President's report on a proposed grant to OpenGeoHub Foundation (OGH) for Capitalizing on Earth Observation (CAPEO) to support design, implementation, monitoring and evaluation and impact assessment of rural development projects

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Action: The Executive Board is invited to approve the recommendation contained in paragraph 20.

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I. Background and compliance with the IFAD Regular Grants Policy

1. Enhancing the targeting, efficiency and effectiveness of rural development projects requires data. Information on natural resources (water, soils, forests, crops, etc.) is critical, as many of IFAD's target groups, such as smallholders, depend directly upon natural resources to sustain their livelihoods. However, natural resources worldwide are increasingly under pressure from overexploitation and climate change.

2. Natural resources are spatially variable. Hence, maps are needed to provide information on the status and use of natural resources. Recent years have seen an exponential increase in the availability of data from satellites and spatial models that use satellite data. Many open-access global datasets are now available, for instance on soil fertility, climate resilience, water stress in plants, biomass growth and carbon sequestration. In the near future, additional satellites will be launched that will provide even more data. While these data are very useful to inform rural development projects, they are currently underutilized in IFAD and IFAD-supported project management units (PMUs) and in the broader context of rural development.

3. The grant will allow IFAD and partners to use satellite data for project design, implementation, monitoring and evaluation (M&E) and impact assessment. The project will develop a built-for-purpose data viewer and tool, populate these with a wide range of relevant datasets, develop training materials and support at least six IFAD country teams in using satellite-derived maps. There will be close collaboration with country-level partners to strengthen local capacities and ensure the sustainability of impacts.

4. The Capitalizing on Earth Observation (CAPEO) project will complement the work of the IFAD geographic information system (GIS) unit. The GIS unit will significantly benefit from the spatial data to be provided by CAPEO, which can be used to monitor indicators in IFAD's core indicators (CI) framework, such as: (i) CI 1.1.2 farmland under water-related infrastructure constructed/rehabilitated; (ii) CI 3.1.4 land brought under climate-resilient management; and (iii) CI 3.2.4 biodiversity improvements at ecosystem level. CAPEO will also support the development of the new IFAD ecological impact indicator.

5. The proposed project is in line with the goal and objectives of the IFAD Regular Grants Policy (2021).[1] Outputs and capacities developed through this grant will be made available for use by governments; national, local and international organizations; farmers and farmers' associations; and the general public.

6. The OpenGeoHub (OGH) Foundation was identified through competitive selection as the grant recipient. OGH is a spin-off of Wageningen University, a global top-five university in the field of agriculture, food and forestry. OGH specializes in the analysis of spatial data, including very large datasets, machine learning and webtool development. OGH currently has around 35 staff and implements projects for, among others, the World Bank and the Bill & Melinda Gates Foundation. OGH

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[1] See EB 2021/132/R.3.

won a competitive bidding process with its proposal, which was one of 30 proposals submitted to IFAD. The original proposal submitted by OGH has been enhanced in collaboration with the IFAD team supporting the selection process (three staff and one long-term consultant who is specialized in GIS analysis; the three staff are from the Sustainable Production, Markets and Institutions Division, the Research and Impact Assessment Division, and the Environment, Climate, Gender and Social Inclusion Division respectively).

II. The proposed project

7.   OGH formed a consortium with the software company GILab Ltd (Serbia), the CGIAR International Institute of Tropical Agriculture (IITA), the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP) and Wageningen University & Research (in the Kingdom of the Netherlands). The consortium will build the LandMetric tool and implement the project.

8.   The primary end users of the LandMetric tool will be staff of IFAD, PMUs of IFAD projects, farmers' and pastoralists' associations, other international development agencies, government agencies and NGOs working on development. No technical knowledge about geographic information systems will be required to use the data (although advanced models may be developed based on these data by expert users). Farmers and local stakeholders (e.g. farmers' organizations) that are interested in satellite-derived maps of their areas of operation will be able to directly download such maps (e.g. maps showing changes in vegetation cover or water stress in crops over time).

9.   The project will work in collaboration with FAO and WFP. Both organizations will receive limited funding (US$50,000 and US$40,000, or 3.5 per cent and 2.8 per cent, respectively, of the project budget) to finance external IT support required to connect FAO and WFP web-based spatial data tools to the LandMetric tool. In return, IFAD's LandMetric tool will be able to integrate FAO and WFP data layers that have cost several million dollars to develop. The project will also facilitate mutual learning and exchange of experiences in the use of spatial data between IFAD and FAO and WFP.

