth Observation platforms, and objective limitations to dry forest monitoring because of the biophysical characteristics, complexity, and heterogeneousness of dry forest landscapes (TE, pp. 36-38).

More details for each Component are below:

Component 1 – Work plan and assessment of requirements and capacity. The work plan was prepared on time and repeatedly updated and adjusted based on actual project progress (TE, p. 7). A separate work plan was prepared for Namibia when it was added as a project country. The partner country assessments, technical gap analysis, review of methods and tools, capacity building plan, and work planning were delivered as per project document (TE, p. 7). These allowed in particular to develop the training planned under Component 4, among others (TE, p. 11).

Component 2 – Design of satellite earth observation methods. All the software tools produced were developed in Python for the Linux command line, which was considered as the best possible solution to

make use of the open-source operation system (Linux) and the openly accessible Python programming environment (TE, p. 12). Appropriate online, open-source data were selected. The design was done jointly with partner countries, as planned, and included three methodologies for the assessment and monitoring of deforestation and degradation in dry forests (Biota, Deforest, and Acacia), and one methodology for the pre-processing of European Space Agency (ESA) Sentinel data, thus excluding the originally planned methodology for the prediction of where future deforestation is likely to occur (TE, p. 12). Also, related documentation was produced for the tools developed, which are available online (TE, p. 14).

Component 3 – Implementation and validation of satellite earth observation methods. Field work was organized in Mozambique and Zambia for reference data collection, to produce subnational datasets on related aspects. This included compiling catalogue of drivers of deforestation, preparing a data collection protocol, developing a working definition of deforestation and degradation, and preparing and carrying out field data collection (TE, p. 21). Then, tools were tested during the two major regional training events for concrete forest mapping and monitoring purposes according to their needs (TE, p. 28). In addition, several other countries have independently tested and used some of the methodologies and tools produced by the project (TE, p. 30).

Component 4 – Global knowledge exchange and capacity building. The project provided capacity building in Mozambique and Zambia through formal training workshops and online collaboration and video sessions, and covered not only basic Earth Observation (EO) skills, especially relating to radar remote sensing and those required for Python and Linux, but also those specifically necessary to calibrate and use SMFM EO tools. Other training inputs prepared the field teams for reference data collection or provided users with the necessary basics to operate the tools on the Forestry Thematic Exploitation Platform (F-TEP) cloud processing platform (TE, p. 23). In Namibia, training was organized on Linux, Python and in concrete tool use (TE, p. 25). Training materials were also produced, including introductory trainings and tool-specific trainings (TE, p. 26). As for knowledge exchange, the project team presented the project outputs at some international events and conferences, and organized South-South knowledge exchange events (TE, pp. 32-33).

4.3 **Efficiency**	S

The TE does not rate efficiency, and this review rates it as Satisfactory. The TE does not discuss aspects related to project efficiency. Based on the limited information included in the PIR 2020 (p. 8), at the time of PIR 2020, 66% of the GEF financing was actually used. Given that all targets were achieved, this may imply a satisfactory cost-effectiveness of the project.

4.4 **Outcome**	S

Summarize key outcomes related to environment, human well-being, and enabling conditions (Policy, Legal & Institutional Development; Individual & Institutional Capacity-Building; Knowledge Exchange & Learning; Multistakeholder Interactions), as applicable. Include any unintended outcomes (not originally targeted by the project), whether positive or negative, affecting either ecological or social aspects.

Where applicable, note how both intended and unintended outcomes have positively and/or negatively affected marginalized populations (e.g., women, indigenous groups, youth, persons with disabilities), and where some stakeholder groups have benefited more/ less than others.

The TE does not rate outcomes, and this review rates them as Satisfactory. The project was relevant to GEF and national priorities, and was overall well-designed; it achieved all ex-ante targets in a cost-effective way. The key outcomes and impacts are summarized as follows:

Environmental. The TE does not specify environmental outcomes.

Socioeconomic. The TE does not specify socioeconomic outcomes.

Enabling conditions. The project developed tools and methodologies for more accurate and more cost-effective earth observation monitoring and assessment of dry forests and dry forest degradation, which is fundamental for sustainable forest and land management, in the project countries, contributing also to building related capacity through delivering appropriate technical training.

