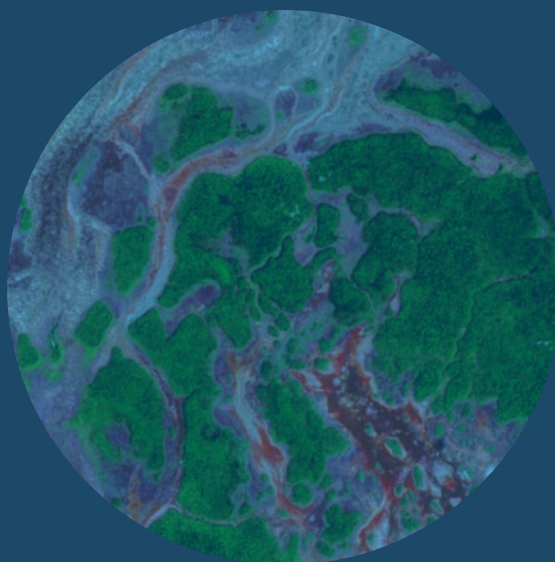




Food and Agriculture  
Organization of the  
United Nations

Evaluation of the project  
“System for Earth  
Observation Data  
Access, Processing  
and Analysis for Land  
Monitoring” (SEPAL)



**Project Evaluation Series  
08/2022**

# **Evaluation of the project “System for Earth Observation Data Access, Processing and Analysis for Land Monitoring” (SEPAL)**

**Project code: GCP/GLO/537/NOR**

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## Abstract

The “System for Earth Observation Data Access, Processing and Analysis for Land Monitoring” (SEPAL) is a cloud-based computing platform for fast access and processing of remotely sensed data sources. The evaluation focused on responding to the Organisation for Economic Cooperation and Development’s Development Assistance Committee (OECD-DAC) evaluation criteria, while aiming to have maximum possible usefulness for SEPAL Phase II. For instance, the evaluators performed tests of the platform and end-user analysis, organized user focus groups, and performed a survey.

The project team took an adaptive management approach to maintain the project’s relevance over the seven years of implementation. The project team’s outreach was relevant and effective, based on a solid partnership approach. As a technical project, gender was not at the forefront of project implementation but considered for capacity building. Demand for changes to the intended use of the platform during Phase II emerged. The project outcomes are congruent with FAO and the donor’s objectives and the Reducing Emissions from Deforestation and Forest Degradation, Forest Conservation, Sustainable Management of Forests and Enhancement of Carbon Stocks in Developing Countries (REDD+) vision. The SEPAL project is needs based and fills gaps of national forest authorities in REDD+ reporting and beyond. The project showed a strong performance at the output level and made progress in achieving outcome-level results. SEPAL enabled participating countries to improve their REDD+ reporting. The project team took the mid-term evaluation seriously and changed from a purely technical model into enhanced outreach, including capacity building. While results are encouraging, there is room for improvement concerning capacity building, despite receiving good support from SEPAL’s partners. Project management and partnership arrangements were appropriate and effective, with room for improving the formalization of some partnerships. It is challenging for other donors to contribute to a signed project agreement as they cannot shape the agreement anymore. This affected the co-financing of SEPAL. If SEPAL would not exist, it would need to be invented to ensure quicker, cheaper, and less complex forestry monitoring and reporting for today and the future. Financially, the sustainability of SEPAL is ensured during Phase II, but many other risks are beyond the project’s direct control. Strong coherence emerges between SEPAL and its partners, which can mitigate some sustainability risks. SEPAL’s framework is sufficiently robust for scaling up and replication.

The project team is encouraged to build on its successful partnership approach and systematically apply it to future technical development, particularly capacity building. The project team should address a number of emerging needs in Phase II, notably a “plan B” option to mitigate SEPAL’s dependency on Google Earth Engine (GEE). It should also address the two partially achieved outputs (relating to project documentation and monitoring and evaluation [M&E]). The project team should consult its partners to assess which partners would welcome a formalization of the partnership, for example, through letters of agreement (LOAs). For SEPAL Phase II, the project team should identify and develop concept notes for specific modules outside the main donor’s funding. Additionally, the project team should embark on a risk mitigation strategy, combined with a sustainability/exit strategy.



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The evaluation wanted to separately acknowledge the focus group participants who were willing to share their experiences, ideas, and suggestions about utilizing SEPAL.



## **Abbreviations and acronyms**

CAFI	Central African Forest Initiative
FAO	Food and Agriculture Organization of the United Nations
GEE	Google Earth Engine
GFOI	Global Forest Observations Initiative
NICFI	Norway's International Climate and Forest Initiative
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goal
SEPAL	System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring project

## **Executive summary**

### **Evaluation purpose and users**

1. This final evaluation of the project “System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring” (SEPAL) was conducted for both accountability and learning purposes of the donor, the Food and Agriculture Organization of the United Nations (FAO), project partners, and other participating institutions. The latter are also the main users of the evaluation. It also presents strategic recommendations to maximize performance in Phase II.

### **Project context**

2. The implementation of SEPAL began in 2015 with the support of the Kingdom of Norway’s International Climate and Forest Initiative (NICFI). According to the project document, this global project primarily supports FAO’s Strategic Objective 2: “Increase and improve provision of goods and services from agriculture, forestry, and fisheries in a sustainable manner.”
3. The project's budget was USD 7.2 million and increased to USD 9.59 million (FAO, 2021) following a project amendment. The project concluded by the end of December 2021. At the same time, Phase II of SEPAL was launching.
4. The primary outcome of the project is for “relevant institutions in participating REDD+ [to] have the capacity to produce annual estimates of the state and trend of their forest resources” achievable through four outputs:
  - i. Output 1. Project management and participation are established.
  - ii. Output 2. SEPAL is established and providing selected countries access to relevant satellite data and processing capabilities to produce forest information products.
  - iii. Output 3. Relevant institutions in participating REDD+ countries are capable of using SEPAL.
  - iv. Output 4: Relevant institutions in participating REDD+ countries select, access, and process the relevant remote sensing data they need to produce biannual estimates of change in forest and carbon stocks.

### **Evaluation scope and objective**

5. The scope of the evaluation is Phase I of SEPAL. The final evaluation encompasses the entire project of global scope, with all its project outputs implemented between 2015 and 2021.
6. The objectives of the final evaluation are to:
  - i. examine the extent and magnitude of the project achieving its stated objective and outcomes to date and determine the likelihood of future impacts, especially relating to environmental sustainability due to changes following the project’s interventions;
  - ii. provide an assessment of the project’s performance, gender-disaggregated achievements, and the implementation of planned project activities and planned outputs against actual results; and
  - iii. synthesize Lessons learned that may help design and implement future FAO, as well as Norway’s International Climate and Forest Initiative (NICFI); land degradation; Sustainable

Land and Forest Management; Land use; Land use Change; and Forestry and/or climate change-related initiatives.

## **Evaluation criteria and questions**

7. The evaluation terms of reference (TOR) listed the following numbered evaluation questions using the Organisation for Economic Cooperation and Development's Development Assistance Committee (OECD/DAC) evaluation criteria, validated during the inception phase and re-ordered by evaluation criteria, as required. As stated in the inception report, out of the original 21 evaluation questions listed in the TOR, the inception phase found that 18 were relevant, for example, given the potential to merge evaluation questions with similar ones.

### **Relevance**

- i. How relevant was the project design in supporting the activities and expected results?
- ii. How developed and relevant is the strategic vision employed by the project, including through partnerships?
- iii. Was the manner in which the SEPAL target users were identified congruent with its objectives and considerations for project effectiveness and inclusivity? Why or why not?
- iv. Were gender equality considerations adequately reflected in project objectives and design? Were gender equality considerations taken into account in project implementation and management?
- v. Shall the intended use of the platform change in any way based on user needs, that is, do user needs now differ from the original conception?

### **Coherence**

- i. Are the project outcomes congruent with the FAO and donor's objectives, that is, FAO Strategic Objectives (SO) and the REDD+ vision?
- ii. How did it fill a gap or complement existing mechanisms for REDD+ support?

### **Effectiveness**

- i. What results (stated outputs and outcomes, with a focus on outcomes) have been achieved, and which factors affected the effectiveness or ineffectiveness of the project in achieving results?
- ii. Did, and how, SEPAL enable countries with limited computing resources and bandwidth to produce high-quality activity data for reporting on REDD+ specifically?
- iii. To what extent have SEPAL's activities extended to the intended users and uses? If the project did reach all or the majority of its intended users, what success factors allowed it to do so?
- iv. How has the project worked to ensure that users had the capacity to apply the SEPAL tool to their particular use? What capacity-building and outreach strategies did the project use and how effective were they? Would the evaluation recommend that any changes be made?

### **Efficiency**

- i. To what extent were the project management and partnership arrangements appropriate and effective? Areas to consider include management, financial, and human resources; project communications; and costs.
- ii. Which factors either enabled or hindered the materialization of the planned co-financing? What conclusions for Phase II of the project can be gained from these insights?

## **Sustainability**

- i. What quantitative and qualitative higher-level and durable benefits has the project achieved?
- ii. How sustainable are the project results and what are the risks?
- iii. How, if at all, does the project's coherence with other initiatives contribute to the likelihood of sustainability?
- iv. Has SEPAL led to other changes, including scalable or replicable results?
- v. Is the framework sufficiently robust for scaling up, given the plans to increase users in the next phase?

## **Evaluation approach**

8. The evaluation used a utilization-focused evaluation approach, focusing on the utility of the evaluation process and reporting for learning and accountability and to inform Phase II of the project. The following evaluation steps were taken.
  - i. briefing meetings with evaluation manager and project manager;
  - ii. initial document review;
  - iii. development of evaluation matrix and data collection tools;
  - iv. technical review, including interviews;
  - v. non-technical stakeholder interviews, including for capacity building and online survey;
  - vi. reporting: draft report with emerging findings; and
  - vii. final report with conclusions and recommendations.
9. Besides, the evaluation benefited from a technical review, conducted by senior geospatial and modelling experts on the evaluation team.
10. For evaluating the results of capacity building, the team leader used the Kirkpatrick approach to evaluate the effects of capacity development for SEPAL, as previously applied in the United Nations context.<sup>1</sup> The evaluation captured knowledge, awareness, and practice changes and provided robust evidence.

## **Evaluation reach**

11. The evaluation reached 360 persons in total: 48 persons through interviews; 382 persons through the general online survey registering about 6 percent response rate; and 29 persons through a specific capacity-building online survey registering 20.4 percent response rate.

## **Sampling**

12. The evaluation used the most significant change approach for stratified sampling of specific project components. Following the document reviews and interviews in the inception phase, countries where the project left the deepest footprint with a geographic stratification were as follows: Costa Rica (in cooperation with academia); Ecuador (placement of project staff); Indonesia (peatland monitoring); Kenya (United Nations' Safe Access to Fuel and Energy); Uganda (REDD+ results to the United Nations Framework Convention on Climate Change UNFCCC); the Democratic Republic of the Congo (in cooperation with the United Nations); and Zambia.

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<sup>1</sup> For example, UNITAR/Engelhardt, A., 2021: Independent evaluation of the UNITAR Strategic Framework (2019–2020).

## Limitations

13. This evaluation did not encounter major limitations, given the good cooperation of the project team and the readily available documentation. Besides, FAO's evaluation manager played a proactive role throughout the entire evaluation process.
14. Due to the COVID-19 pandemic, no field visits could take place. The latter minor limitation for such a technical project was mitigated through two evaluation surveys (a general one and one specifically for capacity building); technical and general interviews; and virtual meetings, including a focus group discussion with users around the globe (and experiencing different bandwidth capacity).
15. The evaluation was unable to assess gender-disaggregated achievements, which is one of the evaluation objectives, as the project did not track such data, including for the user base. *Ex post*, it was not possible to reconstruct this data.
16. The key evaluation findings, conclusions, and evaluation recommendations are presented in the following figure.

### Executive Summary Figure 1. Key findings, conclusions, and recommendations

	Key findings of the evaluation	Conclusions	Recommendations for Phase II
Relevance	EQ 1: The project design changed over time. As the donor's priorities and user needs changed, the project team applied an adaptive management approach to ensure the relevance of SEPAL.	1. The project team took an adaptive management approach to maintain the project's relevance over the seven years of implementation.	No short- or medium-term recommendation, but a Practice 1 to keep applying. See also Lessons learned 1.
	EQ 2: The project's strategic vision was well developed and highly relevant.		
	EQ 3: The project team targeted users or potential users and partners through systematic outreach through FAO projects in REDD+ countries where opportunities emerged and were based on demand.	2. The project team's outreach was relevant and effective, based on a solid partnership approach.	R1: The project team was encouraged to build on its successful partnership approach and systematically apply it to future technical development, particularly capacity building. Secondments from partners to the SEPAL team were one way to operate accordingly.  Priority: very high: next three months.  See also Good practice 1
	EQ 4: As a technical project, SEPAL approached gender when delivering capacity-building events, but the final selection of nominees was out of FAO's control.	3. As a technical project, gender was not at the forefront of project implementation but considered for capacity building.	No short- or medium-term recommendation, but a Practice 2 to keep applying.
	EQ 5: As SEPAL kept developing, users' and partners' needs also changed, with many of those needs related to documentation, awareness raising, capacity building, communication, and systematic application by new user groups. A Plan B might be required to address SEPAL's dependency on Google Earth Engine.	4. Demand for changes to the intended use of the platform during Phase II emerged.	R2: The project team should address the following emerging needs in Phase II: <ul style="list-style-type: none"> <li>• Develop a Plan B in case it would be needed to address options to mitigate SEPAL's dependency on Google Earth Engine.</li> <li>• Provide documentation, such as a user manual, tutorials, or guidance, whether written or as videos to better understand and work with the available functions (e.g., algorithms), particularly new ones.</li> <li>• Significantly upscale SEPAL's outreach through: <ul style="list-style-type: none"> <li>○ Awareness raising, for example by using i) all relevant FAO projects; ii) all forest resource assessments; and iii) identifying and serving countries in need for Sustainable Development Goal (SDG) 15.1.1. reporting; and</li> </ul> </li> </ul>

	Key findings of the evaluation	Conclusions	Recommendations for Phase II
			<ul style="list-style-type: none"> <li>○ Capacity building; focusing on a training of trainers model in main project countries; and more systematic and formalized communication between SEPAL and its partners, for example, through monthly meetings.</li> <li>● Consider the demand for higher resolution data and the possibility to modify scripts.</li> </ul> <p>Priority: very high: next three months</p>
Coherence	EQ 6: The intended use of SEPAL results contributes to FAO and donor objectives expressed in the project document with contribution to the REDD+ reporting.	5. The project outcomes are congruent with FAO and the donor's objectives and the REDD+ vision.	See Practice to keep applying 1 and Lesson learned 1
	EQ 7: SEPAL fills gaps for REDD+ reporting through national capacity building for better forest monitoring and complements existing tools users apply, such as Google Earth Engine or Collect Earth by providing data analysis without the need for coding.	6. The SEPAL project is needs based and fills gaps of national forest authorities in REDD+ reporting and beyond.	See Practice to keep applying 3
Effectiveness	EQ 8: The project achieved 27 out of 29 output-level targets. At least three out of four outcome-level indicators were achieved, including tools and data for national monitoring, national institutions' capacity building, and a functioning platform.	7. The project showed a strong performance at the output level and made progress in achieving outcome-level results.	<p>R3: The project team should address the two partially achieved outputs: developing SEPAL documentation in French and Spanish and systematically applying monitoring and evaluation of capacity-building events.</p> <p>Capacity-building M&amp;E should use pre-, and post-course assessments, such as initial participant needs assessments and an evaluation questionnaire/survey after the course. For longer events beyond one day, the use of a complementary evaluation questionnaire/survey six months after the event could be applied to assess the use of knowledge/application of SEPAL.</p> <p>Priority: very high: next three months</p>
	EQ 9: The cloud-based approach reaches users predominantly in bandwidth-limited environments, enabling 73 percent of users.	8. SEPAL enabled participating countries to improve their REDD+ reporting.	

	<b>Key findings of the evaluation</b>	<b>Conclusions</b>	<b>Recommendations for Phase II</b>
	<p>EQ 10: A targeted outreach through FAO projects, a wide net of partners, and active participation in international events helped SEPAL identify intended users and reach them through capacity-building events.</p> <p>EQ 11: After the mid-term review, the project team acted upon recommendations and strengthened communication and outreach, investing significant efforts in capacity building in cooperation with partners. The overall satisfaction with the usefulness of the capacity-building events reached 72 percent.</p>	<p>9. The project team took the mid-term evaluation seriously and changed from a purely technical model into enhanced outreach, including capacity building. While results are encouraging, there is room for improvement concerning capacity building, despite receiving good support from SEPAL's partners.</p>	<p>See R1, 2, and 3 on capacity building.</p>
Efficiency	<p>EQ 12: SEPAL project management benefits from the strong continuity of its technical team but shows shortcomings in the quality of reporting to the donor. Partnership arrangements, while broadly appropriate, could at times benefit from more formalization.</p>	<p>10. Project management and partnership arrangements were appropriate and effective, with room for improving the formalization of some partnerships.</p>	<p>R4: The project team should consult its partners to assess which partners would welcome a formalization of the partnership, for example, through letters of agreement (LOAs) or memoranda of understanding (MOUs).</p> <p>Besides, project reporting should be more results based using both quantitative and qualitative indicators for the new log frame of Phase II, including systematically monitoring the outcome-level results and reporting those accordingly to the donor in its annual reports.</p> <p>The project team should also communicate its scheduled events to the donor before the events rather than only reporting about the event <i>ex post</i>.</p> <p>Priority: high: next three to six months.</p>
	<p>EQ 13: Donors' expectations for co-financing were not met, but in-kind contributions were significant, reaching 14 percent of SEPAL budget in the case of one academic partner. A modular approach could attract co-financing in Phase II, with NICFI funding SEPAL core costs and donors funding modules or services adapted to their development objectives.</p>	<p>11. It is challenging for other donors to contribute to a signed project agreement as they cannot shape the agreement anymore. This affected the co-financing of SEPAL.</p>	<p>R5: For SEPAL Phase II, the project team should identify and develop concept notes for specific modules outside the NICFI funding, which could be further negotiated and modified depending on potential donors' priorities. Engage potential donors and partners for resource mobilization accordingly.</p> <p>Priority: high: next three to six months</p>



	<b>Key findings of the evaluation</b>	<b>Conclusions</b>	<b>Recommendations for Phase II</b>
Sustainability	EQ 14: While it is not easy to systematically report quantifiable durable benefits of SEPAL, users were quick to answer what would happen if SEPAL would not exist. Issues transpired of loss of time saved increased complexity, costs, and ultimately less monitoring and reporting. Capacity building shows room for improvement. One quantifiable result is SEPAL's contribution to carbon credits for up to 120 000 people in Zambia's Eastern Province.	12. If SEPAL would not exist, it would need to be invented to ensure quicker, cheaper, and less complex forestry monitoring and reporting for today and the future.	No recommendation
	EQ 15: The role of the Kingdom of Norway as a long-term partner of SEPAL is crucial for an ongoing open-access, cloud-based solution. The risks for the sustainability of SEPAL's results within SEPAL's reach concern capacity building and staff continuity in its team. However, most risks are mainly beyond the project's mitigation capacity, such as pricing policies of cloud providers, cyber security issues, or the willingness of FAO to include server costs into its core budget at one point in the future.	13. Financially, the sustainability of SEPAL is ensured during Phase II, but many other risks are beyond the project's direct control.	R6: While many risks are outside the direct control of SEPAL, the project team should embark on a risk mitigation strategy, combined with an exit strategy for SEPAL to systematically plan for SEPAL's use once the Norwegian funding has ended.  Priority: high: next three to six months.  See also R 2 on a Plan B for the use of Google Earth Engine and R5 on funding.
	EQ 16: Strong coherence emerges between SEPAL and its partners, such as Collect Earth, the Central African Forest Initiative (CAFI), the Global Forest Observations Initiative (GFOI), the Open Foris Initiative, and many REDD+ related FAO projects and partnerships with academic institutions.	14. Strong coherence emerges between SEPAL and its partners, which is one approach to mitigate some risks to its sustainability.	
	EQ 17: The evaluation found examples of the replicability of SEPAL's use beyond the initial objective of REDD+ reporting in countries such as Ecuador, Indonesia, Uganda and Zambia.	15. SEPAL's framework is sufficiently robust for scaling up and replication. At the same time, the technical analysis identifies specific actions to strengthen its robustness further.	R7: Continue the parallel development of Amazon Web Services (AWS) and Google Earth Engine (GEE) solutions, both to cater to users that need the additional flexibility of AWS-based solutions and promote sustainability and reduce risk if the GEE platform becomes unavailable as a Plan B scenario.  R 8: Work with the GEE team to improve authentication and related technical barriers to data sharing within the SEPAL platform; GEE integration should be entirely transparent to an end user if it is the preferred mode of computation.  R 9: Dedicate a resource to documentation for end users, including curated tutorials and guides. Also, consider a Wiki framework for storing help pages, all having the same structure. Related to this, example scripts should be subjected to regular
	EQ 18: Despite the risks identified in this evaluation, SEPAL is well positioned to serve an increased user base, as staff beyond technical experts can use the platform, informing real-time land use management.		