10.   The specific components of the CAPEO project are:

(i)   Development of the LandMetric web-based viewer and spatial analysis tool, which will provide access to spatial datasets for project identification, management, M&E and impact assessment. The tool will be fully open-access. The LandMetric tool will include at least 35 key indicators with global coverage, including soil organic carbon, productivity of vegetation, carbon sequestration and water stress in crops. It is estimated that the tool will incorporate a total of between 200 and 300 terabytes of data. The tool will have an additional back-end solution that can be deployed on Google Earth Engine or similar commercial cloud platforms.

(ii)   Development of a data catalogue with all required metadata that is easily updatable, extendable and compliant with the findability, accessibility, interoperability and reuse (FAIR) principles. The accuracy of the data will be indicated, so that it is clear to end users what limitations apply and for what purposes the data may be used.

(iii) Implementation of the LandMetric tool and the data it contains in six use cases (most likely involving Brazil, Ethiopia, Ghana, Lesotho, Sierra Leone and the Central Asia region, and potentially also a country in the Asia and Pacific Region). This selection is based on the interest expressed by the respective country teams. Country teams and other stakeholders, such as farmers' associations, in these countries will be trained in applying the tool. Based on their feedback, the tool will be enhanced.

(iv) Preparation of training materials and manuals (computational notebooks, tutorials, manuals and videos) providing complete descriptions of processes, examples of outputs and online training courses for basic and advanced users). These resources can then be used for self-training and offline capacity-building.

11. The project will be implemented over three years, with activities in the first year focusing on development of the viewer and the spatial tools and in the second and third years on developing user cases and capacity-building. All data layers of the tool will continue to be made accessible by OGH for five years after project closure. In addition, OGH will maintain the LandMetric tool beyond the five-year period, with funding from various sources, and will continue to update the data layers, as well. Hence the tool will still be relevant for IFAD in five years. In the meantime, the IFAD GIS unit will build capacity to continue training people on how to use the data layers in the long term.

III. Expected outcomes and outputs

12. The project is expected to produce the following outcomes and outputs:

(i) A series of high-resolution data layers that will be highly relevant for rural development (e.g. Social, Environmental and Climate Assessment Procedures (SECAP), soils, water, forests, carbon) for all IFAD countries of interest, organized according to the United Nations System of Environmental-Economic Accounting framework.

(ii) A back-end and front-end solution, with a web viewer that will make the above-mentioned data layers easily accessible to users, including staff of international finance organizations, PMUs, NGOs and farmers' organizations. No expertise in geographic information systems will be required to use these data.

(iii) Training manuals and documentation explaining the sources, underlying assumptions and accuracy of the data layers.

(iv) At least eight training courses given at two levels: novice (six courses, each with specific application examples in an IFAD country) and expert (two courses targeted at staff with prior GIS expertise to facilitate their efforts in integrating the datasets into models, for example for M&E).

(v) Use cases in six countries, in which the LandMetric tool will be used to support specific IFAD projects. A tentative selection of these six countries has been made, based on interest expressed by IFAD country directors.

(vi) A final report documenting all outputs provided and lessons learned and setting out a strategy for embedding the use of satellite data in future IFAD operations, including options for collaboration with FAO and WFP.

IV. Implementation arrangements

13. The project will be implemented over 36 months, in two phases:

14. Phase 1 – Specification, co-design, data preparation and incremental implementation (first 12 months): in this phase the data layers, data viewer, target groups and use cases will be confirmed. The provided specifications will be used to guide data preparation/harmonization and the development of the LandMetric tool.

15. Phase 2 – Use case implementation and capacity-building (months 13–36): in this phase there will be continuous contact with individuals involved in the use cases. This will contribute to an effective feedback loop and continuous usability improvements in the implemented functionalities. In parallel, OGH will finish the spatial layers and land indicators, fix bugs, improve the viewer and conduct training workshops (in person and remotely).

16. OGH will prepare an annual workplan and budget to guide all activities. The project planning will be posted and monitored in online project management tools (Gitlab and Taiga), which can be accessed by selected IFAD staff. Every four months the implementing partners will re-evaluate the project planning, making adjustments and updates based on lessons learned and recommendations provided by the supervision team.

17. IFAD staff members from four divisions (the Sustainable Production, Markets and Institutions Division; the Environment, Climate, Gender and Social Inclusion Division; the Operational Policy and Results Division; and the Research and Impact Assessment Division) and from country/regional teams will form part of a supervision team. This team will hold (virtual) quarterly meetings with OGH to track progress and provide feedback as required. An advisory board consisting of five external experts (including from FAO and WFP) will be established to provide guidance on new developments in spatial datasets and ensure integration with datasets from other agencies.