Unintended impacts. The TE does not indicate any unintended impacts.

4.5 **Sustainability**	ML

Note any progress made to sustain or expand environmental benefits beyond project closure, using stakeholder (rather than project) resources, e.g. through replication, mainstreaming or scaling-up of GEF-supported initiatives. Examples would be farmers adopting practices using own funds, follow-on replication projects, development of plans for scaling, inclusion in local or national legislation, and allocation of government budgets or private sector investments for institutional adoption.

The TE does not rate sustainability, and this review rates it as Moderately Likely. The TE does not explicitly discuss sustainability of outcomes beyond project closure. Some elements were identified in the text, which could pose risks to the future continuation of project benefits, and related to technical aspects. Overall, the project benefits are evaluated as more likely to continue than abate.

Financial. The TE does not identify financial risks to project sustainability.

Sociopolitical. The TE does not identify sociopolitical risks to project sustainability.

Institutional frameworks and governance. Risks to project sustainability relate to the fact that the earth observation platforms are not ready for operation. This is related to the following issues: (1) Difficulty to keep the deployed tools functioning after the project expires, due to the fact that most earth observation cloud processing platforms are still under development, which repeatedly led to breaking of the deployed tools requiring, yet again, adjustments to the already functioning tools (TE, p. 38); (2) Services are insufficiently flexible and not yet ready for operational use into the platform services. Hence, uncertainty persists around the actual cost implications that operation at national scale of forest assessment and monitoring would have for a dry forest country. This is an issue that is yet unresolved and can understandably prevent tropical dry forest countries from relying on EO cloud processing platforms (TE,

p. 38); (3) the limited availability of high-frequency L-band radar data, which limits the potential of application of this monitoring methodology (TE; p. 39).

Environmental. Some underlying challenges cannot be easily addressed by technology alone, relating to biophysical characteristics, complexity, and heterogeneity of dry forest landscapes (TE, p. 38). Also, there is still no widely accepted or applied definition of tropical dry forests, making their assessment and monitoring challenging; also, the concept of dry forest degradation is still vague (TE, p. 38).

5. Processes and factors affecting attainment of project outcomes

Before describing the factors, you may choose to summarize reported outcomes and sustainability here: https://www.research.net/r/APR2023.

5.1 Co-financing. To what extent was the reported co-financing essential to the achievement of GEF objectives? If there was a difference in the level of expected co-financing and actual co-financing, what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

The project PIF included an expected co-financing of USD 4,345 million from European Space Agency; however, neither the Final PIR 2020 nor the TE mention or discuss the actual mobilization of this amount, nor whether and how this affected project outcomes.

5.2 Project extensions and/or delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

The project was extended until December 2020 to allow extensive dissemination and consultations made possible by savings in other project activities (PIR 2020, p. 4).

5.3 Stakeholder ownership. Assess the extent to which stakeholder ownership has affected project outcomes and sustainability. Describe the ways in which it affected outcomes and sustainability, highlighting the causal links.

Neither the Final PIR 2020 nor the TE mention or discuss aspects related to stakeholder ownership, nor how it affected project outcomes and sustainability.

5.4 Other factors: In case the terminal evaluation discusses other key factors that affected project outcomes, discuss those factors and outline how they affected outcomes, whether positively or negatively. Include factors that may have led to unintended outcomes.

The TE mention no other factors that affected project outcomes.

6. Assessment of project's Monitoring and Evaluation system

Ratings are assessed on a six point scale: Highly Satisfactory to Highly Unsatisfactory.

Please justify ratings in the space below each box.

6.1 **M&E Design at entry**	UA

The TE does not rate M&E design, and this review cannot rate it as neither the TE nor the Final PIR 2020 mention or discuss any aspects related to M&E design. The PIF does not include any provisions for an M&E plan; the Final PIR 2020 included some intermediate output indicators, which were established in the first progress review in January 2019, while the targets dates were adjusted in Progress Report 3/20 to reflect the extension of the project.

6.2 **M&E Implementation**	UA

The TE does not rate M&E implementation, and this review cannot rate it as neither the TE nor the Final PIR 2020 mention or discuss any aspects related to this aspect.