	<b>Key findings of the evaluation</b>	<b>Conclusions</b>	<b>Recommendations for Phase II</b>
			<p>testing to ensure errors do not emerge over time due to updates of the SEPAL platform.</p> <p>Implement a video platform storing help videos.</p> <p>R10: Increase the efficiency of some of the developed algorithms, according to the focus group's suggestions.</p> <p>Priority: high: next three to six months.</p>

Source: Elaborated by the evaluation team.



# **1. Introduction**

## **1.1 Purpose of the evaluation**

1. This final evaluation of the project "System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring" (SEPAL) was conducted for both accountability and learning purposes of the donor; the Food and Agriculture Organization of the United Nations (FAO); project partners; and other participating institutions.
2. The evaluation documents essential lessons to guide Phase II and other relevant future actions. It serves as an input to improve the formulation and implementation of projects that may use similar approaches. Specifically, it presents strategic recommendations to maximize performance in Phase II while at the same time providing accountability to the donor and FAO about the results and implementation of Phase I, as outlined in the TORs.

## **1.2 Intended users**

3. The primary audience and intended users of the evaluation are:
  - i. FAO; the Project Management Team; members of the Project Task Force who will use the findings and lessons identified in the evaluation to finalize project activities; plan for sustainability of results achieved, and improve the formulation and implementation of similar projects;
  - ii. project governance and implementation bodies, such as the project's advisory group;
  - iii. the national government counterparts, Reducing Emissions from Deforestation and Forest Degradation (REDD+) countries;
  - iv. FAO headquarters and technical division (Forestry);
  - v. the donor, Norway's International Climate and Forest Initiative (NICFI), who can use the findings to inform strategic investment decisions in the future in addition to the SEPAL Phase II;
  - vi. other donors, organizations and institutions interested in supporting and/or implementing similar remote sensing projects that could benefit from the evaluation report; and
  - vii. other FAO projects, current and upcoming, which address REDD, the Global Forest Resources Assessment, and other similar initiatives.

## **1.3 Scope and objective of the evaluation**

4. The scope of the evaluation is Phase I of SEPAL. The final evaluation encompasses the entire project of global scope, with all its project outputs. The project's goal can be described as supporting REDD+ countries to "monitor and report routinely and sustainably on the state of their national forests, carbon stocks, and associated greenhouse gas fluxes, enabling improved forest management and reduced deforestation and degradation". The primary outcome of the project is for "relevant institutions in participating REDD+ [to] have the capacity to produce annual estimates of the state and trend of their forest resources" achievable through four outputs:

- i. Output 1. Project management and participation are established.
  - ii. Output 2. SEPAL is established and providing selected countries access to relevant satellite data and processing capabilities to produce forest information products.
  - iii. Output 3. Relevant institutions in participating REDD+ countries are capable of using SEPAL.
  - iv. Output 4: Relevant institutions in participating REDD+ countries select, access, and process the relevant remote sensing data they need to produce biannual estimates of change in forest and carbon stocks.
5. The objectives of the final evaluation are to:
- i. examine the extent and magnitude of the project achieving its stated objective and outcomes to date and determine the likelihood of future impacts especially relating to environmental sustainability due to changes following the project's interventions;
  - ii. provide an assessment of the project's performance, gender-disaggregated achievements, and the implementation of planned project activities and planned outputs against actual results; and
  - iii. synthesize lessons learned that may help design and implement future FAO, as well as NICFI; land degradation; sustainable land and forest management; land use, land-use change; and forestry and/or climate change-related initiatives.
6. The evaluation TOR listed the following numbered evaluation questions using the Organisation for Economic Cooperation and Development's Development Assistance Committee (OECD/DAC) evaluation criteria, validated during the inception phase and re-ordered by evaluation criteria, as required. As stated in the inception report, out of the original 21 evaluation questions listed in the TOR, the inception phase found that 18 were relevant, for example, given the potential to merge evaluation questions with similar ones.

### **Relevance<sup>2</sup>**

- i. How relevant was the project design in supporting the activities and expected results?
- ii. How developed and relevant is the strategic vision employed by the project, including through partnerships?
- iii. Was the manner in which the SEPAL target users were identified congruent with its objectives and considerations for project effectiveness and inclusivity? Why or why not?
- iv. Were gender equality considerations adequately reflected in project objectives and design? Were gender equality considerations taken into account in project implementation and management?
- v. Shall the intended use of the platform change in any way based on user needs, that is, do user needs now differ from the original conception?

### **Coherence**

- i. Are the project outcomes congruent with FAO and the donor's objectives, that is, FAO Strategic Objectives and the REDD+ vision?
- ii. How did it fill a gap or complement existing mechanisms for REDD+ support?

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<sup>2</sup> The original evaluation question concerning Indigenous Peoples' communities is deleted from the list of evaluation questions, as this was not a project focus, as revealed in inception interviews with the project team: "Did the project adequately consider the needs of and reach Indigenous Peoples' communities?".

### **Effectiveness**

- i. What results (stated outputs and outcomes, with a focus on outcomes) have been achieved, and which factors affected the effectiveness or ineffectiveness of the project in achieving results?
- ii. Did, and how, did SEPAL enable countries with limited computing resources and bandwidth to produce high-quality activity data for reporting on REDD+ specifically?
- iii. To what extent have SEPAL's activities extended to the intended users and uses? If the project did reach all or the majority of its intended users, what success factors allowed it to do so?
- iv. How has the project worked to ensure that users had the capacity to apply the SEPAL tool to their particular use? What capacity-building and outreach strategies did the project use, and how effective were they? Would the evaluation recommend that any changes be made?

### **Efficiency<sup>3</sup>**

- i. To what extent were the project management and partnership arrangements appropriate and effective? Areas to consider include management, financial, and human resources; project communications; and costs.
- ii. Which factors either enabled or hindered the materialization of the planned co-financing? What conclusions for Phase II of the project can be gained from these insights?

### **Sustainability<sup>4</sup>**

- i. What quantitative (quantifiable) and qualitative (descriptive and conceptual) higher-level and durable benefits has the project achieved?<sup>5</sup>
  - ii. How sustainable are the project results and what are the risks, particularly financial and governance/institutional risks?
  - iii. How, if at all, does the project's coherence with other initiatives contribute to the likelihood of sustainability?
  - iv. Has SEPAL led to other changes, including scalable or replicable results?
  - v. Is the framework sufficiently robust for scaling up, given the plans to increase users in the next phase<sup>6</sup> (considering IT, organizational and HR aspects)?
7. Additionally, the technical evaluation experts identified technical review questions included in the evaluation matrix.

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<sup>3</sup> Evaluation question 12 subsumes a very similar original evaluation question listed in the TOR: "To what extent were the project management and partnership arrangements appropriate (i.e. promoted SEPAL's compatibility with other existing interventions) and effective?"

<sup>4</sup> Evaluation question 13 subsumes a very similar original evaluation question listed in the TOR: "How has the project worked to ensure funding from sources other than the main donor? How can this be secured in the future?"

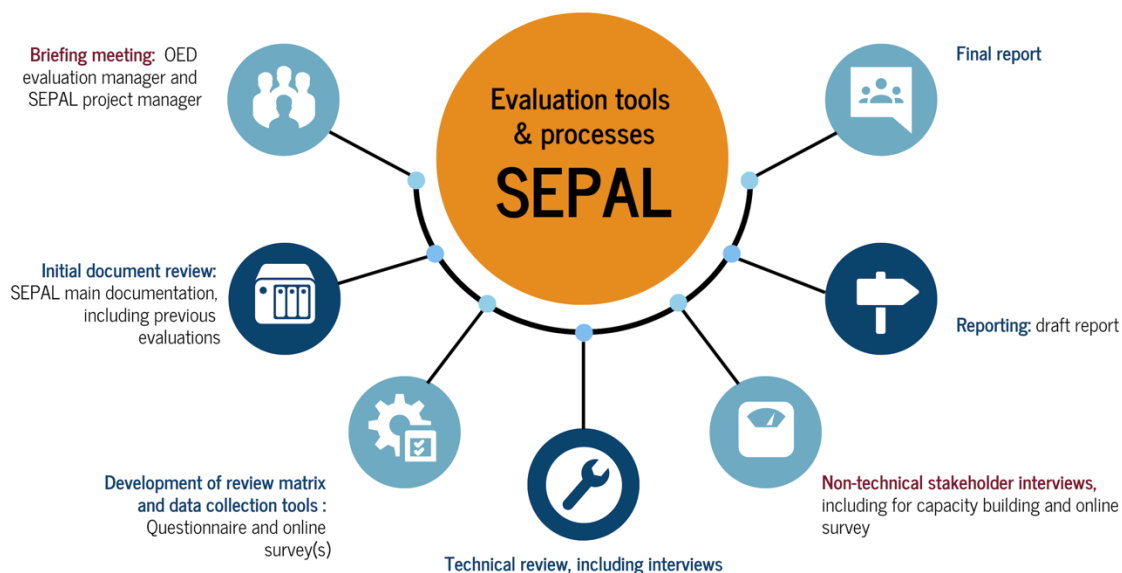
<sup>5</sup> i.e. long-lasting improved REDD+ reporting from countries with limited resources (as defined above in the Evaluation questions table); durable capacity building that is institutional focused.

<sup>6</sup> The evaluation can also recommend, in case it is found that the framework is not robust enough, how to make it more robust.

## 1.4 Methodology

8. The evaluation consisted of the following steps, as outlined in Figure 1.

**Figure 1. Main steps in the final evaluation of SEPAL**



Source: Elaborated by the evaluation team.

9. The evaluation process contained the following steps:

- i. briefing meetings with evaluation manager and project manager;
- ii. initial document review;
- iii. development of evaluation matrix and data collection tools;
- iv. technical review, including interviews;
- v. non-technical stakeholder interviews, including for capacity building and online survey;
- vi. reporting: draft report with emerging findings; and
- vii. final report with conclusions and recommendations.

10. The technical review was conducted by senior geospatial and modelling experts on the evaluation team. It included the following methodology:

- i. desk review of implementation documents and other related documents;
- ii. review of academic literature to identify uses of SEPAL.IO outside of FAO and related agencies;
- iii. review the costs of technical services from a cloud provider to determine the real use of elements of the SEPAL.IO system;
- iv. review the cadence of new user registrations and rationale(s) provided for registration;
- v. review of the actual creation of instances on a cloud provider, which provisioned the analytic capability for a range of SEPAL.IO functions;
- vi. semi-structured interviews with the technical team, users, and other stakeholders; and
- vii. voluntary responses from a survey and a focus group of SEPAL.IO users.<sup>7</sup>

<sup>7</sup> The focus group included participants from the Federal Democratic Republic of Ethiopia, the republic of India, the Republic of the Union of Myanmar, the Republic of Uganda, the republic of South Africa, and the European Union countries.

11. While the technical review has been duly shared with the SEPAL team, it is not included, in its entirety, in this evaluation report. Instead, findings, conclusions, and recommendations from the technical review are reflected in this evaluation report insofar as they respond to the evaluation questions.
12. Reach: the evaluation reached 360 persons in total: 48 persons through interviews; 382 persons through the general online survey registering about a 6 percent response rate;<sup>8</sup> and 29 persons through a specific capacity-building online survey registering a 20.4 percent response rate.
13. Sampling: in principle, the evaluation considered all the countries where the SEPAL has been active and covered them through a sampling approach. Additionally, due to the particularities of this project (SEPAL being an online system) and the limitations posed by the coronavirus disease 2019 (COVID-19) pandemic, project sites were not visited, and the evaluation was conducted remotely.
14. The evaluators used a purposeful stratified sampling approach using the most significant change approach, that is, where SEPAL left the deepest footprint in project countries. This approach had the highest likelihood of capturing valuable learning for Phase II of SEPAL compared to a random sampling approach.
15. Following the document reviews and interviews in the inception phase, countries where the project left the deepest footprint with a geographic stratification were as follows: Costa Rica (in cooperation with academia); Ecuador (placement of project staff); Indonesia (peatland monitoring); Kenya (United Nations' Safe Access to Fuel and Energy); Uganda (REDD+ results to the United Nations Framework Convention on Climate Change [UNFCCC]), the Democratic Republic of the Congo (in cooperation with the United Nations); and Zambia.<sup>9</sup>
16. General user survey: this survey was designed with a twofold objective. One was to gain feedback about users' perspectives on the technical merits and challenges of the platform, that is, on the quality and relevance of the satellite imagery data. Second, to provide direct inputs into some of the evaluation questions, that is, "Did the product(s) you produced with SEPAL contribute to outcomes associated with REDD, REDD+, or mitigating deforestation more broadly?". The optional "free text" comment boxes allowed users to share additional information in relation to almost all survey questions. Finally, the survey asked users to share their "dream scenario" for SEPAL to respond to their needs and/or to create a data-driven impact. The survey questionnaire is provided in Appendix 4 of this report.
17. Evaluating capacity building: The team leader used the Kirkpatrick approach to evaluate the effects of capacity development for SEPAL, as previously applied in the United Nations context.<sup>10</sup> The evaluation captured knowledge, awareness, and practice changes and provided robust evidence.
18. Kirkpatrick's model was presented in 1975 (Kirkpatrick, 1975). The model remains the most widely used model for evaluating training (Kotvojs, 2009). It seems particularly relevant to this evaluation due to SEPAL's frequent use of capacity building. The model is also recommended in the FAO

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<sup>8</sup> The survey was sent to all users, but many email addresses of registered users have since become obsolete, making it difficult to determine exact response rate.

<sup>9</sup> In the inception report, Saint Vincent and the Grenadines was proposed as an additional country in the context of emergency rapid resource assessments. However, the project team deemed that the responsiveness of stakeholders would be higher in the cases of SEPAL activities in the Republic of Costa Rica, the Democratic Republic of the Congo and the Republic of Zambia. Hence, the geographic sampling was amended accordingly.

<sup>10</sup> For example, UNITAR/Engelhardt, A., 2021: Independent evaluation of the UNITAR Strategic Framework (2019-2020).



Office of Evaluation's Capacity Development Evaluation Framework. The four levels assessed in the model are as follows:

- i. reaction: what the participants thought and felt about the training;
  - ii. learning: the resulting increase in knowledge, skills or changes in attitude;
  - iii. behavior: the extent of on-the-job behavior change by the participant due to the training and capability improvement and implementation/application; and
  - iv. results: the effects on the business or environment resulting from the participant's performance. This is the impact of the training on the participant's organization and their clients, for example, whether an organizational change was generalized or whether the output was used to address other problems or issues.
19. The team leader used a knowledge, attitude and practice (KAP) survey to implement the Kirkpatrick model practically.

### **Box 1. KAP survey: what and why**

#### **What is a KAP survey?**

A KAP survey usually is conducted to collect information on the knowledge (i.e. what is known); attitudes (i.e. what is thought); and practices (i.e. what is done) about general and/or specific topics of a particular population (WHO, 2014).

#### **Why conduct a KAP survey?**

A KAP survey can generate data that can be used for the following purposes (WHO, 2014):

- to identify knowledge gaps, cultural beliefs, and behavioural patterns that may identify needs, problems, and barriers to help plan and implement interventions;
- to deepen the understanding of commonly known information, attitudes, and factors that influence behaviour; and
- to generate baseline levels and measure changes that result from interventions.

*Source: WHO. 2014. Knowledge, attitudes and practices (KAP) surveys during cholera vaccination campaigns: Guidance for oral cholera vaccine stockpile campaigns. Working group and monitoring and evaluation.*

20. Bhattacharyya (1997) and Stone and Campbell (1984) analysed the attractiveness of KAP surveys which seems attributable to characteristics such as a straightforward design; quantifiable data; ease of interpretation; concise presentation of results; generalizability of small sample results to a broader population; cross-cultural comparability; speed of implementation; and the ease with which one can train enumerators (Launiala, n.d.).
21. The use of a KAP survey focused on assessing the project's capacity-building components in levels 2, 3, and 4 of the Kirkpatrick model. The survey is presented in Appendix 3.