18. Deviations from standard audit procedures: the grant recipient is exempt from institutional audit under Netherlands domestic law. Therefore, the requirement to submit to IFAD yearly audited institutional financial statements will be waived as an exception to the general provisions. This exception will be incorporated in the grant agreement. The grant recipient will, however, be required to submit a project-specific audit opinion on the statement of expenditures within six months after the end of each fiscal year, in line with IFAD standard audit procedures. There will be no deviations from the standard procedures for financial reporting. All procurement, disbursement, audit and other financial procedures will be set out in the grant agreement.

V. Indicative project costs and financing

19. Tables 1 and 2 below present the total project costs, including the portions funded by the IFAD grant and by OGH. Table 1 presents costs by component and financier. Table 2 presents costs by expenditure category and financier.

Table 1
Costs by component and financier
(Thousands of United States dollars)

Components	IFAD	OGH	Total
1. User-driven system design	86		86
2. LandMetric spatial layers	146	242	388
3. LandMetric tool	429		429
4. Use case engagement	254		254
5. Communication and project management	284		284
Total	**1 199**	**242**	**1 441**

Table 2
Costs by expenditure category and financier
(Thousands of United States dollars)

Expenditure category	IFAD	OGH	Total
1. Salaries and allowances	359	242	601
2. Goods and services	176		176
3. Workshops and training	59		59
4. Travel and allowances	67		67
5. Subgrants	450		450
6. Indirect costs	88		88
Total	**1 199**	**242**	**1 441**

VI. Recommendation

20. I recommend that the Executive Board approve the proposed grant in terms of the following resolution:

> RESOLVED: that the Fund, in order to finance, in part, the project Capitalizing on Earth Observation (CAPEO) to support design, implementation, monitoring and evaluation and impact assessment of rural development projects, shall provide a grant of one million one hundred ninety nine thousand United States dollars (US$1,199,000) to the OpenGeoHub Foundation upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board herein.

Alvaro Lario
President

Results-based logical framework

Results hierarchy	Indicators			Means of verification			Assumptions
	Name	Baseline	End target	Source	Freq.	Respons.	
Goal To improve development effectiveness of rural development programmes through the enhanced application of spatial information for project targeting and measuring of results.	Total number of IFAD projects that make use of Land Metric data for project design, implementation, M&E, impact evaluation	-	20	LandMetric API	Every four months (after first LandMetric release)	OGH	IFAD will provide polygon delineation/boundaries for countries and land intervention areas.
Development objective To make up-to-date, high resolution and accurate spatial data (maps) derived from satellite imagery available to IFAD staff, PMUs and development partners, and to support them in using these data in an effective and cost- and time-efficient manner.	Number of active users accessing and using LandMetric at least once a month, including IFAD staff, PMUs and development partners	-	75	LandMetric API	Every month (after first LandMetric release)	OGH	IFAD will promote LandMetric early releases and capacity building initiatives through its official internal and external communication channels (maillist, social media, etc).
Outcome 1.1: Adaptive development of the LandMetric tool by recurrent interactions with the target groups	Number of LandMetric software releases	-	6	Source code tagged and changelog publicly available in version control platform (GIT)	Every two months (after first LandMetric release)	GILAB	Continuous Integration and Continuous Delivery (CI/CD) will be provided by the version control platform.
Output 1.1: IFAD supervision team and Advisory Board	Number of individual members integrating the committee	-	10	Periodic online meetings and meeting minutes available to IFAD	Every month	CGIAR	IFAD will provide at least two points of contact (name & email) per target group and projects connected to the use cases.
Output 1.2: Report "User Requirements and Data Gaps for LandMetric Tool"	Number of land assessment indicators specified and included in the Land Metric tool	-	40	Document (PDF format) distributed and approved by IFAD	Single time	CGIAR	The supervision team will provide a concrete list of land assessment indicators for the M&E.
			6	Document (PDF format)	Single time	OGH	The supervision team will provide user requirements with analysis and reports