7. Assessment of project implementation and execution

Quality of Implementation rating is based on the assessment of the performance of GEF Agency(s). Quality of Execution rating is based on performance of the executing agency(s). In both instances, the focus is upon factors that are largely within the control of the respective implementing and executing agency(s). A six-point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess.

Please justify ratings in the space below each box.

7.1 **Quality of Project Implementation**	MS

The TE does not rate project implementation, and this review rates it as Moderately Satisfactory. Based on the limited information included in the Final PIR 2020 and the TE, project implementation was adequate although sometimes perceived as insufficient, negatively impacting on project duration.

The World Bank task team in Washington, DC had the role of overall oversight and responsibility for project execution, while WB country offices provided the main communication link to partner countries (TE, p. 5). During the few occasions when the consultant team was in-country, key staff was fully available and the project made good progress. However, as assistance to the partner countries was done mostly by remote means, at times it was perceived inefficient and impacted on the time used for developing the tools and, ultimately, the duration of the project (TE, p. 37). Longer periods of on-site support with key partner country personnel made available could have yielded better and faster results (TE, p. 37).

7.2 **Quality of Project Execution**	S

The TE does not rate project implementation, and this review rates it as Satisfactory. Based on the limited information included in the Final PIR 2020 and the TE, project execution was satisfactory although with some inter-institutional conflicts in one project country.

The project was executed at national level by country working groups. In Zambia, it was executed by the Forestry Department (ZFD) under the Ministry of Lands and Natural Resources, and its National Remote Sensing Centre (NRSC) under the Ministry of Higher Education. In Mozambique, execution was assigned

to the National Sustainable Development Fund (FNDS), with the Forestry Department (DINAF), under the Ministry of Land and Environment, playing a role in field data collection. In Namibia, a specialized unit within the Namibia Directorate of Forestry, under the Ministry of Agriculture, Water and Forestry, was charged with testing and applying the Satellite Monitoring for Forest Management Earth Observation (SMFM EO) methods and algorithms. European Space Agency provided technical assistance in terms of advice to WB task team, provision of earth observation data, and access to earth observation processing infrastructure and data repositories. Moreover, a consortium composed of LTS International and the University of Edinburgh was responsible for the project work plan, EO methodology/algorithm development and documentation, training and capacity development, and reporting. Other minor executing partners were the Regional Centre for Mapping of Resources for Development (RCMRD) in Kenya, which provided venues and experts for regional SMFM trainings, and the F-TEP team, which helped the SMFM project to set up the EO tools on the FTEP platform by implementing adjustments to the platform.

The TE (p. 36) notes that in Mozambique, as the forestry department (DINAF) did not have full capacity in key concepts for large-scale geospatial data processing', whereas National Sustainable Development Fund Mozambique (FNDS), an institution not officially mandated with forestry, had more suitable personnel, the latter was selected for execution; however, this led to some interinstitutional conflict. In Zambia, the situation was similar, although collaboration between the Forestry Department and the National Remote Sensing Centre was good. In Namibia, the Department of Forestry had a specialized and capable GIS and remote sensing unit that was naturally tasked with project implementation.

8. Lessons and recommendations

8.1 Briefly describe the key lessons, good practices, or approaches mentioned in the terminal evaluation report, including how they could have application for other GEF projects. Lessons must be based on project experience.

The TE (pp. 36-39) proposes the following lessons derived from project implementation:

- The project could have included other non-African countries; this would have helped to understand the potentials and limits of tool performance under various conditions. Also, project presence on each of these continents could have triggered additional interest and tool pick-up by other countries in the respective region. At the same time, it would have required increasing the number of countries to fully capture the diversity within each region.
- the project experience has shown that specialist skills are required to fully understand and exploit the potentials of the Satellite Monitoring for Forest Management Earth Observation (SMFM EO) tools, and that remote sensing specialists are clearly better placed to operate the tools than forestry officers with no prior experience in operating EO data.
- The project provided limited in-country assistance; longer periods of on-site support with key partner country personnel made available could have yielded better and faster results.
- When working with partner country institutions is that even within specialized remote sensing teams, skills in Linux and Python are yet to be well developed. At least basic Linux skills are

required to calibrate and operate the tools. Skills in Python would be required to adjust and customize the tool code, if required for national application. While this was not part of the project's activities, it became obvious that at least basic training in both had to be provided to the country teams. As a conclusion, the lack of Linux and Python skills may be similar in other tropical countries, potentially affecting uptake and use of the tools.