## **1.5 Limitations**

22. This evaluation did not encounter major limitations, given the good cooperation of the project team and the readily available documentation. Besides, FAO's evaluation manager played a proactive role throughout the entire evaluation process.
23. Due to the COVID-19 pandemic, no field visits could take place. The latter minor limitation for such a technical project was mitigated through two evaluation surveys (a general one and one

specifically for capacity building); technical and general interviews; and virtual meetings, including a focus group discussion with users around the globe (and experiencing different bandwidth capacity).

24. The evaluation was unable to assess gender-disaggregated achievements, which is one of the evaluation objectives, as the project did not track such data, including for the user base. *Ex post*, it was not possible to reconstruct this data.

## **1.6 Structure of the report**

25. The report starts with presenting the findings for all evaluation questions grouped by evaluation criteria. Key findings are highlighted at the beginning of each subsection for each criterion.
26. Subsequently, lessons learned and good practices are identified before drawing conclusions, thoroughly based on the key evaluation findings. The main body of the report concludes with the evaluation's recommendations.

The following appendices and annexes accompany the report:

- i. TORs for the evaluation;
- ii. documents reviewed;
- iii. list of people interviewed;
- iv. evaluation matrix; and
- v. data collection tools, including survey questions.



## **2. Background and context of the project**

### **2.1 Context of the project**

27. SEPAL began in 2015, with the support of Norway's International Climate and Forest Initiative (NICF). According to the project document, this global project primarily supports FAO's Strategic Objective 2: "Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner."
28. The project's budget was USD 7.2 million and increased to USD 9.59 million (FAO, 2021) following a project amendment. The project concluded by the end of December 2021. At the same time, Phase II of SEPAL was launching.
29. The SEPAL project (hereafter "the project") is closely linked with the UN-REDD programme. It aims to address the challenges countries face when developing forest monitoring systems due to difficulties accessing and processing remotely sensed data. SEPAL is a cloud-based computing platform for fast access and processing of remotely sensed data sources. It is designed to assist national forest monitoring and reporting for the REDD+ mechanism. The project's goal can be described as supporting REDD+ countries to "monitor and report routinely and sustainably on the state of their national forests, carbon stocks and associated greenhouse gas fluxes, enabling improved forest management and reduced deforestation and degradation". The project's primary outcome is for "relevant institutions in participating REDD+ [to] have the capacity to produce annual estimates of the state and trend of their forest resources" achievable through four outputs listed in the introductory section.
30. According to the project document, "The main participants of the project are REDD+ countries with reporting commitments or countries with the desire to participate in REDD+. More specifically, this involves relevant national institutions designated as the reporting entity on forests, the environment, and/or climate change." Since its inception, the project has grown in scope. For instance, according to the project's communications materials, SEPAL now has 5 500 users from 180 countries. See also section on the mid-term review below.
31. The project's end date has been set for the end of 2021. However, Phase II of the project has already been approved. Similar to Phase I, it will be implemented by the National Forest Monitoring Team (NFM) in FAO's Forestry Division (NFO). The implementation period is five years, with an estimated budget of USD 12 million.
32. The present evaluation is a final evaluation of the project (Phase I) and will feed into learning for Phase II implementation.

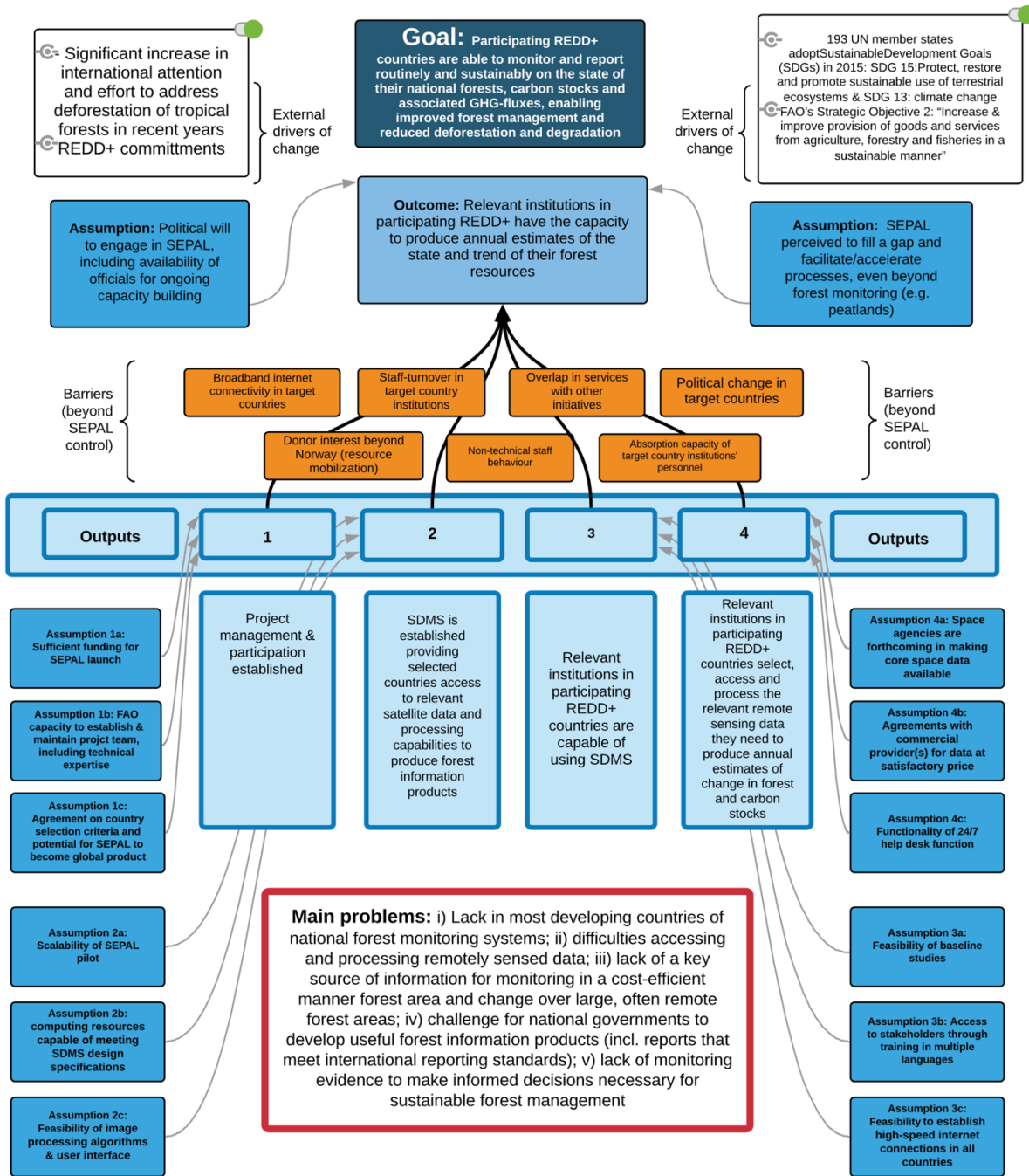
### **2.2 Theory of change**

33. Figure 2 presents SEPAL's reconstructed theory of change (TOC). The following paragraphs describe and analyse the TOC.
34. Description: the TOC, from bottom to top, lists the main problems which SEPAL aimed to address, followed by the four project outputs. For each output, the evaluation identified three assumptions. Those assumptions need to hold for the output to be delivered, such as the sufficiency of funding to launch SEPAL. Between the outputs and the outcomes are listed barriers in orange blocks, highlighting obstacles for SEPAL that are beyond its control and reach but require careful monitoring for the project to adapt its implementation accordingly. One example is an overlap of

services with other initiatives. In this case, SEPAL would need to engage with those initiatives to find coherent solutions to avoid the duplication of efforts. Another example concerns donor interests, which in SEPAL's case resulted in a focus on Ecuador and the development of early warning modules on the platform based on the interests of another donor.

35. Two key assumptions accompany the outcome level before reaching the project goal at the top of the TOC. External drivers of change accompany the goal level, which are beyond the control of SEPAL but have a catalytic effect on the project delivery.
36. Analysis: even though the project document did not require a formal TOC of SEPAL, the evaluators managed to reconstruct the TOC based on information contained in the project document and using the key informant interview with the project manager.
37. The problem analysis expressed in the project document in 2015 seems valid and remains to be so. Those problems include:
  - i. lack of national forest monitoring systems in most developing countries;
  - ii. difficulties in accessing and processing remotely sensed data;
  - iii. lack of a key source of information for monitoring forest area and change over large, often remote forest areas in a cost-efficient manner;
  - iv. challenge for national governments to develop useful forest information products, including reports that meet international reporting standards; and
  - v. lack of monitoring evidence to make informed decisions necessary for sustainable forest management.
38. The evaluation found that the results pathway from outputs to outcomes and the project goal logically connects the projects' results levels. The combination of outputs, establishing project management, developing the platform, creating user capacities in relevant institutions and data access and processing for annual reporting contributes to the project outcome: "Relevant institutions in participating REDD+ countries have the capacity to produce annual estimates of the state and trend of their forest resources." This results in capacity building, which, in turn, contributes to the ability for routine monitoring and reporting in participating REDD+ countries, which is the project goal.
39. The validity of all reconstructed assumptions seems largely a given. The only assumption that appears to hold is the feasibility of establishing high-speed internet connections in all participating project countries. While internet connectivity was no problem to use SEPAL in six central African countries with a notoriously challenging internet setting, national institutions in at least two other countries listed limitations in internet connectivity as an obstacle to broadly using SEPAL.

**Figure 2. Reconstructed theory of change of SEPAL, Phase I**



Notes: Acronyms: greenhouse gas (GHG), Space Data Management System (SDMS).

Source: Elaborated by the evaluation team, January 2022.

40. The reconstructed barriers listed in the TOC were reflected during some of the evaluation interviews, such as with SEPAL stakeholders. Concerning the barriers, SEPAL delivered, for example, a series of webinars to mitigate the barrier of staff turnover in government institutions. The evaluation finds that this mitigation strategy was largely successful but finds it less sustainable, with the option of a training of trainers model transpiring as an alternative option. This option, suggested by one stakeholder, is further explained in the evaluation report’s sustainability section.

41. At the outcome level, the assumption concerning the political will and the availability of officials for ongoing capacity building seems a given, based on the broad interest of government institutions to participate in this evaluation and officials calling for further capacity building. The second outcome-level assumption also holds, with stakeholders verifying that SEPAL fills a gap and would need to be reinvented if it did not exist.
  
42. External drivers of change catalysing the project delivery are the increased attention to deforestation, which still is the case, as experienced in late 2021 during the Conference of the Parties (COP26) in Glasgow, and forestry related commitments of many governments. At the same time, REDD+ commitments were in place in 2015, which is still the case. National governments committed to the Sustainable Development Goals (SDGs), including SDG 15 on protecting or restoring ecosystems and SDG 13 on climate change. Finally, FAO's objective 2 serves as a driver of change, given SEPAL's contribution to providing services from forestry, agriculture, and fisheries, which should serve as an incentive to use FAO.

### 3. Key findings by evaluation questions

#### 3.1 Relevance: Was SEPAL doing the right thing?

##### Box 2. Summary of evaluation findings: SEPAL relevance

*EQ 1: The project design changed over time. As the donor's priorities and user needs changed, the project team applied an adaptive management approach to ensure the relevance of SEPAL.*

*EQ 2: The final evaluation found that the project's strategic vision was well developed and highly relevant.*

*EQ 3: The project team targeted users or potential users as well as partners through systematic outreach and FAO projects in REDD+ countries where opportunities emerged and based on demand.*

*EQ 4: As a technical project, SEPAL approached gender when delivering-capacity building events, but the final selection of nominees was out of FAO's control.*

*EQ 5: As SEPAL kept developing, users' and partners' needs also changed, with many of those needs related to documentation, awareness raising, capacity building, communication, and systematic application by new user groups. A Plan B might be required to address SEPAL's dependency on Google Earth Engine.*

Source: Elaborated by the evaluation team.

*EQ 1. How relevant was the project design in supporting the activities and expected results?*

**Finding 1.** The final evaluation found that the project design changed over time. As the donor's priorities and user needs changed, the project team applied an adaptive management approach to ensure the relevance of SEPAL.

43. The initial project design had a strong technical focus, a small core use group of about 100 users, and designated pilot countries, mainly related to REDD+ projects, which is also reflected in the mid-term evaluation results in 2017 (Neeff, 2017). Since 2017, the project has reached a broader user group, with users from any country around the globe able to join.
44. Based on several proxy indicators, the project design's relevance and changes seemed high. The evaluation's user survey reached 382 SEPAL users, resulting in nearly 91 percent positive responses related to the relevance of the satellite imagery data provided in SEPAL. Concerning the relevance of SEPAL training events to participants' needs<sup>11</sup> and the timeliness of training,<sup>12</sup> ratings reached 79 percent.
45. Figure 33 provides insights into the rationale for SEPAL user registration. Out of the 8 404 registered SEPAL users,<sup>13</sup> 2 438 indicated "forests" and "monitoring" as the reason for registering. The technical analysis of SEPAL user registration includes other reasons such as "data," "change," "learn," "classification," "REDD," "peatland," or "mosaic".

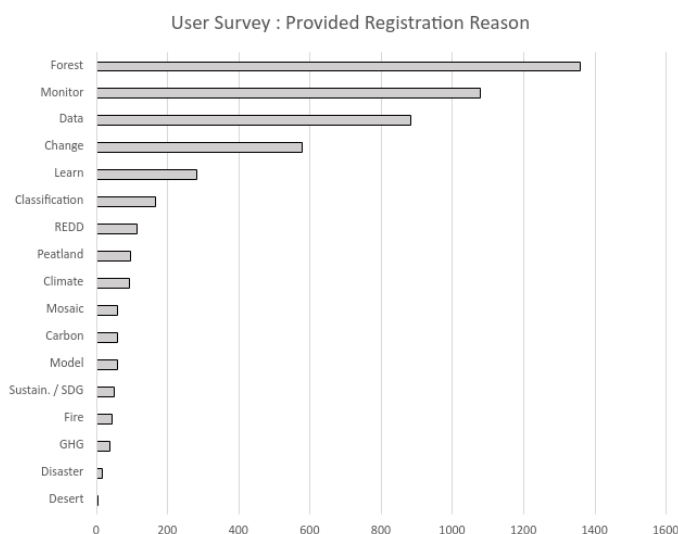
<sup>11</sup> n = 28.

<sup>12</sup> n = 27.

<sup>13</sup> May 2017 to October 2021.



**Figure 3. Reasons for SEPAL registration – user analysis**



Source: SEPAL.io user registration statistics, May 2017 to October 2021, n=8 404.

46. On a qualitative basis, Table 1 **Error! Reference source not found.** summarizes the relevance of SEPAL for stakeholders interviewed during the evaluation process. Depending on the use of SEPAL, its relevance also changed. While the qualitative analysis confirmed the main use of SEPAL for forest monitoring, issues of forest fires, deforestation, the cocoa supply chain, and forest management planning for refugee settlements emerged and constitute an additional area of SEPAL’s relevance.
47. Stakeholders identified some main technical elements contributing to SEPAL’s relevance, such as accelerating processes enabling close to real-time monitoring results, the availability of programmed algorithms, and the user-friendly interface. Besides, the technical analysis performed by the evaluation team revealed the notable lower cloud costs compared to on-premise alternatives.

**Table 1. Relevance of SEPAL for selected stakeholders**

Stakeholder	Overarching relevance: SEPAL use	Specific SEPAL relevance
NICFI, donor	Better information for natural resource management in governments Use of FAO mandate and global network	Move from local data storage to centralized one to save money Quicker and cheaper estimates
Democratic Republic of the Congo Forest Inventory and Management Department	Deforestation monitoring CO2 reporting to UNCFF	Quicker processes More frequency of multiple data
Copper Belt University, Zambia	Forest monitoring	Downloading processed imageries Use of indices
Satellite Monitoring for Forest Management (SMFM) toolkit	Dry forest monitoring (Mozambique, Namibia, Zambia)	Better user interface than comparable platforms Adaptability of SEPAL and trust in SEPAL’s continuity
Forestry Department, Ecuador	Forest monitoring, early warning	Direct access to scripts and huge cloud-based data volume Quicker processes, better real-time responses to government queries

Stakeholder	Overarching relevance: SEPAL use	Specific SEPAL relevance
Global Forest Observations Initiative (GFOI)	Forest monitoring and conservation	Often only truly available open platform SEPAL: setting global standard
World Wide Fund for Nature (WWF)	Forest conversion in Kavango-Zambesi basin	Quicker processes: algorithms already programmed
FAO's Safe Access to Fuel and Energy (SAFE)	Forest management planning for refugee settlements with United Nations High Commissioner for Refugees (UNHCR) (Uganda)	Complements methodology for assessing fuelwood supply and demand
Peking University	Reforestation and climate change	Tool freely published on SEPAL
Centre for High Technology, Costa Rica	Deforestation monitoring	Quicker processes, nearly real-time algorithms already programmed; combines Sentinel and Landsat data
European Forest Institution (EFI)	Forest monitoring: European Union (EU) regulation on deforestation in supply chain (cocoa in West Africa)	No coding required, no need to download images Empowers non-technical experts
Ministry of Forestry, Indonesia	Validation for land cover change and forest fires	Access to high-resolution images to support own data Use of mosaics but challenges with Internet connectivity
Wageningen University	Global forest monitoring using satellite and on the ground data	Uptake of advanced research tools through SEPAL
Central African Forest Observatory	Land cover mapping	User-friendly interface but challenges in technical capacities
National Forestry Authority, Uganda	Forest monitoring: evidence-based management decision making	Quicker processes, easy to download. Imagery already processed, algorithm added to the platform A one-stop-shop, cloud storage

Source: Evaluation interviews, 2021/2022.

48. The technical part of the SEPAL evaluation found that the project design was relevant from a technical point of view, as presented in the box below. The assessment of the relevance of selected satellite imagery and cloud-based infrastructure follows this subsection's final paragraphs.

### Box 3. Functional relevance of SEPAL

SEPAL ensures online calculation with memory stored on servers rather than on single computers, allowing users with slow connection to perform bandwidth-heavy analysis.

The project is centered on facilitating remote sensing analysis by providing access to standardized, repeated measures of the Earth surface based on satellite data at different spatial, spectral, and temporal scales. SEPAL allows an approach to face major ecological analysis, for example, related to the impacts of future climate change, habitat loss and land-use change.

SEPAL's design supported multiple results of interest, including a large number of users, scalability, and use of the tool for purposes of forest monitoring. SEPAL also made an attempt to standardize and improve remotely sensed environmental variables for other potential uses, related, for example, to biodiversity monitoring, ecosystem conservation, and multitemporal change analysis.

The functionality of the platform (i.e., what algorithms were chosen to implement) is based on both international reporting requirements and user demand. In each case, selection is based on best available information from peer-reviewed literature and related best practices.

Source: Elaborated by the evaluation team.

