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Exploitation Concepts**

**Capacity for Copernicus REDD+ and Forest Monitoring
Services**



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Summary

The first version of this document contained identification of relevant international initiatives supporting REDD+ and their point of contact to be consulted with the aim to collect their feedbacks on technical and organisational components of a Copernicus REDD+ and FM Service, as well as their willingness to establish potential collaborative framework with the Service. These stakeholders were separated in different types (Financiers, Donors and Development Agencies / Technical and scientific organizations / International Initiatives and NGOs). A list of key items to discuss with them in order to obtain harmonized feedback from all was also provided.

This second version of the document provides an update on the potential collaborative framework though the discussions that were engaged in year 2020 which is the second year of the project, and that were possible despite the COVID-19 crisis which has impeded a number of physical meetings/conferences from taking place. During this second year, initial design of the Service was showcased through learning exercises held in tropical countries with relevant local stakeholders (WP4), aiming at collecting their feedbacks, which was also a subject of discussion with International Initiatives. As for EU stakeholders, a number of discussions were engaged specially to obtain updates on institutional elements and feedbacks on the future Service as proposed by the Consortium as part of the WP 7 (organisational elements) and WP 8 (technical elements).

The potential collaborative framework with all international initiatives will be assessed once all have been contacted in final version of this deliverable, which is due beginning of 2022.

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Executive Summary

The aim of REDDCopernicus is to propose a new Service Component for the forest monitoring sector, considering the REDD+ requirements, which is planned to be included in the European Copernicus programme in the coming years. To fulfil that aim and considering the global dimension of the proposed Service Component and the potential for Downstream activities as well as increasing the awareness and impact of such a Service Component, there is a strong requirement to interact with international initiatives supporting REDD+ (UN REDD, GFOI, donor agencies...) with a view to gather feedback on the proposed Service Component and potential collaborative opportunities.

In the initial version of the deliverable, the work focused on the communication with European stakeholders and the identification of the relevant international entities to contact in the context of the project, with criteria including the type of support which is provided to the stakeholders in the area of FM EO and specifically the REDD+ policy. If an entity is already aware of the REDD+ process and supporting it, it is likely that the future Copernicus Service will be of interest to them.

The present deliverable is the second of the three version as part of WP5 which will be delivered during the project. The WP5 has the following main objectives:

- Present the technical and organizational components of a Copernicus REDD+ Service as presented in WP3, WP7 and WP8 to the different international agencies and initiatives supporting REDD+;
- Compile feedback and potential collaborative framework from these international agencies and initiatives: this is a key outcome of the WP since it must be ensured that the future Copernicus Services are considered in the development of international capacity building and strengthening initiatives; and allow to consider the future development of international initiatives in the definition of the proposed Copernicus Service Component.

It can already be said that even though there are a large number of initiatives around REDD+, very few have access to the types of services and products that are being envisaged as part of the proposed REDD+ Service Component despite the need already expressed as part of WP1 for this type of products and services with level of operationalisation rendered possible through the Copernicus programme.

The first version of the deliverable from WP5, immediately followed from WP1 and WP2 deliverables, and presented the list of organisations / initiatives to be contacted outlining their role in the REDD+ process and identifying relevant contact points. Initial contacts were already made with some of these organisations and were documented in the following sections, and already confirmed the level of potential interest.

In the second version of the deliverable, interactions with a number of international initiatives / organisations were made possible despite the COVID-19 crisis, and the outcomes from the discussions on a potential collaborative framework are documented. The feedbacks about the Service as presented during the discussions obtained so far from discussions with the international initiatives are positive. This is a positive outcome of this WP at the end of the second year, and gives a first insight into a potential framework for collaboration with these initiatives. Still, even if the stakeholders wish to be kept informed about the development of the Service, they frequently mention that to disseminate the Service to their networks they will need to see that it is useful and accurate for their purposes. In any case, these interviews provided many useful elements for the development of the project and the stakeholders are positive on the fact that the future Service will allow to enhance the uptake of EO data and methodologies from the local tropical stakeholders. Being funded by European Member States (MS) is also seen as a very valuable point for some of the respondents, avoiding a number of conflict of interest and providing credibility to the Service, as well as the principle of transparency that is foreseen for the Service, additionally with a provision of clear definition each of the products are important aspects of the future Service. Often mentioned, the accuracy figures planned to be provided with each of the products is a real added value compared to other existing datasets.

Finally, from the feedbacks obtained so far, it seems that although the initiatives and organisations contacted would not see a role in contributing to the development of the planned Core Service, they clearly see the potential of the proposed service in fostering the development of downstream activities

by facilitating access to improved information on forest As a conclusion, the project is rather positive about a potential collaborative framework in the future with some of the organisations involved in the sector, and expect to get more additional concrete feedbacks during the last year of the project.