- The use of the Biota tool requires the capacity to develop a radar backscatter model for local vegetation and dry forest types from L-band radar data for local tool calibration. Other tropical dry forest countries might require assistance to set up a network of suitable plots and to derive the backscatter/Aboveground Biomass(AGB) equation from the collected data.

- At the end of the project, the partner countries were generally convinced of the benefits of cloud processing, but the main lesson was that the services are insufficiently flexible and not yet ready for operational use. Resulting from the fact that the cloud processing services are still developing, uncertainty persists around the actual cost implications an operation at national scale of forest assessment and monitoring would have for a dry forest country. This is an issue that is yet unresolved and can understandably prevent tropical dry forest countries from relying on EO cloud processing platforms.

- Dry forest countries and users of the project tools have to understand that there are upstream tasks to accomplish before making full use of their potentiality. Ideally, countries should attempt to establish their own AGB/backscatter model.

- The SMFM project examined physical and spectral parameters of deforestation events to try to identify common characteristics that may be related to particular drivers or resource use activities, which yielded only limited results. In reality, there is often a combination or a sequence of drivers that cause degradation or deforestation, which are not easily separable. Hence, the key lesson to be drawn is that it actually may not be possible at all to reliably identify drivers of degradation and deforestation from EO data alone, thus implicating the potential success of methodologies such as the SMFM Acacia.

8.2 Briefly describe the recommendations given in the terminal evaluation.

The TE (p. 40) proposes the following recommendations:

Opportunities for further tool development and hosting

- The tools produced by the project should be hosted on a widely recognized and utilized platform that is fully operational and easily accessible to tropical dry forest countries; the FAO System for Earth Observation Data Access, Processing and Analysis for Land Monitorin (SEPAL) is the ideal long-term location.

- The tools developed are standalone applications; this does not always respond to the concrete needs of a user, and future development should include tailoring tool modules rather than full applications, so that users could pick the modules they need and integrate them into existing workflows or combine them to create new ones, moving towards user-friendly interfaces that would enable experienced non-specialist forestry staff to use the applications.

- Future tool development should include the option to ingest and process from new data sources and formats coming up from a number of operators (including, potentially, the ESA Radar Observing System for Europe at L-band (ROSE-L) mission, so as to expand data sources and improve data availability.

Application of tools by other countries

- To make the SMFM outputs and tools more accessible to dry forest countries in West Africa, French-language support and translation of at least key documents and training materials should be envisaged. Similarly, a translation into Spanish could help promote tool use in Latin America.
- National forestry agencies and remote sensing units in tropical dry forest countries should envisage providing training to their personnel to establish at least basic knowledge in Linux command line and Python programming. While these skills are not required when off-the-shelf commercial software is used, it opens a wide array of possibilities to make use of highly specialized open-source tools and applications that can then be customized and domesticated to respond to concrete national-level requirements.
- Further research and analytical work still are needed to understand the costs of using the new tools, how access to high-frequency satellite data can be incorporated into the decision-making of forest agencies and the formulation of forest policy. It also is likely that—despite the relatively high skills required—using EO will be increasingly done in-house by trained specialists in forest agencies rather than external experts and consultants. How that changes these agencies is yet to be seen.
- To promote the SMFM and other EO methodologies and tools to a wider group of dry forest countries outside the geographic scope of the SMFM project (i.e., Southern Africa), development partners should provide targeted support to interested tropical dry forest countries by establishing a suitable network of control points and sample plots (ideally networks of permanent sample plots), collecting AGB data in various dry forest conditions, and developing a locally valid AGB/backscatter model as a prerequisite to making full use of tool potentials. Ultimately, this could lead to the establishment of a library of AGB/backscatter calibration data from dry forest countries on different continents.
- Due to unclear cost implications of using Sentinel data and F-TEP, potential users may refrain from relying on this kind of service. ESA, therefore, should consider offering low-cost access to its F-TEP platform services for interested dry forest countries in the developing world to assist these in overcoming acute computing limitations when attempting to produce national-level map products from earth observation data.
- Further support could be provided to assist one or more interested countries in further testing and applying the Deforest methodology. Results (i.e., early warning signals of deforestation) could be used and evaluated for practicability by, for instance, forestry departments and forestry law enforcement agencies, even without full-scale scientific validation of the results.