49. Relevance of the selected satellite imagery: the imagery selected is appropriate for the performed analysis. Most users seem to rely on Landsat data. Providing additional specific tools for Sentinel

would be a crucial step to build robust data cubes and perform analysis with higher spatial and temporal resolutions.

50. Relevance of the cloud-based infrastructure: While the relevance is high, room for improvement emerges. It might be helpful to use training platforms like Kaggle to link SEPAL with, for example, the ecological community, and with organized knowledge straightforwardly explained. The whole system should be reliable and operational in terms of infrastructure and data/analysis delivered to different researchers worldwide.

*EQ 2. How developed and relevant is the strategic vision employed by the project, including through partnerships?*

**Finding 1.** The project's strategic vision is well developed and highly relevant.

51. SEPAL is used across several workstreams in FAO's Forestry Division, including the Norwegian-funded project titled "Transparent reporting on global forestry resources". SEPAL also supported Forestry Division's work on calculating Sustainable Development Goal (SDG) indicator, SDG 15.4.2, the Mountain Green Cover Index.
52. For NICFI, the Norwegian donor, SEPAL constituted a strategic research and development investment. Once the proof of model was given, SEPAL started fulfilling the expectation that it would replace local data centres in public institutions and makes land-use monitoring more efficient through cloud computing.
53. FAO Member States such as the Democratic Republic of the Congo and Ecuador use SEPAL strategically to research and analyse forest cover changes for statistical purposes and to inform policymakers. Representatives from the European Commission and United Nations Development Programme (UNDP) underscored the importance of SEPAL for forest monitoring in the United Nations and its Member States, as in the case of the Central African Forest Initiative (CAFI) benefiting six countries.
54. SEPAL formalized partnerships, for example, with Peking University and Wageningen University, and signed memoranda of understanding (MOUs), for instance, with the Japan Aerospace Exploration Agency (JAXA).

*EQ 3. Was the manner in which the SEPAL target users were identified congruent with its objectives and considerations for project effectiveness and inclusivity? Why or why not?*

**Finding 3.** The project team targeted users or potential users and partners through systematic outreach and FAO projects in REDD+ countries where opportunities emerged and based on demand.

55. The stakeholder interviews revealed that users or potential users were targeted through SEPAL's strategic engagement with national forestry departments or related authorities; FAO projects in REDD+ countries; and based on demand or opportunities, for instance during international conferences.
56. In the case of Peking University, an inception webinar reached over 100 stakeholders, resulting in expressions of interest for further information about SEPAL. The latter was then delivered through a roadshow in those countries. Other rationales for cooperation are shown in the box below.
57. The evaluation team also enquired about inclusion issues and SEPAL's reach of Indigenous Peoples communities. The donor NICFI clarified that the strength of FAO was its engagement at

the ministerial level and that Norway had complementing projects to address communities and Indigenous Peoples.

58. Based on this understanding, the project did not target Indigenous Peoples' communities, bearing in mind that the REDD+ process uses a national-level focus under the Warsaw framework.

*EQ 4. Were gender equality considerations adequately reflected in project objectives and design? Were gender equality considerations taken into account in project implementation and management?*

**Finding 4.** As a technical project, SEPAL approached gender when delivering capacity-building events, but the final selection of nominees was out of FAO's control.

59. Stakeholders observed that SEPAL encouraged female participation in its events. However, as partners such as governments nominated trainees for workshop participants, the final gender composition of cohorts was beyond SEPAL's reach.

"We employed women as consultants in the CAFI study, and gender sensitivity should always be applied when selecting who gets trained." - SEPAL stakeholder

60. The evaluation survey targeting beneficiaries of SEPAL capacity building in 2021<sup>14</sup> resulted in 76 percent male responses and 24 percent female ones, with a higher female participation in Francophone Africa at 30 percent.

61. The evaluation also found that user data is not gender-disaggregated, which is a shortcoming for monitoring purposes.

*EQ 5. Do user needs now differ from the original conception?*

**Finding 5.** As SEPAL keeps developing, users' and partners' needs also change, with many of those needs related to documentation, awareness raising, capacity building, communication, and systematic application by new user groups. A Plan B might be required to address SEPAL's dependency on Google Earth Engine (GEE).

62. As SEPAL developed and new modules and functionalities become available, some users noted a lack of documentation, such as a user manual, tutorials, or guidance to better understand and work with the available functions. This includes a need expressed by some users to understand the algorithms better. Suggestions were made to make this information available through short videos, complementing written documentation.

"The SEPAL platform itself is immensely useful. It provides a great wealth of observation resources for countries which previously had no access. SEPAL unlocked an immense potential for observation, but more awareness raising is required to communicate that SEPAL is an open platform and not for FAO only." - SEPAL stakeholder

63. Other emerging needs for SEPAL include:
- i. possibility to modify scripts;
  - ii. demand for higher resolution data (e.g., for urban monitoring/planning purposes);
  - iii. upscaling of capacity building using a training of trainers model;

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<sup>14</sup> n= 29, 20,4% response rate (29 out of 142).

- iv. awareness raising and increasing outreach for countries in need of SEPAL solution (see also text box above);
  - v. more systematic use of SEPAL in forest resource assessments (FRA) to improve FRA quality and target existing user group;
  - vi. SDG 15.1.1 reporting on forest areas and target new user group, often in statistics authorities; and
  - vii. more systematic and formalized communication between SEPAL and its partners, for example, through monthly meetings.
64. The technical review of the evaluation finds that a Plan B might be required to address the dependency on Google Earth Engine, which might become a commercial tool and increase SEPAL costs.
65. Several remote-sensing approaches are available in SEPAL, including challenging analyses tasks such as the Tool for performing pixel-based time series analysis of Landsat Surface Reflectance data (BFAST), satellite image time series (SITS), and Forest Canopy Disturbance Modelling (FCDM). Complex automated methods can be applied to large amounts of data, and even non-remote sensing specialists gain the ability, via SEPAL, to work with remote sensing analysis workflows. One potential issue is that currently, SEPAL appears to be based exclusively on the GEE. Plan B solutions are encouraged to allow additional platforms to be linked with SEPAL. The evaluation's technical review recommended the parallel development of Amazon Web Services and GEE solutions to cater to users who need the additional flexibility of Amazon-based solutions and promote sustainability and a Plan B scenario.

### 3.2 Evaluation question on coherence: How well does SEPAL fit?

#### Box 4. Summary of evaluation findings: SEPAL coherence

*EQ 6: The intended use of SEPAL results contributes to FAO and donor objectives expressed in the project documents with direct contribution to the REDD+ vision.*

*EQ 7: SEPAL fills gaps for REDD+ reporting through national capacity building for better forest monitoring and complements existing tools users apply, such as Google Earth Engine or Collect Earth by providing data analysis without the need for coding.*

The SEPAL project is needs based and fills gaps of national forest authorities.

Source: Elaborated by the evaluation team.

*EQ 6: Are the project outcomes congruent with the FAO and donor's objectives, that is, FAO Strategic Objectives) and the REDD+ vision?*

**Finding 6.** The intended use of SEPAL results contributes to FAO and donor objectives expressed in the project document with a contribution to the REDD+ reporting.

66. The general user survey showed that 61 percent (155) of survey respondents indicated the products they produced with SEPAL were relevant to REDD, REDD+, or deforestation mitigation efforts. Eighty-four percent (190) of survey respondents believed SEPAL would contribute to their REDD, REDD+, or forest management efforts in the future. As such, the intended use of SEPAL results contributes to FAO and donor objectives expressed in the project document. The evaluation finds a contribution to SEPAL's objectives at the outcome level, related to "REDD+ countries capacities to produce annual estimates of the state and trends of their forest resources".

67. At the same time, room for improvement emerges for using SEPAL more systematically across FAO due to its congruence with FAO objectives and other areas of use in FAO. This includes, for example, agriculture monitoring, SDG reporting, the Chief Statistics Office and the Land and Water Division.

“SEPAL is better known outside FAO than inside [the Organization]” - SEPAL stakeholder in FAO

EQ 7. How did it fill a gap or complement existing mechanisms for REDD+ support?

**Finding 7.** SEPAL fills gaps for REDD+ reporting through national capacity building for better forest monitoring and complements existing tools users apply such as Google Earth Engine or Collect Earth by providing data analysis without the need for coding.

68. SEPAL filled gaps by developing capacities for national counterparts to use in REDD+ reporting. However, its use in other related processes also emerged, for example, non-carbon benefits in the case of SEPAL application in West Africa.
69. The final evaluation found that complementarities emerged between SEPAL with its remote sensing angle and Collect Earth, a Finnish-funded Open Foris initiative, filling a gap on big forestry data.
70. From the user perspective, SEPAL complements REDD+ reporting, as it transparently enables data validation, as reported from a user in the Republic of Zambia. While many users interviewed use various tools such as Google Earth Engine, Collect Earth, or GIS software, SEPAL seems to facilitate users' work. Stakeholders stressed again SEPAL's advantage of analysing land cover changes without coding, which required further specialized technical skills.

“SEPAL does things faster and better, compared to what was done before. In the past, we used to analyse time series of two years grouped together. Now, we have annual time series over five years on degradation or deforestation by forest type. This absolutely fills a gap and allows so much more analysis.” - SEPAL stakeholder

### 3.3 Evaluation question on effectiveness: Is SEPAL achieving its objectives?

#### Box 5. Summary of evaluation findings: SEPAL effectiveness

EQ 8: The project achieved 27 out of 29 output-level targets (Output 1: project management and participation are established: All nine targets achieved; Output 2: SEPAL is established and providing selected countries access to relevant satellite data and processing capabilities to produce forest information products: All 14 targets achieved; output 3: Relevant institutions in participating REDD+ countries select, access, and process the relevant remote sensing data they need to produce annual estimates of change in forest and carbon stocks: four out of six targets achieved, partial achievement for availability of documentation beyond English versions and systematic application of capacity-building evaluations).

At least three out of four outcome level indicators were achieved, including tools and data for national monitoring, national institutions' capacity building, and a functioning platform.

EQ 9: The cloud-based approach reaches predominantly users in bandwidth limited environments, enabling them (73 percent of surveyed users).

EQ 10: A targeted outreach through FAO projects, a wide net of partners and its active participation in international events helped SEPAL to identify intended users and to reach them through capacity building events.

EQ 11: After the mid-term review, the project team acted upon recommendations and strengthened communication and outreach, investing significant efforts in capacity building and cooperation with partners. The overall satisfaction with usefulness of the capacity building events reached 72 percent.

Source: Elaborated by the evaluation team.

EQ 8. What results (stated outputs and outcomes, with a focus on outcomes) have been achieved, and which factors affected the effectiveness or ineffectiveness of the project in achieving results?

**Figure 4. Overview of SEPAL output performance**

<b>Outputs</b>	<b>Indicator</b>	<b>Target</b>	<b>Results 03/21</b>
<b>Output 1.</b> Project management and participation are established.	<p>1.1.1 number of interested/potential donors;</p> <p>1.1.2 number of confirmed donors;</p> <p>1.1.3 percentage of funding achieved;</p> <p>1.2.1 number of full-time staff dedicated to the project;</p> <p>1.2.2 number of days to elaborate project work plan;</p> <p>1.3.1 number of representatives accepting invitations to SEPAL AG;</p> <p>1.3.2 number of AG meetings conducted;</p> <p>1.4.1 number of countries contacted and informed; and</p> <p>1.4.2 number of countries implementing the SEPAL platform.</p>	<p>1.1.1 two interested donors in 2015;</p> <p>1.1.2. three donors by 2016;</p> <p>1.1.3.100% funding by 2017;</p> <p>1.2.1 three full-time staff by 2015;</p> <p>1.2.2 work plan ready in 30 days after approval;</p> <p>1.3.1 all representatives accept invitations;</p> <p>1.3.2 at least one AG meeting held annually;</p> <p>1.4.1 three original pilot countries and six additional countries contacted by 2015; and</p> <p>1.4.2 thirteen countries fully implementing SEPAL platform.</p>	<p>1.1.1 fully achieved: project-specific funding contributing to the SEPAL project;</p> <p>1.1.2 fully achieved: In-kind contributions and SEPAL adoption by other programmes have increased total SEPAL funding above 100% of original goals;</p> <p>1.1.3 fully achieved;</p> <p>1.2.1 fully achieved;</p> <p>1.2.2 fully achieved: Work plan continually updated and tied to FAO Performance Evaluation and Management System;</p> <p>1.3.1 achieved;</p> <p>1.3.2 achieved;</p> <p>1.4.1 fully achieved; and</p> <p>1.4.2 fully achieved.</p>
<b>Output 2.</b> SEPAL is established and is providing selected countries access to relevant satellite data and processing capabilities to produce forest information products.	<p>Activity 2.1 was completed during the first reporting period.</p> <p>2.2.1 level of completion of design concept note based on experiences of pilot countries;</p> <p>2.2.2 functionality of SEPAL meeting programmer requirements;</p> <p>2.2.3 functionality of SEPAL meeting user requirements;</p> <p>Activity 2.3 was completed during the first reporting period;</p> <p>2.4.1 number of Open Foris algorithms available on the platform;</p> <p>2.4.2 number of algorithms used to produce results in limited scale for pilot countries; and</p>	<p>2.2.1 Fully complete technical specifications and design;</p> <p>2.2.2 SEPAL version 2.0 released by July 2016;</p> <p>2.2.3 SEPAL user survey created and completed by participating institutions;</p> <p>2.4.1 all Open Foris algorithms loaded and operational in SEPAL platform;</p> <p>2.4.2 Documented use of image processing algorithms;</p> <p>2.5.1 at least one tender for supply of data from commercial providers;</p> <p>2.5.2 at least one commercial provider negotiated with; and</p> <p>2.5.3 at least one contract for commercial data signed.</p>	<p>2.2.1 fully achieved;</p> <p>2.2.2 fully achieved;</p> <p>2.2.3 fully achieved;</p> <p>2.4.1 fully achieved in Reporting period 1;</p> <p>2.4.2 fully achieved in Reporting period 3;</p> <p>2.5.1 fully Achieved: Tender submitted for high-spatial, high-cadence data;</p> <p>2.5.2 fully Achieved: Negotiations with Planet completed;</p> <p>2.5.3 fully Achieved: Contract with Planet signed;</p> <p>2.5.4 fully Achieved: Data downloaded and processed for countries;</p> <p>2.6.1 fully achieved;</p> <p>2.6.2 fully achieved;</p> <p>2.6.3 fully achieved in Reporting period 1;</p> <p>2.6.4 fully achieved in Reporting period 1; and</p> <p>2.6.5 fully achieved.</p>

Outputs	Indicator	Target	Results 03/21
	<p>2.5.1 number of tenders realized for supply of data from commercial providers.</p> <p>2.5.2 number of negotiations concluded with commercial data providers;</p> <p>2.5.3 number of contracts with commercial data providers;</p> <p>2.5.4 volume of commercial data in country archives on SEPAL;</p> <p>2.6.1 level of completion of interface programming;</p> <p>2.6.2 number of months to install interface on platform;</p> <p>2.6.3 number of users that can query, select, and access remote sensing data;</p> <p>2.6.4 number of users that can download data to SEPAL; and</p> <p>2.6.5 number of users that can process remote sensing data.</p>	<p>2.5.4 data volumes appropriate for type and extent of data required for each SEPAL country;</p> <p>2.6.1 user interface fully programmed;</p> <p>2.6.2 user interface fully programmed within one and a half years of project start;</p> <p>2.6.3 all SEPAL user countries able to carry out operations;</p> <p>2.6.4 all SEPAL user countries able to carry out operations; and</p> <p>2.6.5 all SEPAL user countries able to carry out operations.</p>	
<p><b>Output 3.</b> Relevant institutions in participating REDD+ countries select, access, and process the relevant remote sensing data they need to produce annual estimates of change in forest and carbon stocks.</p>	<p>3.1.1 number of appropriate institutions engaged and using SEPAL;</p> <p>3.1.2 number of users and/or amount of use generated by appropriate institutions;</p> <p>3.2.1 number of training modules produced in English, French, and Spanish;</p> <p>3.3.1 number of training courses by type;</p> <p>3.3.2 number of relevant participants; and</p> <p>3.3.3 response rate and satisfaction of course evaluation.</p>	<p>3.1.1 at least 13 participating countries via their appropriate national institutions;</p> <p>3.1.2 at least 13 participating users from appropriate national institutions using SEPAL;</p> <p>3.2.1 training manuals produced for common remote sensing procedures in English, French, and Spanish;</p> <p>3.3.1 three pieces of training delivered in each participating country;</p> <p>3.3.2 minimum of five participants in each country; and</p> <p>3.3.3 80 percent response rate and satisfaction level.</p>	<p>3.1.1 fully achieved at the level of participation: 139 countries;</p> <p>3.1.2 fully achieved: &gt;6 000 active users, about 50 percent from government agencies;</p> <p>3.2.1 partial achievement: documentation available and expanding only in English at the moment but French and Spanish scheduled;</p> <p>3.3.1 fully achieved: potential to revisit targets now that REDD+ programme is winding down and other programmes are starting;</p> <p>3.3.2 fully achieved; potential to revisit targets as in 3.3.1; and</p> <p>3.3.3 partial achievement: course evaluation is still applied irregularly.</p>

Source: Elaborated by the evaluation team.



**Finding 8.** The project achieved or fully achieved 27 out of 29 output-level targets. At least three out of four outcome-level indicators were achieved, including tools and data for national monitoring, national institutions' capacity building, and a functioning platform.

71. Output-level achievements: The final evaluation finds that based on a suboptimal use of the results framework, the project achieved 28 out of 29 targets, reflecting a very strong project performance. However, the reporting on the results framework is output focused, omitting the outcome level, and many indicators relate to the initial phase of SEPAL, where the platform was established. The evaluation finds that an opportunity was missed to update the results framework following the mid-term evaluation to reflect SEPAL's uptake and results achievement, following its technical set-up and launch.
72. The output target partially achieved concerns SEPAL documentations, which was only available in English at the time of reporting despite SEPAL's use across many francophone and Spanish-speaking countries. The room for improvement in the documentation of SEPAL. For example, guidelines, tutorials, or short videos could be provided, as previously stated in this evaluation report. Besides, monitoring and evaluation of capacity-building courses are also partially achieved.
73. Outcome-level achievements: SEPAL's outcome was as follows, "Relevant institutions in participating REDD+ have the capacity to produce annual estimates of the state and trend of their forest resources".