The final version of the deliverable is due at the end of the project at month 37 and will constitute the final version of the deliverable.

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List of Abbreviations

AD	Activity Data
AFD	Agence Française de Développement
AFOLU	Agriculture, Forestry and Other Land Use
AGB	Above-Ground Biomass
API	Application Programming Interface
ARD	Analysis Ready Data
ARL	Application Readiness Level
ASB	Alternatives to Slash and Burn
AUSAID	Australian Aid Programme
AWS	Amazon Web Services
BBL	Brown Bag Lunch
BEIS	UK Department for Business, Energy & Industrial Strategy
BFAST	Breaks For Additive Season and Trend
BIS	Business, Innovation and Skills
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	Federal Ministry for Economic Cooperation and Development
BTR	Biennial Transparency Reports
CAFI	Central African Forest Initiative
CALM	Consistently Assessing Levels of Maturity
CAR	Central African Republic
CBD	Convention on Biological
CC&E	Carbon Cycle & Ecosystems
CCI	Climate Change Initiative
C-DIAS	Copernicus Data Infrastructure Access Service
CEOS	Committee on Earth Observation Satellites
CESBIO	Centre d'Etudes Spatiales de la Biosphère (Centre for Space Studies of the Biosphere) - France
CI	Conservation International
CIB	Congolaise Industrielle des Bois
CIFOR	Center for International Forestry Research
CLS	Collecte Localisation Satellites, France
CMP	Parties serving as the meeting of the Parties to the Kyoto Protocol
CNES	Centre national d'études spatiales (National Centre for Space Studies) - France
DFID	Department for International Development
DG CLIMA	Directorate General for Climate action
DG DEFIS	Directorate General for Defence Industry and Space
DG DEVCO	Directorate-General for International Cooperation and Development
DG ENV	Directorate General for Environment
DG GROW	Directorate General for Internal Market, Industry, Entrepreneurship and SMEs
DG INTPA	Directorate-General for International Partnership

DRC	Democratic Republic of the Congo
EC	European Commission
ECV	Essential Climate Variable
EF	Emission Factor
EO	Earth Observation
EORC	JAXA Earth Observation Research Center
ERPA	Emission Reductions Payment Agreement
ERS	European Remote Sensing
ESA	European Space Agency
ETF	Enhanced Transparency Framework
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCDM	Forest Cover Disturbance Monitoring
FCPF	Forest Carbon Partnership Facility
FCS	Forest Stewardship Council
FFEM	French Global Environment Facility
FLEGT	Forest Law Enforcement Governance and Trade
FLR	Forest Landscape Restoration
FM	Forest Monitoring
FP	Focal Points
FREL	Forest Reference Emission Levels
FSC	Forest Stewardship Council
FTY	Forest Seasonality/Type
GAF	GAF AG, Consultant for Geoinformation services
GAR	Golden Agri-Resources
GCCA+	Global Climate Change Alliance+
GCF	Green Climate Fund
GCRF	Global Challenges Research Fund
GCS	Geographic Coordinate System
GDAL	Geospatial Data Abstraction Library
GEE	Google Earth Engine
GEF	Global Environment Facility
GFOI	Global Forest Observations Initiative
GFW	Global Forest Watch
GHG	Greenhouse Gas
GHGI	Green House Gas Inventory
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Development Agency)
GLAD	Global Land Analysis & Discovery
GMES	Global Monitoring for Environment and Security
GNU	Germany, Norway, and the United Kingdom

GPG	Good Practice Guidance
GPS	Global Positioning System
GSE	GMES Service Element
HCS	High Carbon Stock
HCV	High Conservation Value
HQ	Head Quarters
HR	High Resolution
HRL	High Resolution Layers
IBRD	International Bank for Reconstruction and Development
ICRAF	World Agroforestry
ICT	Information and Communication Technologies
IDA	International Development Association
IDDR	Institute for Sustainable Development and International Relations
IKI	International Climate Initiative
INPE	Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) – Brazil
IPCC	Intergovernmental Panel on Climate Change
IPP	International Partnerships Programme
IPR	Intellectual Property Rights
ISFL	Initiative for Sustainable Forest Landscapes
ISG	Inter-Service Group
ITT	Intellectual Property Rights
IUCN	International Union for Conservation of Nature
JAXA	Japan Aerospace Exploration Agency
JICA	Japan International Cooperation Agency
JPL	Jet Propulsion Laboratory
JRC	Joint Research Centre of the European Commission
KFW	Kreditanstalt für Wiederaufbau (German Development Bank)
KLD	Norwegian Ministry of the Climate and Environment
LC	Land Cover
LDN	Land Degradation Neutrality
LULC	Land Use, Land Use Change
LULUCF	Land Use, Land Use Change and Forestry
MAFF	Japan Ministry of Agriculture, Forestry and Fisheries
MGD	Methods and Guidance Document
MOF	Japan Ministry of Finance
MRV	Monitoring, reporting and verifying
MS	Member State
NASA	National Aeronautics and Space Administration
NBR	Normalized Burn Ratio
NDA	National Designated Authorities
NDC	Nationally Determined Contributions