9. Quality of the Terminal Evaluation Report

Before rating the quality of the terminal evaluation, click here to summarize your observations on the sub-criteria: https://www.research.net/r/APR2023.

A six-point rating scale is used for each sub-criteria and overall rating of the terminal evaluation report (Highly Satisfactory to Highly Unsatisfactory)

Criteria/indicators of terminal evaluation quality	GEF IEO COMMENTS	Rating
1. Timeliness: terminal evaluation report was carried out and submitted on time?	The TE was carried out within 6 months from project completion, and submitted to the GEF portal within 12 months	HS
2. General information: Provides general information on the project and evaluation as per the requirement?	The TE did not provide GEF ID nor environmental objectives; it generally mentioned start and end dates, and listed the executing agencies, while it did not list the evaluators	MU
3. Stakeholder involvement: the report was prepared in consultation with – and with feedback from - key stakeholders?	The project identified the key stakeholders of the project; as a project implementation report, it was not expected to seek feedback of key stakeholders on the draft report	S
4. Theory of change: provides solid account of the project's theory of change?	The TE discusses the causal links and mechanisms to achieve intended impact, and presents one assumption of the project, without discussing its validity	S
5. Methodology: Provides an informative and transparent account of the methodology?	The TE described project sites and activities, but it does not discuss information sources, did not perform interviews, and does not describe tools and methods, nor limitations of evaluation	MU
6. Outcome: Provides a clear and candid account of the achievement of project outcomes?	The TE assesses relevance to GEF and country priorities, and of design; it reports on performance for all components and discusses factors that affected outcomes, reporting also on timeliness, but not on efficiency	S
7. Sustainability: Presents realistic assessment of sustainability?	The TE provides some elements, based on which some risks could be identified; however, it does not discuss likely effects, nor indicates overall likelihood of sustainability	MU

8. M&E: Presents sound assessment of the quality of the M&E system?	The TE does not assess M&E design and implementation	U
9. Finance: Reports on utilization of GEF funding and materialization of co-financing?	The TE does not discuss any aspect related to co-financing	U
10. Implementation: Presents a candid account of project implementation and Agency performance?	The TE provides a limited account of project implementation and execution, including factors that affected them and how challenges were addressed	S
11. Safeguards: Provides information on application of environmental and social safeguards, and conduct and use of gender analysis?	The TE does not report on safeguards, nor on gender	U
12. Lessons and recommendations are supported by the project experience and are relevant to future programming?	The TE presents lessons based on project experience and discusses applicability; it presents recommendations, with clear actions, although not specifying always action takers	S
13. Ratings: Ratings are well-substantiated by evidence, realistic and convincing?	The TE was not expected to provide ratings	NA
14. Report presentation: The report was well-written, logically organized, and consistent?	The TE is written in English; it is well-written, well-organized, and consistent, and makes good use of charts and tables	HS
Overall quality of the report		MS

10. Note any additional sources of information used in the preparation of the terminal evaluation report (excluding PIRs, TEs, and PADs).

GEF/C.39/Inf.10. Programming Approach for Utilization of the Resources Set-Aside outside the STAR. GEF Council, 2010.