**Table 2. Outcome indicators listed in the project document**

Outcome indicator	Results
Participating national institutions are in possession of tools and annual satellite data required for national forest mapping, monitoring, and reporting on current forest extent and its historical and future changes.	Uganda, Equatorial Guinea and Ethiopia are using SEPAL to monitor degradation in dry and humid tropical forests; map deforestation in many countries from Bhutan to Ecuador, with a recent focus on Central Africa, the Kavango-Zambezi Basin, and dry forests of Southern Africa. Monitor ecosystem restoration efforts: Indonesia uses SEPAL to monitor peat moisture content as part of efforts to protect and restore peatlands. Reforestation tracking efforts in the Lower Mekong region.
Participating national institutions are trained and capable of monitoring national forests with the use of satellite data.	See Evaluation question 11 in this section, with overall positive results.
Participating national institutions are producing biannual estimates of change in forest area and carbon stocks.	The evaluation did not manage to get a systematic overview concerning this indicator due to the diverse use of SEPAL.
A well-tested and efficiently functioning SDMS has been established and offers improved access to remote sensing images and processing tools to more REDD countries, both the United Nations-REDD member countries and those participating in the World Bank Forest Carbon Partnership Facility (FCPF).	920 000 km <sup>2</sup> of Planet imagery was downloaded over Chile, Colombia, the Democratic Republic of the Congo, Costa Rica, Ghana, Indonesia, Mexico and Mozambique. Over 8 000 users (by October 2021). New, improved time series analysis algorithms available, including a faster version of BFAST and fully integrated Continuous Change Detection and Classification (CCDC) processing. New Jupyter notebooks are available to analyse near real-time deforestation alerts, forest fragmentation and Planet data downloads. Jupyter notebooks have also been added to explore Planet's high-spatial resolution data for active fire detection, near real-time deforestation alerts, forest law enforcement and reference data collection monitoring reporting, and verification. SMFM Toolkit (smfm-project.com) integrated into SEPAL.

Source: FAO. 2014. GCP/GLO/537/NOR project document. Rome.

74. Factors affecting SEPAL's performance: The final evaluation found that SEPAL's uptake seemed most substantial in countries with stable institutional arrangements and authorities benefiting from adequate technical capacities. Examples include Ecuador, Indonesia, Kenya, Uganda and Zambia. Additionally, the location of other ongoing FAO projects in countries facilitated the uptake of SEPAL, as observed in middle-income countries in West Africa and the least developed countries in Central Africa.
75. The needs-based nature of SEPAL is one precondition for its effectiveness.

"SEPAL addresses a clearly identified need. Besides, it is well funded and resourced, including human resources." - SEPAL stakeholder

76. Other factors affecting the effectiveness of SEPAL are the stability of the project team with a solid technical lead, combined with sufficient and predictable funding by Norway for seven years. This long project cycle is an exception rather than the rule in international development cooperation but one of the key factors facilitating SEPAL's results achievement.
77. Factors affecting the effectiveness of SEPAL negatively comprise the communication between the project team and the donor through regular updates. Rather than informing the donor about upcoming events, the donor learned about past ones through project reports, missing the opportunity to inform and engage Norwegian embassies in project countries.
78. Specifically, from the users' perspective, positive factors facilitating SEPAL's effectiveness are the achievement of quick results, which policymakers or multilateral partners can use to monitor government commitments. Analysis of data close to real time and the use of SEPAL for early warning purposes, as in the case of Ecuador, significantly enhance the demand for such data and, subsequently, the use of SEPAL.
79. For users, negative factors are the instability of internet connections in countries such as the Democratic Republic of the Congo (a factor outside of SEPAL's control) and limited SEPAL credits requiring the users to ask the project team in Rome for a recharge. The limited storage space on SEPAL was also mentioned.

*EQ 9. Did and how SEPAL enable countries with limited computing resources and bandwidth to produce high-quality activity data for reporting on REDD+ specifically?*

**Finding 9.** The cloud-based approach predominantly reaches users in bandwidth-limited environments, enabling them (according to 73 percent of surveyed users).

80. NICFI's strategic decision to invest in SEPAL to move from the expensive creation of national computing capacities to a cloud-based platform for forestry monitoring directly contributes to enabling countries with computing resources and bandwidth to produce high-quality activity data.
81. While the internet connectivity is still a challenge in many countries, as previously stated in this report, the evaluation finds that SEPAL was successfully applied, for example, by CAFI in six Central African countries despite low bandwidth.
82. The technical review found that monthly, SEPAL has provided computational capability equivalent to over 100 workstations, only considering paid activities, that is, not including Google Earth Engine activities. Approximately 81 percent of users surveyed came from bandwidth-limited

environments, and 73 percent of users in bandwidth-limited environments felt SEPAL was enabling.

83. Also, the evaluation found that in some countries, Google Earth Engine is not available independently from bandwidth issues, and SEPAL was an important alternative.

*EQ 10. To what extent have SEPAL's activities reached the intended users and uses? If the project did reach all or the majority of its intended users, what success factors allowed it to do so?*

**Finding 10.** A targeted outreach through FAO projects, a wide net of partners, and its active participation in international events helped SEPAL identify intended users and reach them through capacity-building events.

84. Evaluation interviews with the project team, SEPAL partners and users supported the triangulation of this finding. The evaluation found that SEPAL targeted and reached technical staff in relevant government agencies, such as the forestry authorities or ministries of environment in countries such as Ecuador, Indonesia, Uganda, the Democratic Republic of the Congo, and neighbouring countries in Central Africa. As previously stated, not all authorities use SEPAL for its entire forest monitoring due to connectivity or capacity issues.
85. Other essential users are academics, researchers, or international non-governmental organizations (NGOs), as shown in the examples of Costa Rica, Zambia and other countries of the Kavango-Zambezi Basin.
86. The success factors are the demand-led nature of SEPAL, the targeted outreach of SEPAL through FAO projects, a wide net of partners, and its active participation in international events. Subsequently, SEPAL offers targeted capacity-building events, often with a regional or subregional focus, using regional languages, such as French for a webinar series in Central Africa in 2021 or Portuguese for events in the Angola and Cabo Verde, also in 2021.
87. Ways to enhance the user base would be to broaden SEPAL's thematic focus beyond forestry, but this would first require a strategic management decision.

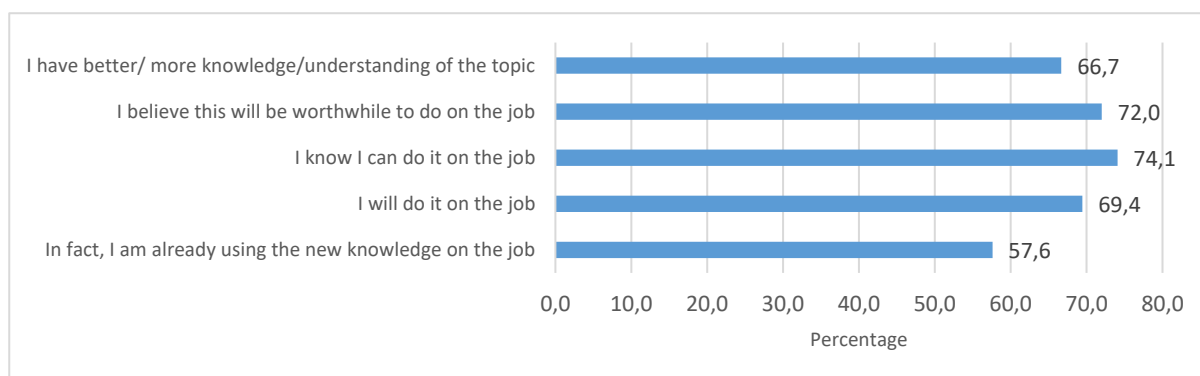
*EQ 11: How has the project worked to ensure that users had the capacity to apply the SEPAL tool to their particular use? What capacity-building and outreach strategies did the project use, and how effective were they? Would the evaluation recommend any changes be made?*

**Finding 11.** After the mid-term review, the project team acted upon recommendations and strengthened communication and outreach, investing significant efforts in capacity building and cooperation with partners. The overall satisfaction with the usefulness of the capacity-building events reached 72 percent.

88. The project team invested significant efforts in developing the platform to achieve proof of concept, particularly in the early stages of the project. The mid-term evaluation in 2017 identified the solid technical focus of SEPAL and its limited outreach at the time. Subsequently, the project team acted upon the mid-term evaluation recommendations. It addressed issues such as communication efforts, increasing the user base, collaboration with other capacity-development agencies and aiming for institutional uptake by governments.
89. During the COVID-19 pandemic, SEPAL continued its capacity-building efforts, using virtual means such as webinars and events via Zoom.

90. The evaluation noted that SEPAL delivered capacity building in cooperation with partners such as Peking University in Southeast Asia and African countries using SEPAL or the Open Foris Initiative. In the latter case, six capacity-building sessions took place in November and December 2021. They were targeted at anglophone and francophone Africa as part of a project funded by the Swedish International Development Agency. REDD+ projects were also used to jointly deliver capacity building, for example, in May 2021, by targeting users across various regions of the Democratic Republic of the Congo.
91. Effectiveness of capacity building: the capacity-building survey showed that effectiveness ratings for virtual events in 2021 reached 67 percent while the overall satisfaction with the usefulness of the events reached 72 percent.<sup>15</sup>
92. Figure 5 presents SEPAL capacity-building results in the areas of knowledge, awareness, and practice for 2021, with overall positive results and a median reaching 69.4 percent. Interestingly, the results achievement concerning changes in knowledge (66.7 percent)<sup>16</sup> are superseded by results in awareness (72 percent)<sup>17</sup> and confidence of applying knowledge (74.1 percent).<sup>18</sup> This could imply that beneficiaries of capacity-building events in 2021 already had an advanced knowledge base, with strengthened awareness and confidence to apply this knowledge.
93. The determination of beneficiaries to use knowledge transferred during the SEPAL capacity-building event reached 69.4 percent<sup>19</sup> while the actual application of knowledge dropped to 57.6 percent.<sup>20</sup> Given the high level of confidence and determination of applying the knowledge transferred, the lower application rate could be interpreted as lacking opportunities to use SEPAL, for example, due to challenges with internet connectivity or consultants undertaking related analysis in national authorities rather than the trained staff. Both reasons transpired as explanations from interviews.

**Figure 5. Changes in knowledge, awareness and practice**



Source: FAO. 2022. *Capacity-building evaluation survey*. Rome.

94. Figure 6seven analyses results and changes following the attendance of SEPAL capacity-building events in 2021. The most significant changes show an enhanced engagement on SEPAL topics (69.6 percent)<sup>21</sup> and the confidence to lead on SEPAL related issues at the workplace

<sup>15</sup> n=26.

<sup>16</sup> n=27, "I have better/ more knowledge/understanding of the topic".

<sup>17</sup> n=25, "I believe this will be worthwhile to do on the job".

<sup>18</sup> n=27, "I know I can do it on the job".

<sup>19</sup> n=27, "I will do it on the job".

<sup>20</sup> n=23, "In fact, I am already using the new knowledge on the job".

<sup>21</sup> n=23.

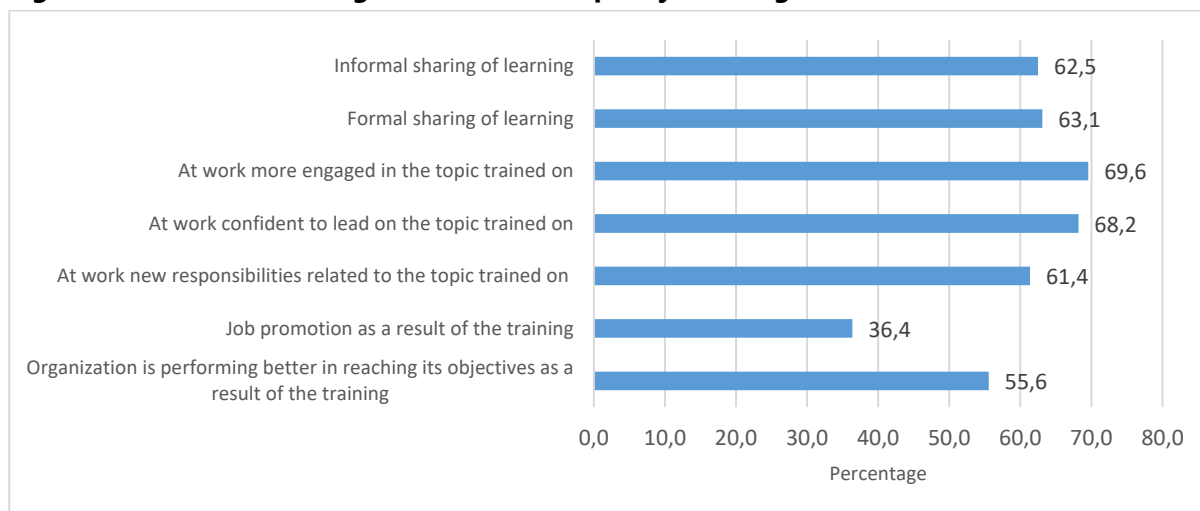
(68.2percent).<sup>22</sup> In fact, 61.4 percent<sup>23</sup> of respondents stated that they gained new responsibilities on SEPAL related topics at the workplace.

95. However, easier achievable changes such as knowledge sharing following the SEPAL event, either formally (63.1 percent)<sup>24</sup> or informally (62.5 percent),<sup>25</sup> show lower results than levels of engagement or confidence to lead, which indicates room for improvement in institutionalizing learning. While interviews revealed that this is, indeed, the case in at least one national authority where the internal knowledge transfer following SEPAL events was criticized, in smaller authorities with very few staff, all relevant personnel might have benefited from the event, mainly if undertaken virtually. In the latter case, the sharing of specialized technical knowledge to staff engaged in other areas of work might not be pertinent.
96. Interestingly, over 55 percent<sup>26</sup> of respondents experienced improved organizational or institutional performance due to the SEPAL event. The latter is reflected, for example, in significant time savings when using SEPAL for forest cover monitoring and the possibility to use less technically specialized personnel for related tasks, as coding skills are no longer needed.

“Following SEPAL training and the use of the platform, we have experienced reduced data processing times. Previously, we manually did pre-processing and the processing of satellite data. Now, more staff support the automatized tasks in SEPAL, reducing the time for analysis from six months to a few weeks.” - SEPAL stakeholders

97. Finally, 36.4 percent of respondents attributed the attendance of SEPAL events to one reason for a job promotion.<sup>27</sup>

**Figure 6. Results and changes after SEPAL capacity building**



Source: FAO. 2022. *Capacity building evaluation survey*. Rome.

98. The capacity-building evaluation survey also showed that 59.7 percent of SEPAL capacity-building beneficiaries in 2021 attribute the strengthening of knowledge and skills to the SEPAL event.

<sup>22</sup> n=22.

<sup>23</sup> n=22.

<sup>24</sup> n=21.

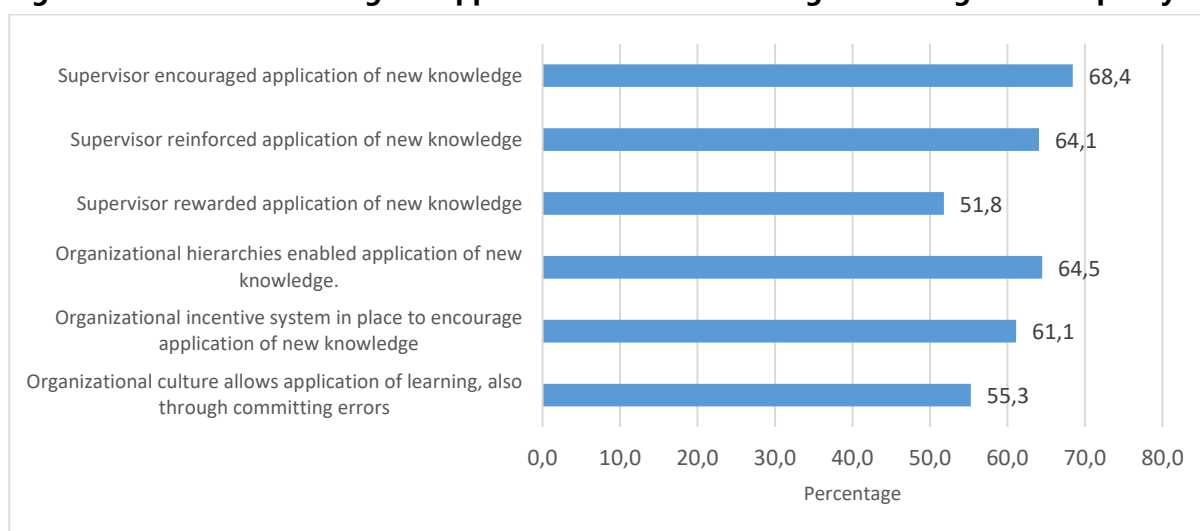
<sup>25</sup> n=22.

<sup>26</sup> n=18.

<sup>27</sup> n=11.

99. While 34.8 percent of respondents frequently or often applied knowledge gained at the SEPAL event, 47.8 percent applied the new knowledge occasionally, and 17.4 percent infrequently or never. The evaluation enquired about enabling or disabling factors for the use of new knowledge in the context of the workplace and revealed interesting results
100. The encouragement of supervisors to apply new knowledge acquired in the SEPAL events in 2021 was the most significant enabling factor, reaching 68.4 percent. Organizational hierarchies follow as the second-highest enabling factor with 64.5 percent. The latter would imply comparatively flat hierarchical structures in the national authorities and other institutions that allow learning. However, organizational culture also allowing for committing errors when using SEPAL reached only 55.3 percent of ratings, which in turn inhibits the use of new technologies. Finally, rewards for using new knowledge seem only moderately developed among national authorities and other SEPAL users participating in capacity-building events in 2021.

**Figure 7. Factors influencing the application of new knowledge following SEPAL capacity building**



Source: FAO. 2022. *Capacity-building evaluation survey*. Rome.

### 3.4 Evaluation question on efficiency: How well are resources being used?

#### Box 6. Summary of evaluation findings: SEPAL efficiency

*EQ 12: SEPAL project management benefits from strong continuity of its technical team but shows shortcomings in the quality of reporting perceived by the donor. Partnership arrangements, while largely appropriate, could at times benefit from more formalization.*

*EQ 13: Donors' expectations for co-financing were not met but in-kind contributions were significant, reaching 14 percent of SEPAL budget in the case of one academic partner. A modular approach could attract co-financing in Phase II, with NICFI funding SEPAL core costs and donors funding modules or services adapted to their development objectives.*

*Based on the above key findings, the evaluation finds that project management and partnership arrangements were appropriate and effective and a good use of project resources, with room for improving the formalization of some partnerships.*

Source: Elaborated by the evaluation team.

*EQ 12. To what extent were the project management and partnership arrangements appropriate and effective?*

**Finding 12.** SEPAL project management benefits from the strong continuity of its technical team but shows shortcomings in the quality of reporting. Partnership arrangements, while broadly appropriate, could, at times, benefit from more formalization.