Results hierarchy	Indicators			Means of verification			Assumptions
	Name	**Baseline**	**End target**	**Source**	**Freq.**	**Respons.**	
	Number of user stories including example reports		(One for each use case)	distributed and approved by IFAD			from previous land assessments.
Outcome 2.1: Enhanced monitoring capabilities of IFAD intervention areas through new land assessment indicators that are currently unavailable to the target groups and use cases	Number of new land assessment indicators (non-existent in other IFAD geospatial solutions) implemented and publicly accessible	3 (i) Carbon; (ii) biodiversity based on Globio, and (iii) ecosystem services based on ESVD	4 (enhancements to existing indicators + new IFAD ecological indicator)	Dynamic STAC and STAC-Browser publicly accessible http://stac.landmetric.org	Every two months	OGH	The supervision team is actively promoting the use of the data currently available in existing IFAD geospatial solutions.
Outcome 2.2: Expanded number, spatial coverage and spatial resolution of available layers in existing FAO/IFAD geospatial tools and applications	Total storage size of LandMetric spatial layers fully integrated in at least one existing FAO/IFAD geospatial tools and applications	-	200 TB	Cloud object storage service	Every months	OGH	Existing FAO/IFAD geospatial tools and applications compatible and interoperable with Cloud-Optimized GeoTIFF and STAC standards.
Output 2.1: Curated and decision-ready spatial data available through Spatio-Temporal Asset Catalogue (STAC, multiple releases)	Number of land assessment indicators implemented and publicly accessible	-	35	Dynamic STAC and STAC-Browser publicly accessible http://stac.landmetric.org	Every two months	OGH	Mostly of the land assessment indicators can be estimated/derived through EO data.
Outcome 3.1: Improved monitoring capabilities of IFAD intervention areas through data-orientated, customizable and automated land assessment reports (including PDF maps)	Number of customizable and automated land assessment reports types implemented	-	10	LandMetric tool publicly accessible http://landmetric.org	Every two months (after first LandMetric release)	GILAB	The user requirements and data gaps were properly specified by O1.1 and O1.2.
Outcome 3.2: Enhanced capacity of IFAD staff in designing new rural development projects through spatial-explicit and country-based	Number of country-based analysis types implemented	-	6	LandMetric tool publicly accessible http://landmetric.org	Every two months (after first LandMetric release)	GILAB	The user requirements and data gaps were properly specified by O1.1 and O1.2.

Results hierarchy	Indicators			Means of verification			Assumptions
	Name	**Baseline**	**End target**	**Source**	**Freq.**	**Respons.**	
analysis of productivity trends of several land assets.							
Output 3.1: LandMetric tool (multiple releases)	Number of users registered in LandMetric, including IFAD staff (technical and M&E officers)	-	200	LandMetric API	Every month (after first LandMetric release)	GILAB	IFAD will promote LandMetric early releases through its official internal and external communication channels (maillist, social media, etc).
Output 3.2: EarthMap Integration	Number of new LandMetric spatial layers integrated and available in EarthMap	-	5	New LandMetric spatial layers visible in https://earthmap.org	Every two months	OGH	EarthMap compatible and interoperable with Cloud-Optimized GeoTIFF and STAC standards.
Outcome 4.1: Adoption and effective use of the LandMetric tool by the use cases and other target groups	Average session duration in LandMetric	-	5 minutes (indicates active engagement)	Google Analytics / which ever is compatible within political area	Every month	OGH	IFAD will promote LandMetric early releases through its official internal and external communication channels (maillist, social media, etc).
Output 4.1: LandMetric use cases workshops targeting basic and advanced users	Average number of participants in the LandMetric use cases workshops	-	10	Summary of each in-person workshop	Every year	CGIAR	IFAD will promote the workshop summit through its official internal and external communication channels (maillist, social media, etc).
Output 4.2: Report "Assessment of LandMetric usability and adherence to use cases"	Number of users providing structured and documented feedback based on early releases of LandMetric	-	6 (one for each target group and use case)	Document (PDF format) distributed and approved by IFAD	Every year	CGIAR	The supervision team will have constant access to the LandMetric tool, and proper training for accessing the early releases.
Outcome 5.1: Effective dissemination of LandMetric tool for multiple stakeholder groups	Average number of participants of LandMetric webinars	-	30	Number of attendants in each webinar	Every three months	CGIAR	IFAD will promote the workshop summit through its official internal and external communication channels (maillist, social media, etc).
Output 5.1: LandMetric dissemination materials, including webinars and short videos	Number of LandMetric Webinars registered with DOI and publicly available	-	3	Final professionally edited video	Every year	OGH	The TIB video portal will keep the same upload quota for registering new videos.

Results hierarchy	Indicators			Means of verification			Assumptions
	Name	**Baseline**	**End target**	**Source**	**Freq.**	**Respons.**	
				recordings in https://av.tib.eu/ publisher/OpenGe oHub_Foundation			
Output 5.2: Official LandMetric documentation	Number of communication and documentation material produced		10	Official LandMetric link publicly accessible http://docs.landm etric.org	Every month (from first early release)	OGH	All material will be primarily in English and up to two other languages (French, Spanish or Portuguese) to be defined by the supervision team