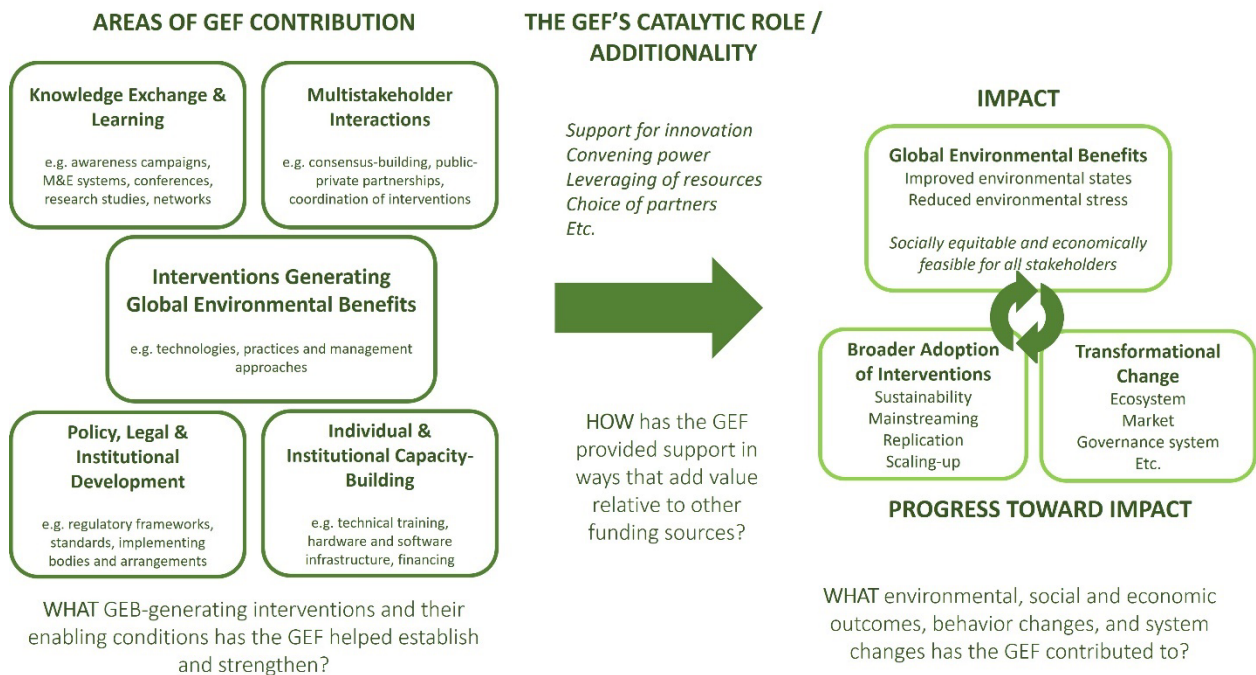## ANNEX 1. GEF IEO THEORY OF CHANGE FRAMEWORK

Figure 1. The GEF IEO's updated Theory of Change Framework on how the GEF achieves impact

The general framework for the GEF's theory of change (figure 1) draws on the large amount of evaluative evidence on outcomes and impact gathered over the years by the GEF Independent Evaluation Office. The framework diagram has been updated to reflect the IEO's learning since OPS5 (GEF IEO 2014, p. 47-50) about how the GEF achieves impact, as well as the evolution of the GEF's programming toward more integrated systems-focused and scaled-up initiatives.

The framework outlines the three main areas that the IEO assesses in its evaluations: a) the GEF's contributions in establishing and strengthening both the interventions that directly generate global environmental benefits, and the enabling conditions that allow these interventions to be implemented and adopted by stakeholders, b) the GEF's catalytic role or additionality in the way that the GEF provides support within the context of other funding sources and partners, and c) the environmental, social and economic outcomes that the GEF has contributed to, and the behavior and system changes that generate these outcomes during and beyond the period of GEF support.

The circular arrow between impact and progress toward impact, as before, indicates how bringing about positive environmental change is an iterative process that involves behavior change (in the form of a broader group of stakeholders adopting interventions) and/or systems change (which is a key characteristic of transformational change). These three areas of change can take place in any sequence or simultaneously in a positively reinforcing cycle, and are therefore assessed by the GEF IEO as indicators of impact.

Assessing the GEF's progress toward achieving impact allows the IEO to determine the extent to which GEF support contributes to a trajectory of large-scale, systemic change, especially in areas where changes in the environment can only be measured over longer time horizons. The updated diagram in particular expands the assessment of progress towards impact to include transformational change, which specifically takes place at the system level, and not necessarily over a long time period.

The updated diagram also more explicitly identifies the link between the GEF's mandate of generating global environmental benefits, and the GEF's safeguards to ensure that positive environmental outcomes also enhance or at the very least do not take away from the social and economic well-being of the people who depend on the environment. Thus the IEO assesses impact not only in terms of environmental outcomes, but also in terms of the synergies and trade-offs with the social and economic contexts in which these outcomes are achieved.