101. Project management: The final evaluation noted that the technical team consisted of a stable core group of developers working full time on SEPAL for the past five years. This stability positively affected the project team's work and is reflected in the users' and partners' significant appreciation of how SEPAL is managed. The project management brings together both developers and technical managers, and partners appreciated the team's knowledge of the user reality on the ground. The project leader spent approximately 30 percent of his time on SEPAL, with peaks depending on demand, such as the period when taking over the project and during recent donor liaison for preparing Phase II.
102. The evaluators identified a risk in the project's reliance on a single technical lead, with insufficient capacities in place if that person becomes unable to continue working on SEPAL.
103. From the donor's perspective, the availability and accessibility of FAO and the project team are very good. However, project reporting appeared suboptimal, with the project's budget structure entailing two budget categories difficult to understand for the donor. The donor self-critically reflected that SEPAL technical reporting was not sufficiently prioritized, resulting in lower quality reporting from FAO. The donor noted shortcomings in the grant management, generally in FAO, beyond the SEPAL project. The uneven reporting quality affected the donor, as the potential for creating linkages for Norway decreased when being less informed about the project and its activities.
104. Looking forward to the SEPAL Phase II, both the project management and the donor aim for more hands-on management while improving formal reporting. The donor also expressed the desire for more forward-looking communication from the project team to enable NICFI to inform Norwegian Embassies about upcoming SEPAL country activities and events. This approach could further strengthen the cooperation with Norway's bilateral development programme.
105. Concerning the management, specifically of capacity development, the evaluation finds an uneven use of pre- and post-event engagement. This evaluation finding seems essential because research by (Brinkerhoff, 2006) shows that a focus of 50 percent of training resources on post-training follow-up<sup>28</sup> results in 85 percent of training application through sustained behaviour change. This data compares to a significantly lower training application rate of only 15 percent when most resources are spent on training delivery with limited or no follow-up.<sup>29</sup> In fact, the evaluation's capacity-building survey showed that in 2021, 63 percent of beneficiaries underwent a capacity needs assessment, but only 37 percent of participants benefited from post-event follow-up.<sup>30</sup>
106. Partnership arrangements: The project successfully used FAO projects and FAO country or regional offices to engage with its partners and users. Examples are the regional offices in Abidjan and Santiago or country offices in Kinshasa, the Democratic Republic of the Congo, and Quito, Ecuador.

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<sup>28</sup> Combined with 25 percent of resources dedicated to pretraining preparations such as needs assessments.

<sup>29</sup> See also: Engelhardt, A./UNITAR, 2021: Independent Evaluation of the Strategic Framework Fund (2019–2020). Geneva, page 33.

<sup>30</sup> n=27.

107. SEPAL partners repeatedly stressed the easy access to SEPAL's technical team for support. The engagement and responsiveness of the technical support were rated very high, and even during the height of the COVID-19 pandemic, only a few comments emerged concerning communication challenges.
108. Room for improvement in SEPAL's partnerships shows, as some partners desire to formalize the partnership through an MOU. However, the evaluation finds that this approach would require a potentially time-consuming MOU process, and alternatives should be explored.
109. Specifically for Zambia, the evaluation identified an important counterpart and potential new partner for SEPAL to enhance its national reach. The National Special Data Infrastructure (NSDI) Committee oversees putting different national datasets together and could serve as an entry point for SEPAL to enhance its visibility and uptake.

*EQ 13: Which factors either enabled or hindered the materialization of the planned co-financing? What conclusions for Phase II of the project can be gained from these insights?*

**Finding 13.** Donors' expectations for co-financing were not met, but in-kind contributions were significant, reaching 14 percent of SEPAL budget in the case of one academic partner. A modular approach could attract co-financing in Phase II, with NICFI funding SEPAL core costs and donors funding modules or services adapted to their development objectives.

110. The evaluation noted that the donor's expectations for co-financing, though not explicitly stated in the project document, were not met. However, the German development bank KfW invested in SEPAL through specific modules on early warning in Ecuador. Besides, in-kind contributions were significant, for example, from academic partners. In the case of Wageningen University, researchers have contributed to the methodological development of SEPAL since 2010. The costs of PhDs amounted to about USD 1 million, without adding the costs of senior researchers for each PhD. Considering the total project budget of USD 7.2 million, the in-kind contribution of one academic partner appeared significant, providing approximately another 14 percent of additional resources to the project.
111. At the same time, some partners stressed difficulties for governments to contribute to a United Nations project once the project document has been signed with another donor. The appetite of contributing to specific modules or services with relevance for their development objectives rather than contributing to a multi-donor project showed in the case of the donor of Germany. As such, partners suggested for SEPAL to offer modules or services for donors' financing, which could be adapted to donors' needs while NICFI covers the core costs of SEPAL in Phase II. In fact, NICFI provides the initial budget for Phase II, given a more extensive programme, attracting additional donor funding.



### 3.5 Evaluation question on sustainability: Will the benefits last?

#### Box 7. Summary of evaluation findings: SEPAL sustainability

*EQ 14: While it is not easy to systematically report quantifiable and durable benefits of SEPAL, users were quick to answer what would happen if SEPAL would not exist. Issues transpired of loss of saving time, increased complexity, and costs and ultimately less monitoring and reporting. Capacity building shows room for improvement. One quantifiable result was SEPAL's contribution to carbon credits for up to 120 000 people in Zambia's Eastern Province.*

*EQ 15: The role of Norway as a long-term partner of SEPAL is crucial for on ongoing open-access, cloud-based solution. The risks for the sustainability of SEPAL's results within SEPAL's reach concern capacity building and staff continuity in its team. However, most risks are largely beyond the project's mitigation capacity, such as pricing policies of cloud providers, cyber security issues, or the willingness of FAO to include server costs into its core budget at one point in the future.*

*EQ 16: Strong coherence emerges between SEPAL and its partners such as Collect Earth, CAFI, GFOI, the Open Foris Initiative and many REDD+ related FAO projects and partnerships with academic institutions.*

*EQ 17: The evaluation found examples of the replicability of SEPAL's use beyond the initial objective of REDD+ reporting in countries such as Ecuador, Indonesia, Uganda, and Zambia.*

*EQ 18: Despite the risks identified in this evaluation, SEPAL is well positioned to serve an increased user base, as staff beyond technical experts can use the platform, informing real time land use management.*

Source: Elaborate by the evaluation team.

*EQ 14. What quantitative (quantifiable) and qualitative (descriptive and conceptual) higher-level and durable benefits has the project achieved?*

**Finding 14.** While it is not easy to systematically report SEPAL's quantifiable and durable benefits, users were quick to answer what would happen if SEPAL would not exist. Issues transpired of loss of time savings, increased complexity, and costs, and ultimately less monitoring and reporting. Capacity building shows room for improvement. One quantifiable result is SEPAL's contribution to carbon credits for up to 120 000 people in Zambia's Eastern Province.

112. The project created a tested and user-friendly platform that serves as a one-stop-shop for forest and land-use monitoring, based on satellite imagery. The user friendliness allows monitoring activities for staff in national authorities even without coding expertise, differentiating SEPAL from other similar solutions. Besides, users mentioned the challenges of short-term commercial modules licenses and considered SEPAL a more durable solution.
113. The quantification of durable benefits was challenging for the evaluation. However, one interviewee stated that SEPAL contributed to REDD+ reporting in Zambia, resulting, for example, in carbon credits for up to 120 000 people in Zambia's Eastern Province, bordering Malawi and Mozambique and about the size of Bosnia and Herzegovina or approximately twice the size of Massachusetts (51 476 km<sup>2</sup>).
114. While it was not easy to estimate further quantifiable and durable benefits of SEPAL, users were quick to answer what would happen if SEPAL would not exist. Issues of loss of time savings, increased complexity, and costs and ultimately less monitoring and reporting transpired, as listed in the box below. Countries would be slowed down in acting upon REDD+ and COP recommendations, as stated by stakeholders in the Democratic Republic of the Congo. The evaluation found that less forest and land-use monitoring would defeat the purpose of SEPAL and its objective to support REDD+ reporting in the long term.

“Without SEPAL, our work would be more complex, more time consuming, and we would need more technical experts. This would be too costly for our Ministry to undertake forest monitoring.” - SEPAL stakeholders in the Americas

“The use of SEPAL is simply so much more cost effective than paying commercial licences or even physical checking and reporting. Ministries would report less.” - SEPAL stakeholder

115. However, the sustainability of national authorities’ forest and land-use monitoring capacities is a challenge, as is capacity development in general (World Bank, 2008). While some respondents mentioned staff turnover as a hurdle to sustaining capacities, the evaluation found that sharing of learning was limited, affecting the institutionalization of learning and its sustainability. As earlier reported, formal or informal sharing of learning reached only about 63 percent of participants undergoing capacity building in 2021.
116. Figure 8 presents determinants affecting training results using the World Bank as a comparator. The figure relates to the entire World Bank portfolio amounting to USD 720 million annually, which can serve as a framework for SEPAL to analyse the sustainability of capacity-building results.
117. The evaluation found that three out of the five criteria are largely met, using evidence previously presented in the report. In comparison, results for the other two criteria were either suboptimal or unclear.
118. The adequacy of training design reached 67 percent, based on survey feedback on the adequacy of training formats, including virtual ones. The organizational context in participating institutions was largely conducive, particularly concerning organizational hierarchies allowing the use of SEPAL knowledge (64.5 percent) but less so concerning an organizational culture also allowing to commit errors (55.3 percent). Finally, the usefulness of SEPAL capacity building reaches ratings of 71.6 percent for 2021, compared to slightly lower ratings for the period 2017–2021 (66.2 percent), indicating an increase in quality.
119. The evaluation did not find references to what extent SEPAL capacity building was anchored in relevant national capacity-building strategies. Also, monitoring and evaluation of training results is the only SEPAL output indicator showing less performance. The capacity building survey confirmed 37 percent of participants benefited from post-event follow-up in 2021.

**Figure 8. Determinants affecting training results and sustainability**

Criteria	Comment on SEPAL
Adequacy of design	6% adequacy of event format, also online
Organizational context	Organizational culture allows application of learning, also through committing errors: 55.3% Organizational incentive system in place to encourage the application of new knowledge: 61.1% Organizational hierarchies enabled the application of new knowledge: 64.5%
Anchoring within capacity-building strategies	Unclear to what extent SEPAL is part of national capacity-building strategies
Quality of training	Usefulness of capacity building: 71.6% (2021), <sup>31</sup> 66.2% (2017–2021) <sup>32</sup>
Monitoring and evaluation of training results	Output indicator 3.3.3: Course evaluation is still applied irregularly 37% of participants benefited from post-event follow-up (2021) <sup>33</sup>

Source: Evaluation survey.

<sup>31</sup> n = 26 (19% response rate).

<sup>32</sup> n = 347.

<sup>33</sup> n = 27 (19% response rate).

*EQ 15. How sustainable are the project results, what are the risks (particularly financial and governance/institutional risks)?*

**Finding 15.** The role of Norway as a long-term partner of SEPAL was crucial to ensure an ongoing open-access, cloud-based solution. Otherwise, project results would not be durable. The risks for the sustainability of SEPAL's results within SEPAL's reach concern capacity building and staff continuity in its team. However, most risks are mainly beyond the project's mitigation capacity, such as pricing policies of cloud providers, cyber security issues, or the willingness of FAO to include server costs into its core budget at some point in the future.

120. For the time being, the project results concerning the availability of an open-access and cloud-based solution seems lasting. The role of Norway as a long-term partner of SEPAL is crucial in this respect.

"Norway is on board. We are long-term partners. Now, it is also for others to [...] value SEPAL." - Donor representative

"The technical outputs of this project are not durable, meaning if the SEPAL.IO platform is shut down, the benefits it accrues would immediately be removed. The sustainability of outcomes is highly contingent on continued support of the SEPAL platform. However, considerable effort has been made to ensure costs scale relative to use, promoting financial sustainability." - Technical experts, SEPAL evaluation

121. Beyond immediate financial issues, capacity building of national authorities is a recurrent item, as stated in Evaluation question 14. The option for SEPAL to address these recurrent needs, which seems largely out of its control if taking a long-term perspective, is the set-up of a training of trainers approach to create national training capacities in relevant institutions. This approach would also facilitate including SEPAL capacity building in relevant national strategies, as trainers are closer to national planning processes.

122. Other risks include:

- i. vulnerability of small SEPAL team in case of staff turnover;
- ii. storage and pricing policy of Amazon Web Services and Google Earth Engine, with a high level of dependency;
- iii. management of servers and ongoing SEPAL development at the end of Norway's funding: Is FAO willing to include those costs into its core budget?;
- iv. cyber security of cloud-based data is an issue despite the trend that government institutions overcome fears of operating with data that is not nationally stored;
- v. countries struggling to understand that costs are involved for getting carbon credits, for example, by paying for cloud-computing credits (which are significantly lower than setting up and maintaining a national computing infrastructure); and
- vi. proliferation of related open-source platforms which could eclipse SEPAL.

*EQ 16. How, if at all, does the project's coherence with other initiatives contribute to the likelihood of sustainability? Has SEPAL led to other changes, including scalable or replicable results?*

**Finding 16.** Strong coherence emerged between SEPAL and its partners such as Collect Earth, CAFI, GFOI, the Open Foris Initiative, and many REDD+ related FAO projects and partnerships with academic institutions.

123. The evaluation identified a strong coherence between SEPAL and its partners such as Collect Earth, CAFI, GFOI, the Open Foris Initiative, and many REDD+ related FAO projects. Opportunities emerge for an even more systematic use of SEPAL across FAO, building on the practice in the Forestry Department. Besides, room for improvement shows to better inform bilateral Norwegian development cooperation, for example, through Norad, about SEPAL activities and events at the country level to strengthen synergies and the likelihood of sustainability.
124. The partnership with research institutions such as Wageningen University, Duke University, Peking University, or the SMFM ensures SEPAL access to state-of-the-art research and continuous development.
125. The evaluation identified secondments from academic institutions or other partners to the SEPAL team as a means to deepen partnerships.

*EQ 17. Has SEPAL led to other changes, including scalable or replicable results?*

**Finding 17.** The evaluation found examples of the replicability of SEPAL's use beyond the initial objective of REDD+ reporting in countries such as Ecuador, Indonesia, Uganda and Zambia.

126. Concerning replicable results, the evaluation identified one participant from a capacity-building event in Zambia who previously used SEPAL for forest monitoring in Eastern Province and transferred the application to his new employer, the Copper Belt University. At Copper Belt University, SEPAL is now used as part of the regular curriculum in the master's class, benefiting 23 master's students and occasionally 20 undergraduates.
127. The use of SEPAL for peatland monitoring in Indonesia, early warning for the Ministry of Environment of Ecuador, or forest management planning in refugee settlements in Uganda are other examples where the use of SEPAL was replicated outside the initial objective of REDD+ reporting.

*EQ 18. Is the framework sufficiently robust for scaling up, given the plans to increase users in the next phase?*

**Finding 18.** Despite the risks identified in this evaluation, SEPAL is well-positioned to serve an increased user base, as staff beyond technical experts can use the platform, informing real-time land use management.

128. The evaluation found that bearing in mind the risks identified for the sustainability of SEPAL under evaluation question 15, SEPAL is well-positioned to serve an increased user base in Phase II of the project.
129. The platform was easier to use, the graphical user interface was appreciated, and many stakeholders pointed at SEPAL's scalable use beyond the forestry sector. The agriculture sector or SEPAL's use for urban planning issues emerge. At the same time, some voices called for SEPAL to be very clear in its targeting and to communicate this accordingly. One stakeholder feared that SEPAL might be spread too thinly if used outside the forestry sector. The project team might not have the expertise to engage with urban planners or the agriculture sector thematically.

130. On the practical side, SEPAL seemed well-positioned for upscaling, given that a wider stakeholder group could use it in national authorities beyond highly specialized technical staff. A focus group of stakeholders in Uganda highly appreciated the availability of already processed imagery, which is easily downloadable with the cloud storage facility and cloud handling of heavy processes such as BFAST for large forest areas.
131. The use of SEPAL to inform evidence-based decision making, as observed in Uganda, or to enable early warning in Ecuador shows its potential for REDD+ or SDG reporting and real-time land use management.

"SEPAL informs evidence-based decision making by the National Forest Authority. SEPAL came in handy when requiring national mosaics for the entire year. Now, we have also monthly mosaics." - SEPAL stakeholders in Uganda

## 4. Conclusions and recommendations

### 4.1 Conclusions

**Relevance:** The evaluation concludes that SEPAL was highly relevant, with the conclusions listed below related to key findings for evaluation questions one to five. The logic and linkages are presented in Executive Summary Figure 1 of this report.

**Conclusion 1.** In the context of changing needs and a changing project design during its seven-year duration, the project team took an adaptive management approach to maintain the intervention's relevance over the seven years of implementation.

**Conclusion 2.** SEPAL's outreach was relevant and effective, based on a solid partnership approach and well-targeted action, for example, in countries with low bandwidth connections.

**Conclusion 3.** As a technical project, gender was not at the forefront of project implementation but considered for capacity building when recommending a balanced nomination of both women and men.

**Conclusion 4.** Demand for changes emerged to the platform's intended use during Phase II. Those changes were based on user needs and possible modifications in the accessibility of open-source data.

**Coherence:** The evaluation concludes that SEPAL's coherence was very high, fitting well to ongoing initiatives.

**Conclusion 5.** The project outcomes were congruent with the FAO and the donor's objectives and the REDD+ vision.

**Conclusion 6.** The SEPAL project is needs-based and fills gaps of national forest authorities in REDD+ reporting and beyond.

**Effectiveness:** Concerning SEPAL's results achievement, the evaluation concludes that the project was highly performant at output and outcome levels.

**Conclusion 7.** The project showed a strong performance at the output level and made progress in achieving outcome-level results.

**Conclusion 8.** SEPAL enabled participating countries to improve their REDD+ reporting.

**Conclusion 9.** The project team took the mid-term evaluation seriously and changed from a purely technical model into enhanced outreach, including capacity building. While results are encouraging, room for improvement transpires concerning capacity building, despite receiving good support from SEPAL's partners. This issue is addressed in the design of Phase II.

**Efficiency:** The evaluation concluded that the project was efficiently managed but would require a different approach to assure co-financing.

**Conclusion 10.** Project management and partnership arrangements were appropriate and effective, with room for improving the formalization of some partnerships.

**Conclusion 11.** It was challenging for other donors to contribute to a signed project agreement, as they could not shape the existing one. This affected the co-financing of SEPAL.

**Sustainability:** The financial aspect of SEPAL's sustainability is ensured for the near future, but other aspects require the project team's attention and mitigation.

**Conclusion 12.** If SEPAL did not exist, it would need to be invented to ensure quicker, cheaper, and less complex forestry monitoring and reporting globally for today and the future.

**Conclusion 13.** Financially, the sustainability of SEPAL is ensured during Phase II, but many other risks are beyond the project's direct control, requiring the project's attention for Phase II.

**Conclusion 14.** Strong coherence emerged between SEPAL and its partners, which is one approach to mitigate some risks to the project's sustainability.

**Conclusion 15.** SEPAL's framework is sufficiently robust for scaling up and replication. At the same time, the technical report identifies specific actions to strengthen its robustness further.

## 4.2 Recommendations

The recommendations below are firmly based on evidence and analysis, as presented in Executive Summary Figure 1 of the report. The evaluation groups the recommendations by priority, starting with the ones requiring immediate action or "act now", followed by recommendations calling for short-term action. Recommendations about keeping good work are grouped at the end in a box.

### Relevance

<b>R1</b> (Responds to EQ 3): The project team is encouraged to build on its successful partnership approach and systematically apply it to future technical development, particularly capacity building. Secondments from partners to the SEPAL team are one way to operate accordingly.
Priority: <b>very high</b> : next three months.
See also Good practice 1
<b>R2</b> (Responds to EQ 5): The project team should address the following emerging needs in Phase II:
<ul style="list-style-type: none"> <li>• develop a Plan B to address options to mitigate SEPAL's dependency on Google Earth Engine</li> </ul>
<ul style="list-style-type: none"> <li>• provide more documentation, such as a user manual, tutorials, or guidance, both written and videos, to better understand and work with the available functions like algorithms, particularly new ones</li> </ul>
<ul style="list-style-type: none"> <li>• significantly upscale SEPAL's outreach through:                             <ul style="list-style-type: none"> <li>o awareness-raising, for example: i) all relevant FAO projects; ii) all forest resource assessments; and iii) identifying and serving countries in need for SDG 15.1.1. reporting.</li> <li>o capacity building, focusing on a training of trainers model in main project countries and more systematic and formalized communication between SEPAL and its partners, for example, through monthly meetings</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• consider the demand for higher resolution data and the possibility to modify scripts</li> </ul>
Priority: <b>very high</b> : next three months

### Coherence

Practice to keep applying three and Lesson learned 1 (Responds to EQ 6)

See Practice to keep applying three (Responds to EQ 7)

## Effectiveness

<p><b>R3</b> (Responds to EQ 8): The project team should address the two partially achieved outputs: developing SEPAL documentation in French and Spanish and systematically applying monitoring and evaluation of capacity-building events.</p>
<p>Capacity-building M&amp;E should use pre- and post-course assessments such as initial participant needs assessments and an evaluation questionnaire/survey after the course. For longer events beyond one day, the use of a complementary evaluation questionnaire/survey six months after the event could be applied to assess the use of knowledge/application of SEPAL.</p>
<p>Priority: <b>very high</b>: next three months</p>
<p>See also Practice to keep applying 4. Responds to EQ 9.</p> <p>Priority: <b>Medium</b>, next six to nine months.</p>

See also R2, R4, and R 6 on capacity building. Responds to EQ 10 and 11.

## Efficiency

<p><b>R4</b> (Responds to EQ 12): The project team should consult its partners to assess which partners would welcome a formalization of the partnership, for example, through letters of agreement (LOAs) or memoranda of understanding (MOUs).</p>
<p>Besides, project reporting should be more results based using both quantitative and qualitative indicators for the new log frame of Phase II.</p>
<p>The project team should also communicate its scheduled events to the donor before the events rather than only reporting about the event <i>ex post</i>.</p>
<p>Priority: <b>high</b>: next three to six months</p>

<p><b>R5</b> (Responds to EQ 12): For SEPAL Phase II, the project team should identify and develop concept notes for specific modules outside the NICFI funding, which could be further negotiated and modified depending on potential donors' priorities. Engage potential donors for resource mobilization accordingly.</p>
<p>Priority: <b>high</b>: next three to six months</p>

## Sustainability

<p><b>R6</b> (Responds to EQ 15 and 16): While many risks are outside the direct control of SEPAL, the project team should embark on a risk mitigation strategy, combined with an exit strategy for SEPAL to systematically plan for SEPAL's use once the Norwegian funding has ended.</p>
<p>Priority: <b>high</b>: next three to six months.</p>
<p>See also R 4 on a Plan B for the use of Google Earth Engine.</p>

<p><b>R7</b> (Responds to EQ 17): Continue the parallel development of AWS and GEE solutions, both to cater to users that need the additional flexibility of AWS-based solutions to promote sustainability and reduce risk if the GEE platform becomes unavailable (Plan B scenario).</p>
<p>Priority: <b>high</b>: next three to six months.</p>



## Additional key recommendations from the technical review

<p><b>R8:</b> Work with the GEE team to improve authentication and related technical barriers to data sharing within the SEPAL platform; GEE integration should be entirely transparent to an end user if it is the preferred mode of computation.</p>
<p><b>R9:</b> Dedicate a resource to documentation for end users, including curated tutorials and guides: Also, consider a wiki framework for storing help pages, all having the same structure. Related to this, example scripts should be subjected to regular testing to ensure errors do not emerge over time due to updates of the SEPAL platform.</p> <p>Implement a video platform storing help videos.</p>
<p><b>R10:</b> Increase the efficiency of some of the developed algorithms, according to the focus group's suggestions.<sup>34</sup></p>
<p>Priority: <b>high</b>: next three to six months.</p>

## Practices to keep applying

<p><b>Relevance</b></p> <p>1. The project team is encouraged to keep applying an adaptive management approach for Phase II. As part of the next mid-term evaluation, the project log frame and corresponding results framework should be reviewed and updated as required at the output and activity level in close coordination with the donor. The same should apply in case of any project extensions, always bearing in mind to maintain the project's relevance and enable meaningful results-based management.</p> <p>Responds to EQ 1 and 2</p> <p>See also Lessons learned 1</p> <p>2. The project team should keep encouraging benefiting institutions to nominate equal numbers of women and men for SEPAL events, including capacity building. At the same time, user data should be collected using sex disaggregation.</p> <p>Responds to EQ 4</p> <p><b>Coherence</b></p> <p>3. The project team should keep developing SEPAL based on user needs as a guiding principle.</p> <p>Responds to EQ 7</p> <p><b>Effectiveness</b></p> <p>4. The project team should keep targeting institutional users in bandwidth-limited environments.</p> <p>Responds to EQ 9</p>
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<sup>34</sup> Details have been provided to the SEPAL project team in the evaluation's Technical Review report.

## 5. Lessons learned and good practices

**Lesson learned 1: Adaptive management, including for results.** For longer-term projects, such as SEPAL spanning over seven years, an adaptive management approach is essential to maintain the project's relevance. The latter was successfully accomplished in SEPAL. At the same time, this requires updating the results framework in coordination with the donor, particularly after the mid-term evaluation to keep outputs relevant in their contribution to the project's outcomes and goal. This lesson seems particularly relevant for projects developing technical solutions, which are subsequently piloted, adapted, scaled up, and replicated where many very distinct development steps apply.

**Lesson learned 2: Partnership approach.** SEPAL's use of partnerships is one factor for its success, as further identified in the good practices below. However, for such an approach to be replicable to other FAO projects, both donors and project designers need to consider the significant amount and length of time required to identify, build, and nurture those partnerships. While SEPAL's partnership approach helped to leverage significant resources and for the project "to punch above its weight," reliable donor engagement over at least five years is required for such an approach to work and fully evolve its potential. The assumption that such an approach would also be likely to work for short-term projects would be erroneous.

**Good practice 1: Partnership approach.** It seems crucial for projects to acknowledge that FAO has particular technical strengths and areas where support from third parties might be required rather than trying to "do it all by itself". In this context, SEPAL used a good practice to engage with relevant academic institutions in a partnership to benefit from the latest available research for platform development while at the same time also benefiting from partners' expertise in capacity building.

## Bibliography

- Bhattacharyya, K.** 1997. Key informants, pile sorts, or surveys? Comparing behavioral research methods for the study of acute respiratory infections in West Bengal. In: M. C. Inhorn & P. J. Brown, eds. *The anthropology of infectious diseases: Theory and practice on medical anthropology and international health*, pp. 211–238. Amsterdam, Routledge.
- Birigazzi, L., Gamarra, J.G.P. & Gregoire, T.G.** 2018. Unbiased emission factor estimators for large-area forest inventories: domain assessment techniques. *Environmental and Ecological Statistics*, 25(2): 199-219.
- Brinkerhoff, R.O.** 2006. *Increasing impact of training investments: An evaluation strategy for building organizational learning capability*. Kalamazoo, United States of America, Western Michigan University.
- Calderón-Urquizo Carbonel, A.V.** 2020. La degradación y deforestación del paisaje forestal en el departamento de San Martín, Perú. Barcelona, Spain, Universitat de Barcelona.
- Chen, D., Shevande, D., Baer, A., He, J., Hoffman-Hall, A., Ying, Q., Li, Y. & Loboda, T.V.** 2021. A Disease Control-Oriented Land Cover Land Use Map for Myanmar. *Data*, 6(6): 63.
- FAO (Food and Agriculture Organization of the United Nations).** 2021. *SEPAL Annual Report April 2020–March 2021*. Rome, FAO.
- FAO & Ministry of Climate and Environment of the Kingdom of Norway.** 2015. *Funding Agreement SEPAL*. Rome and Oslo, FAO.
- FAO & Ministry of Climate and Environment of the Kingdom of Norway.** 2018. *SEPAL Framework Agreement amendment*. Rome and Oslo, FAO.
- Fomete Nembot, T., Acworth, J., Afana, A., Kankey Richard, S., Bonnemaier, J., Ajebe, H., Chigbu, U.E., Rossi, M., Epie, P., Sembres, T. & Dourad, P.** 2018. Reframing local land use planning methods and tools in South-West Cameroon as a foundation for secure tenure, sustainable and equitable rural development, and REDD+. Conference presentation at 2018 World Bank Conference on Land and Poverty: land governance in interconnected world, 2018. Washington, DC.
- Gomes, V.C.F, Queiroz, G.R. & Ferreira, K.R.** 2020. An overview of platforms for big earth observation data management and analysis. *Remote Sensing*, 12(8): 1253.
- Hamunyela, E., Rosca, S., Mirt, A., Engle, E., Herold, M., Gieske, F. & Verbesselt, J.** 2020. Implementation of BFAST monitor algorithm on google earth engine to support large-area and sub-annual change monitoring using earth observation data. *Remote Sensing*, 12(18): 2953.
- Kirkpatrick, D.L.** 1975. *Techniques for Evaluating Programs. Parts 1, 2, 3, and 4. Evaluating Training Programs. Journal of the American Society of Training Directors (ASTD)*.
- Kotvojs, F.** 2009. Development of Framework for Evaluating Capacity Development Initiatives in International Development. Conference presentation at Australasian Evaluation Society International Conference, 2-4 September 2009. Canberra. Canberra. <https://www.aes.asn.au/images/stories/files/conferences/2009/Papers/Kotvojs,%20Fiona.pdf>
- Launiala, A.** (n.d.). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. Finland, University of Tampere and University of Kuopio. [https://www.anthropologymatters.com/index.php/anth\\_matters/article/view/31/53](https://www.anthropologymatters.com/index.php/anth_matters/article/view/31/53)
- Li, H., Zech, J., Ludwig, C., Fendrich, S., Shapiro, A., Schultz, M. & Zipf, A.** 2021. Automatic mapping of national surface water with OpenStreetMap and Sentinel-2 MSI data using deep learning. *International Journal of Applied Earth Observation and Geoinformation*, (104): 102571.

- Lwin, K.K., Ota, T., Shimizu, K. & Mizoue, N.** 2019. Assessing the importance of tree cover threshold for forest cover mapping derived from global forest cover in Myanmar. *Forests*, 10(12): 1062.
- Mao, L., Li, M. & Shen, W.** 2020. Remote sensing applications for monitoring terrestrial protected areas: Progress in the last decade. *Sustainability*, 12(12): 5016.
- Mullissa, A., ORCID, Vollrath, A., Odongo-Braun, C. Slagter, B., Balling, J., Gou, Y., Gorelick, N. & Reiche, J.** Sentinel-1 SAR Backscatter Analysis Ready Data Preparation in Google Earth Engine. *Remote Sensing* 13.10 (2021): 1954.
- Muñoz, E., Enríquez, J., Toctaguano, D., Bustos, M., Betancourt, F., Sangucho, C., Parra, V., Lima, A. & Zozaya, A.** 2020. Automate Lithological Classification of the Amotape Tahuin Metamorphic Complex in Ecuador using Random Forest and a Multi-Sensor Satellite Imagery Approach. Conference presentation at IGARSS 2020–2020 IEEE International Geoscience and Remote Sensing Symposium, 26 September–2nd October 2020. Waikoloa, United States of America, IEEE.
- Muñoz, E., Zozaya, A. & Lindquist, E.** 2020. Satellite remote sensing of forest degradation using NDFI and the BFAST algorithm. *IEEE Latin America Transactions*, 18(7): 1288-1295.
- Neeff, T.** 2017. *A strategic mid-term review of the SEPAL project*. Rome, FAO.
- Purss, M.B.J, Peterson, P., Strobl, P., Dow, C., Sabeur, Z., Gibb, R.B. & Ben, J.** 2019. Datacubes: a discrete global grid systems perspective. *Cartographica: The International Journal for Geographic Information and Geovisualization*, 54(1): 63-71.
- Riitters, K. & Robertson, G.** 2021. The United States' Implementation of the Montréal Process Indicator of Forest Fragmentation. *Forests*, 12(6): 727.
- Sandker, M., Carrillo, O., Leng, C., Lee, D., d'Annunzio, R. & Fox, J.** 2021. The Importance of High-Quality Data for REDD+ Monitoring and Reporting. *Forests*, 12(1): 99.
- Santos, F., Meneses, P. & Hostert, P.** 2019. Monitoring long-term forest dynamics with scarce data: a multi-date classification implementation in the Ecuadorian Amazon. *European Journal of Remote Sensing*, 52(sup1): 62-78.
- Sims, N., Green, C., Newnham, G., England, J., Held, A., Wulder, M., Herold, M. et al. 2017. Good practice guidance. *SDG Indicator 15*, No. 1: 115.
- Sims, N., Newnham, G.J., England, J., Guerschman, J., Simon, C., Roxburgh, S.H., Rossel, V., Raphael, A., Fritz, S. & Wheler, I.** 2021. Good Practice Guidance. SDG Indicator 15.3.1, Proportion of Land That Is Degraded Over Total Land Area. *Version 2.0. United Nations Convention to Combat Desertification*. Bonn, Germany.
- Stone, L. & Campbell, J.G.** 1984. The use and misuse of surveys in international development: An experiment from Nepal. *Human Organization*, 43(1), 27-34.
- Tituaña Jami, J.C.** 2018. *Desarrollo de un método para la clasificación automatizada de imágenes Landsat 8 mediante Redes Neuronales Artificiales*. Quito, Ecuador, University? . BS Thesis.
- Tituaña Jami, J.C., Lopez, C.P. & Yoo, S.G.** 2018. Method for the Automated Generation of a Forest Non-Forest Map with LANDSAT 8 Imagery by Using Artificial Neural Networks and the Identification of Pure Class Pixels. Conference presentation at International Conference on Technology Trends, 2018. Cham, Switzerland, Springer.
- Tivianton, T.A., Barus, B., Purwanto, Y., Anwar, S., Widiatmaka, W. & Laudiansyah, R.** 2021. Temporal NDVI analysis to detect the effects of seawater intrusion on rice growth in coastal areas. *IOP Conference Series: Earth and Environmental Science*, 662(1). IOP Publishing.
- UNITAR & Engelhardt, A.** 2021. *Independent evaluation of the UNITAR Strategic Framework (2019–2020)*. Geneva, Switzerland.

**World Bank.** 2008. *Using training to build capacity for development.* Washington, D.C.

**Xu, P., Herold, M., Tsendbazar, N.E. & Clevers, J.G.P.W.** 2020. Towards a comprehensive and consistent global aquatic land cover characterization framework addressing multiple user needs. *Remote Sensing of Environment*, 250: 112034.

## Appendix 1. People interviewed

First name	Last Name	Institution/Agency	Role
Alejandra	Chacon	Dirección de Bosques Subsecretaría de Patrimonio Natural, Ecuador	SEPAL stakeholder
Ankit	Rawat	Forestry Programme, India	SEPAL stakeholder
Anssi	Pekkarinen	FAO	Project team (former)
Branda	Anicia	National Forestry Authority, Uganda	SEPAL stakeholder
Carlos	Riano	EFI	Technical partner
Cherif	Imen		SEPAL stakeholder
Danilo	Granja	Dirección de Bosques Subsecretaría de Patrimonio Natural, Ecuador	SEPAL stakeholder
David	Gibbs	WRI	Technical partner
David	Saah	SERVIR	Technical partner
Enock	Kaluuba	National Forestry Authority, Uganda	SEPAL stakeholder
Eric	Konan	FAO project, Cote d'Ivoire	SEPAL stakeholder
Henrik	Filfet	Government of Norway, NICFI	Donor agency
Imen	Cherif	FAO project, Tunisia	SEPAL stakeholder
Isaac Nyaneyon	Kannah Teah	FAO project, Liberia	SEPAL stakeholder
Johannes	Moessinger	UNIQUE	Technical partner
John	Diisi	National Forestry Authority, Uganda	SEPAL stakeholder
Julian	Fox	FAO	Project team
Karis	Tenneson	SIG	Technical partner
Lenin	Beltran	Dirección de Bosques Subsecretaría de Patrimonio Natural, Ecuador	SEPAL stakeholder
Marija	Kono	SERVIR	Technical partner
Matieu	Henry	FAO	SEPAL stakeholder
Michael	Schultz	University of Heidelberg	Technical partner
Nabulime	Joanita	Uganda	SEPAL stakeholder
Oswaldo	Carillo	FAO project, Mexico	SEPAL stakeholder
Peter	Vogt	European Commission JRC	Technical partner
Praise	Atwiine	Uganda	SEPAL stakeholder
Quentin	Jungers	COMIFAC	Technical partner
Sam	Kissa	National Forestry Authority, Uganda	SEPAL stakeholder
Samapriya	Roy	Planet	Technical partner
Tania	Birch	Google	Technical partner
Tara	O'Shea	Planet	Technical partner
Valentien	Moe Soe Let	FAO project, Suriname	SEPAL stakeholder
Ximena	Herrera	Dirección de Bosques Subsecretaría de Patrimonio Natural, Ecuador	SEPAL stakeholder
Zhongxin	Chen	FAO	SEPAL stakeholder

Notes: In addition, stakeholders in the Republic of Costa Rica, the Democratic Republic of the Congo, the Republic of Indonesia and the Republic of Zambia were interviewed.