ANNEX 2. DEFINITION OF TERMS

Intervention	Any programmatic approach, full-sized project, medium-sized project, or enabling activity financed from any GEF-managed trust fund, as well as regional and national outreach activities. In the context of post-completion evaluation, an intervention may consist of a single project, or multiple projects (i.e. phased or parallel) with explicitly linked objectives contributing to the same specific impacts within the same specific geographical area and sector. https://www.gefieo.org/evaluations/gef-evaluation-policy-2019
Activity (of an intervention)	An action undertaken over the duration of an intervention that contributes to the achievement of the intervention's objectives, i.e. an intervention is implemented through a set of activities. E.g. training, (support to) policy development, (implementation of) management approach.
Outcome	An intended or achieved short- or medium-term effect of a project or program's outputs. https://www.gefieo.org/evaluations/gef-evaluation-policy-2019
Impact	The positive and negative, primary and secondary long-term effects produced by a project or program, directly or indirectly, intended or unintended. https://www.gefieo.org/evaluations/gef-evaluation-policy-2019
Environmental outcomes	Changes in environmental indicators that could take the following forms: • Stress reduction: reduction or prevention of threats to the environment, especially those caused by human behavior (local communities, societies, economies) • Environmental state: biological, physical changes in the state of the environment http://www.gefieo.org/sites/default/files/ieo/evaluations/ops5-final-report-eng.pdf
Social and economic outcomes	Changes in indicators affecting human well-being at the individual or higher scales, e.g. income or access to capital, food security, health, safety, education, cooperation/ conflict resolution, and equity in distribution/ access to benefits, especially among marginalized groups.
Synergies	Multiple benefits achieved in more than one focal area as a result of a *single intervention*, or benefits achieved from the interaction of outcomes from at least two separate interventions in addition to those achieved, had the interventions been done independently.

	http://www.gefieo.org/evaluations/evaluation-multiple-benefits-gef-support-through-its-multifocal-area-portfolio-map-2016
Trade-offs	A reduction in one benefit in the process of maximizing or increasing another benefit. http://www.gefieo.org/evaluations/evaluation-multiple-benefits-gef-support-through-its-multifocal-area-portfolio-map-2016
Broader adoption	The adoption of GEF-supported interventions by governments and other stakeholders beyond the original scope and funding of a GEF-supported intervention. This may take place through sustaining, replication, mainstreaming, and scaling-up of an intervention and/or its enabling conditions (see definitions below). http://www.gefieo.org/sites/default/files/ieo/evaluations/ops5-final-report-eng.pdf
Sustainability	The continuation/ likely continuation of positive effects from the intervention after it has come to an end, and its potential for scale-up and/or replication; interventions need to be environmentally as well as institutionally, financially, politically, culturally and socially sustainable.https://www.gefieo.org/evaluations/gef-evaluation-policy-2019
Replication	When a GEF intervention is reproduced at a comparable administrative or ecological scale, often in different geographical areas or regions. http://www.gefieo.org/sites/default/files/ieo/evaluations/ops5-final-report-eng.pdf
Mainstreaming	When information, lessons, or specific aspects of a GEF initiative are incorporated into a broader stakeholder initiative. This may occur not only through governments but also in development organizations and other sectors. http://www.gefieo.org/sites/default/files/ieo/evaluations/ops5-final-report-eng.pdf
Scaling-up	Increasing the magnitude of global environment benefits (GEBs), and/or expanding the geographical and sectoral areas where they are generated to cover a defined ecological, economic, or governance unit. May occur through replication, mainstreaming, and linking. http://www.gefieo.org/evaluations/evaluation-gef-support-scaling-impact-2019
Transformational change	Deep, systemic, and sustainable change with large-scale impact in an area of major environmental concern. Defined by four criteria: relevance, depth of change, scale of change, and sustainability. http://www.gefieo.org/evaluations/evaluation-gef-support-transformational-change-2017
Additionality	a) Changes in the attainment of direct project outcomes at project completion that can be attributed to GEF's interventions; these can be reflected in an acceleration of the adoption of reforms, the enhancement of outcomes, or the reduction of risks and greater viability of project interventions. b) Spill-over effects beyond project outcomes that may result from systemic reforms, capacity development, and socio-economic changes. c) Clearly articulated pathways to achieve broadening of the impact beyond project completion that can be associated with GEF interventions. https://www.gefieo.org/sites/default/files/ieo/council-documents/files/c-55-me-inf-01.pdf