Additional partners interviewed included the SMFM, UNDP, WWF, GEO, GFOI, Peking University, and the Wageningen University. The Focus Group consisted of about 15 participants from various countries, while the evaluation also reached 382 persons through the general online survey, and 29 persons through a specific capacity-building online survey.

## Appendix 2. Evaluation matrix

Evaluation criteria	Evaluation questions	Evidence necessary to answer evaluation questions	Sources of information	Data collection methods
<b>Relevance</b>	1. How relevant was the project design in supporting the activities and expected results?	soundness of the implicit or explicit Theory of Change; identification of key needs; and assessments used in project design.	Project document; project reports; TOC, results matrix; relevant FAO headquarters and regional teams NICFI – Government of Norway.	Document review; and remote semi-structured interviews.
	2. How developed and relevant is the strategic vision employed by the project, including through partnerships?	articulated strategic vision, shared by the project, donor, partners; pathway to the impact – Theory of Change (implicit or explicit); and evidence of understanding and articulation of key challenges (REDD+ for instance) that SEPAL overcomes.	Project document; TOC; and partnership agreements.	Document review; remote semi-structured interviews; and TOC workshop, if relevant.
	3. Was the manner in which the SEPAL target users were identified congruent with its objectives and considerations for project effectiveness and inclusivity? Why or why not? (relevance)	initial pilot countries' selection criteria and country participation; and also a technical review area.	meeting minutes	Document review
	4. Were gender equality considerations adequately reflected in project objectives and design? Were gender equality considerations taken into account in project implementation and management?	<ul style="list-style-type: none"> <li>• alignment with FAO strategic priorities (SO); and</li> <li>• alignment with REDD+ strategic priorities/vision.</li> </ul>	Project document; inception report; project reports; FAO SO strategic documents; REDD+ strategic documents; and user data	Document review; and remote semi-structured interviews.
	5. Shall the intended use of the platform change in any way based on user needs, that is,	<ul style="list-style-type: none"> <li>• alignment with the donor's strategic priorities;</li> <li>• alignment with FAO strategic priorities (SO); and</li> </ul>	Project document; inception report; project reports; donor strategic documents; FAO SO strategic	Document review; remote semi-structured interviews; and analysis of the survey and focus group results

Evaluation criteria	Evaluation questions	Evidence necessary to answer evaluation questions	Sources of information	Data collection methods
	do user needs now differ from the original conception?	<ul style="list-style-type: none"> <li>alignment with REDD+ strategic priorities.</li> </ul>	documents; REDD+ strategic documents; relevant FAO headquarters teams; evaluation survey; and focus group results.	(particularly technical analysis and survey results).
<b>Coherence</b>	6. Are the project outcomes congruent with the FAO and donor's objectives, that is, FAO Strategic Objectives, SO, and the REDD+ vision? (coherence)	<ul style="list-style-type: none"> <li>alignment with the donor's strategic priorities;</li> <li>alignment with FAO strategic priorities (SO); and</li> <li>alignment with REDD+ strategic priorities.</li> </ul>	Project document; inception report; project reports; donor strategic documents; FAO SO strategic documents; and REDD+ strategic documents; relevant FAO headquarters teams NICFI – Government of Norway.	Document review; and remote semi-structured interviews.
	7. How did the project fill a gap or complement existing mechanisms for REDD+ support and the REDD+ vision?	<ul style="list-style-type: none"> <li>alignment with REDD+ strategic priorities</li> </ul>	Project document; inception report; project reports; donor strategic documents; and FAO's SDG13 evaluation (secondary data).	Document review; and remote semi-structured interviews.
<b>Effectiveness</b>	8. What results (stated outputs and outcomes, with a focus on outcomes) have been achieved, and which factors affected effectiveness or ineffectiveness of the project in achieving results?	<ul style="list-style-type: none"> <li>extent of output achievement;</li> <li>extent of outcome achievement; and</li> <li>Project contribution.</li> </ul>	Project progress reports; project staff; national and local partners; and contributing partners.	Document review; and remote semi-structured interviews.
	9. Did, and how, SEPAL enable countries with limited computing resources and bandwidth to produce high-quality activity data for reporting on REDD+ specifically?	<ul style="list-style-type: none"> <li>country evidence; and</li> <li>technical review analysis.</li> </ul>	Project reports; project staff; national and local partners; technical review analysis; and survey and focus group results.	Document review; remote semi-structured interviews; analysis of the survey and focus group results.
	10. To what extent have SEPAL's activities reached the intended users and uses? If the project	<ul style="list-style-type: none"> <li>stakeholder feedback</li> </ul>	Project reports; project staff; national and local partners;	Document review; remote semi-structured interviews; and analysis of the survey and focus group results.



Evaluation criteria	Evaluation questions	Evidence necessary to answer evaluation questions	Sources of information	Data collection methods
	<p>did reach all or the majority of its intended users, what success factors allowed it to do so?</p> <p>11. How has the project worked to ensure that users had the capacity to apply the SEPAL tool to their particular use (focus also on multilingual audiences)? What capacity-building and outreach strategies did the project use, and how effective were they?</p>	<ul style="list-style-type: none"> <li>stakeholder feedback;</li> <li>verification of the track record of the capacity building activities (i.e. training material)</li> </ul>	<p>and survey and focus group results.</p> <p>assessment of outputs 3.1 – 3.5, 4.1, and 4.4; and focus group</p>	<p>capacity development questionnaire – TBC; analysis of the focus group discussions; and mapping and analysis of training conducted and other capacity dev</p>
<b>Efficiency</b>	<p>12. To what extent were the project management and partnership arrangements appropriate and effective? Areas to consider include management, financial, human resources and project; project communications; and costs.</p>	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor; and</li> <li>Project documentation – evidence of timely submissions, appropriate budgetary planning, revisions, etc.</li> </ul>	<p>Project reports; budgets; project staff; donor; and national and local partners.</p>	<p>Document review; and remote semi-structured interviews.</p>
	<p>13. Which factors either enabled or hindered materialization of the planned cofinancing? What conclusions for Phase II projects can be gained from these insights? (effectiveness)</p>	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor</li> </ul>	<p>Project reports; project staff; donor; and national and local partners.</p>	<p>Document review; and remote semi-structured interviews.</p>
<b>Sustainability</b>	<p>14. What quantitative (quantifiable) and qualitative (descriptive and conceptual) higher-level and durable benefits has the project achieved?</p>	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor; and</li> <li>evaluation survey results (of SEPAL user base)</li> </ul>	<p>Project reports; project staff; donor; and national and local partners; evaluation survey.</p>	<p>Document review and remote semi-structured interviews</p>

Appendix 2. Evaluation matrix

Evaluation criteria	Evaluation questions	Evidence necessary to answer evaluation questions	Sources of information	Data collection methods
	15. How sustainable are the project results and what are the risks (particularly financial and governance/ institutional risks)?	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor</li> </ul>	Project reports; project staff; donor; and national and local partners.	Document review and remote semi-structured interviews
	16. How, if at all, does the project's coherence with other initiatives contribute to the likelihood of sustainability?	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor</li> </ul>	Project reports; project staff; donor; national and local partners; and results of a light-touch review of similar initiatives.	Document review and remote semi-structured interviews.
	17. Has SEPAL led to other changes, including scalable or replicable results?	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor</li> </ul>	Project reports; project staff; donor; and national and local partners.	Document review and remote semi-structured interviews.
	18. Is the framework sufficiently robust for scaling up, given the plans to increase users in the next phase <sup>35</sup> (considering both IT, organizational, and HR aspects)?	<ul style="list-style-type: none"> <li>feedback from project team, partners, and donor</li> </ul>	Project reports; project staff; donor; and national and local partners.	Document review; and remote semi-structured interviews.

<sup>35</sup> The evaluation can also recommend, in case it is found that the framework is not robust enough, how to make it more robust.

## Evaluation matrix: technical review areas

Provides inputs mainly into evaluation criteria	Subquestions/Indicators	Comments	Data Collection sources Data collection methods Informants
Relevance, effectiveness, coherence Sustainability and SEPAL Phase II Contribution: degree to which the applied modeling and scaling up approaches planned relevant for the project outcomes	Are the algorithms chosen for implementation suitable to the challenges faced by users?	local examples	document review; interviews: SEPAL Task Force Members, User Community; and technical data review: user interaction with SEPAL portal.
	Is the technical infrastructure suitable for scaling to the number of anticipated users?	Are assumptions about user numbers realistic?	
Relevance Contribution: relevance from a technical standpoint	relevance of selected technical approaches; relevance of selected satellite imagery; and relevance of cloud-based infrastructure.	fundamental relevance of selected solution to achieve desired outcomes	document review; and interviews: SEPAL task force members.
Capacity building Contribution: relevance and soundness of the capacity building efforts and technical areas	relevance of the chosen capacity building interventions, from a technical point of view and appropriateness for different audiences; and evidence of technical skills gained and used following the capacity building (i.e., SEPAL usage increase).		user survey; and remote interviews with capacity building project personnel.

Provides inputs mainly into evaluation criteria	Subquestions/Indicators	Comments	Data Collection sources Data collection methods Informants
Effectiveness: To what degree did SEPAL improve or create enabling environments and/or capacity for local REDD+ stakeholders to retrieve, access, and process satellite imagery to produce forest information products? results	What is the nature of users of the tool, both by volume and substance? What is the total population of potential users realistically targeted by SEPAL? What, if any, analyses would not have been generated by end users without FAO efforts? What levels of engagement with the tool are evident in outputs and outcomes? Was the tool designed to enable additional uses of satellite information?	In addition to the noted outcomes, this should also encompass output 2.5.	document review; interviews: SEPAL task force members and user community; and technical data review: user interaction with SEPAL portal.
Efficiency	relevant risks taken into account and mitigation plan developed at global and national levels, including technical aspects		document review; meeting/workshop minutes; and interviews.
Results and efficiency Contribution: Were technical solutions implemented correctly, in a timely fashion, and in a way that benefited the tool's users?	Did the pilot study inform future procurement or technical efforts? Were computing resources procured on time, and were they scoped appropriately? Was appropriate data collected, processed, and integrated for use?	Should include output assessment of 2.1, 2.2., 2.3, 2.4, 4.2, 4.3, 4.1	document review; interviews: SEPAL task force members and user community; and technical data review: user interaction with SEPAL portal.

## Appendix 3. Evaluation questionnaire

Gender	Position	Organization	Country	Date

### (A) Relevance:

1. How relevant was the project design in supporting the activities and expected results?
2. How developed and relevant is the strategic vision employed by the project, including through partnerships?
3. Was the manner in which the SEPAL target users were identified congruent with its objectives and considerations for project effectiveness and inclusivity? Why or why not?
4. Were gender equality considerations adequately reflected in project objectives and design? Were gender equality considerations taken into account in project implementation and management?
5. Shall the intended use of the platform change in any way based on user needs, that is, do user needs now differ from the original conception?

	Very high	High	Medium	Low	Very low	No answer
Overall relevance of SEPAL						

### (B) Coherence

6. Are the project outcomes congruent with the FAO and donor's objectives, that is, FAO Strategic Objectives and the REDD+ vision?
7. How did it fill a gap or complement existing mechanisms for REDD+ support?

	Very high	High	Medium	Low	Very low	No answer
Overall coherence of SEPAL						

### (C) Effectiveness

8. What results (stated outputs and outcomes, with a focus on outcomes) have been achieved, and which factors affected effectiveness or ineffectiveness of the project in achieving results?
9. Did, and how, SEPAL enable countries with limited computing resources and bandwidth to produce high-quality activity data for reporting on REDD+ specifically?

10. To what extent have SEPAL’s activities reached the intended users and uses? If the project did reach all or the majority of its intended users, what success factors allowed it to do so?
11. How has the project worked to ensure that users had the capacity to apply the SEPAL tool to their particular use (multilingual audience)? What capacity-building and outreach strategies did the project use, and how effective were they? Would the evaluation recommend any changes be made?

	Very high	High	Medium	Low	Very low	No answer
<b>Overall effectiveness of SEPAL</b>						

**(D) Efficiency:**

12. To what extent were the project management and partnership arrangements appropriate and effective? Areas to consider include management, financial, and human resources; project communications; and costs.
13. Which factors either enabled or hindered materialization of the planned cofinancing? What conclusions for Phase II projects can be gained from these insights?

	Very high	High	Medium	Low	Very low	No answer
<b>Overall efficiency of SEPAL</b>						

**(E) Sustainability**

14. What quantitative (quantifiable) and qualitative (descriptive and conceptual) higher-level and durable benefits has the project achieved?<sup>36</sup>
15. How sustainable are the project results, what are the risks, particularly financial and governance/institutional risks?
16. How, if at all, does the project’s coherence with other initiatives contribute to the likelihood of sustainability?
17. Has SEPAL led to other changes, including scalable or replicable results?

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<sup>36</sup> i.e. long-lasting improved REDD+ reporting from countries with limited resources (as defined above in the Evaluation Questions table); durable capacity-building (institutional focused)

18. Is the framework sufficiently robust for scaling up, given the plans for increase in users in the next phase (considering both IT, organizational, and HR aspects?)

	Very high	High	Medium	Low	Very low	No answer
Overall sustainability of SEPAL						

## Appendix 4. Evaluation survey for capacity-building beneficiaries

Gender	Position	Organization	Country	Date

### (A) Relevance of the event

1. To what extent was the SEPAL training relevant to a performance need in your organization?

	Very highly relevant	Highly relevant	Somewhat relevant	Slightly relevant	Not relevant at all	No answer
Please select:						

2. To what extent was this particular performance need a priority to be addressed?

	Very much so	High	More or less	A little	Not at all	No answer
Please select:						

*Please explain your assessment:*

### (B) Efficiency: appropriate use of resources

3. To what extent was the SEPAL training a timely response to your needs?

	Very much so	Timely	More or less	A little	Not at all	No answer
Timelines of training (appropriate moment of the event)						

Please elaborate

### (C) Effectiveness: achievement of project results

4. To what extent has the SEPAL training met your needs?

	Very much so	Much	More or less	A little	Not at all	No answer
Please select:						

*Please explain your assessment:*

5. If it was an online event, how effective was the format?

	Very effective	Effective	More or less	A little	Not at all	No answer
Please select:						



6. How would you assess the following results of the SEPAL training?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No answer
I have better/ more knowledge/understanding of the topic						
I believe this will be worthwhile to do on the job.						
I know I can do it on the job.						
I will do it on the job.						

7. As a follow-up to the SEPAL training event, have you applied or transferred any knowledge/skills from the training to your work?

For those who say YES to application: use questions 8 to 12

8. Things you do differently as a result of the training

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No answer
Systematic application of new learning when required						
Opportunities to discuss the use of new learning with line manager						
Formal reporting includes experiences with new learning.						
Formal feedback from line manager on my reporting of applying new learning						

9. Things that changed at your workplace as a result of the SEPAL training

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No answer
I shared learning from the training informally with colleagues (e.g., during lunch breaks)						
I shared learning from the training formally in my workplace (e.g., presentation during a team meeting)						
In my job, I am more engaged in the topic I got trained on						
In my job, I got new responsibilities related to the topic I got trained on						
In my job, I am confident to lead on the topic I got trained on						
As a result of the training, I got a job promotion.						
As a result of the training, I got a new job in a different organization.						
As a result of the training, my organization is performing better in reaching its objectives.						

Appendix 4. Evaluation survey for capacity building beneficiaries

10. Please provide examples of the knowledge/skills area(s) which you have transferred or applied to your work and how you have done it. (Please try to be as specific as possible, indicating what you may have done differently due to transferring or applying the knowledge/skills.)

11. How much of applying the indicated knowledge/skills to your workplace can you attribute directly to the training?

0-100% slider

12. Please indicate how frequently you have applied the knowledge/skills to your work.

	Frequently	Often	Occasionally	Infrequently	Never	No answer
<b>Please select:</b>						

13. To what extent has the following enabled/prevented you from applying the learnings from the SEPAL training?

	Very enabling	highly enabling	Highly enabling	Medium	A little disabling	Very much disabling	No answer
My supervisor closely monitored the application of new knowledge							
My supervisor encouraged the application of new knowledge.							
My supervisor reinforced the application of new knowledge.							
My supervisor rewarded the application of new knowledge.							
Organizational hierarchies enabled the application of new knowledge.							
Organizational incentive system in place to encourage the application of new knowledge							
Organizational culture allows application of learning, also through committing errors							
I had an action plan on how to apply knowledge/skills.							
My peers encouraged me to apply knowledge/skills.							
Enabling environment (policy/structure)							

17. Please reflect on and state your confidence level in applying/transferring the knowledge/abilities from the training event to the workplace.

	Fully confident	Very confident	Neutral	Somewhat confident	Not at all confident	No answer
<b>Please select:</b>						

18. What are your recommendations to improve SEPAL training further?

## Appendix 5. Evaluation survey

\* 1. What is your frequency of use of SEPAL?

Daily

Weekly

Monthly

Few times a year

Used it only once or twice

\* 2. Can you provide a short description of the reason you used SEPAL? What are the main analyses you performed?

\* 3. I have used the following tools on the SEPAL.IO platform

Time series analysis

Index (i.e., NDVI) calculations

BFAST or related breaks analyses

Visualizations of forest cover

Custom (i.e., jupyter notebook or R) code

Other (please specify)

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\* 4. Relative to other methods of data processing, how would you judge the efficiency of SEPAL (with 0 being not at all efficient, and 5 very efficient)?

0 5

\* 5. How would you rate the value of the help documentation provided (with 0 being the lowest, and 5 the highest)?

0 5

\* 6. If you are working from a place with limited computing resources and bandwidth, do you feel SEPAL is enabling to produce high quality activity data?

- YES
- NO
- Not applicable

Comments (optional)

\* 7. In your view, did SEPAL adequately consider the needs of local communities and/or administrations (e.g., providing data at detail scale)?

- YES
- NO
- Other (please explain in comment)

Comment

\* 8. What would you change in SEPAL in terms of data analysis/gathering and/or design interface?

\* 9. Are the satellite imagery data provided in SEPAL generally relevant for your analysis/project?

- YES
- NO
- Other

Please provide more information

\* 10. Would you recommend SEPAL to your colleagues?

- YES
- NO
- Other (please explain in comment)

Comment

\* 11. Did the product(s) you produced with SEPAL contribute to outcomes associated with REDD, REDD+, or mitigating deforestation more broadly?

- YES
- NO
- Not applicable
- Other

Please provide more information

12. Do you anticipate that SEPAL will contribute to your organization's goals related to REDD, REDD+, or forest management in the future? Leave question blank if not applicable.

- YES
- NO
- Other

Comment

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