NFMS	National Forest Monitoring Strategy
NGO	Non-Governmental Organization
NICFI	Norway's International Climate and Forest Initiative
NIR	Near-InfraRed Bands
NORAD	Norwegian Agency for Development Cooperation
NRT	Near-Real Time
ODA	Official development assistance
OSFACO	Spatial Observation of Forests in Central and West Africa
OTB	Orfeo ToolBox
OTC	Open Telekom Cloud
PDR	Lao People's Democratic Republic
PEFC	Programme for the Endorsement of Forest Certification
PES	Payments For Environmental Services
POPs	Stockholm Convention on Persistent Organic Pollutants
PROFOR	Program on Forests
RBP	Results-based Payments
REA	Research Executive Agency
REDD+	Reducing Emissions from Deforestation and Degradation "plus" conservation, the sustainable management of forests and enhancement of forest carbon stocks
REM	REDD Early Movers
R-PIN	Readiness Plan Idea Note
RSPO	Roundtable for Sustainable Palm Oil
RTO	Research and Technology Organization
RTRS	Round Table on Responsible Soy
S2GM	Sentinel-2 Global Mosaic
SAR	Synthetic Aperture Radar
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDG	Sustainable Development Goals
SEPAL	System for Earth Observation Data Acquisition, Processing and Analysis for Land Monitoring
SFM	Sustainable Forest Management
SIDS	Small Island Developing States
SL	Sustainable Landscapes
SMFM	Satellite Monitoring for Forest Management
SNAP	Sentinel Application Platform
TCAF	Transformative Carbon Asset Facility
TCD	Tree Cover Density
TEP	Thematic Exploitation Platform
TFT	The Forest Trust
TMF	Tropical Moist Forest
UMD	University of Maryland

UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNREDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing
USGS	United States Geological Survey
VHR	Very High Spatial Resolution
VTT	Technical Research Centre of Finland Ltd
WB	World Bank
WFS	Web Feature Service
WMS	Web Map Service
WP	Work Package
WRI	World Resources Institute
WU	WAGENINGEN UNIVERSITY
WWF	World Wide Fund for Nature
ZD	Zero Deforestation

1 Introduction

The aim of REDDCopernicus is to propose a new Service Component for the forest monitoring sector, considering the REDD+ requirements, which is planned to be included in the European Copernicus programme in the coming years. To fulfil that aim and considering the global dimension of the proposed Service Component and the potential for Downstream activities as well as increasing the awareness and impact of such a Service Component, there is a strong requirement to interact with international initiatives supporting REDD+ (UN REDD, GFOI, donor agencies...) with a view to gather feedback on the proposed Service Component and potential collaborative opportunities.

The present deliverable is the second of the three version as part of Work Package (WP) 5 which will be delivered during the project. WP5 has the following main objectives:

- Present the technical and organizational components of a Copernicus REDD+ Service as presented in WP3, WP7 and WP8 to the different international agencies and initiatives supporting REDD+;
- Compile feedback and potential collaborative framework from these international agencies and initiatives: this is a key outcome of the WP since it must be ensured that the future Copernicus services are considered in the development of international capacity building and strengthening initiatives; and allow to consider the future development of international initiatives in the definition of the proposed Copernicus Service Component.

The assessment of the FM EO capacity currently available in Europe and globally was made alongside a consultation to determine user requirements. This assessment was performed as part of WPs 1 & 2. These assessments are essential for the European institutional framework to be aware of the quality, knowledge, advantages and drawbacks of the services they are proposing; and to guide future programme and policies there are designing. A summary of the outcomes from these assessments are detailed in section 4 from the current document. The information gathered was used to identify relevant initiatives and / or organizations that are documented in this deliverable.

It is a primary importance to communicate with all the sector stakeholders in order to do a knowledge exchange about the latest policy developments in the forest sector and about the experiences in the development and the use of existing international datasets used for FM. Firstly, this kind of interactions will raise awareness on the proposed new Service Component, and secondly it will enable the project team to identify potential additional funding to enhance the proposed Service Component scope if deemed necessary but also for identifying and supporting potential Downstream services. The feedback from the Users and Stakeholders from the “Learning Exercises” related to WP4 and Co-ordination with International agencies are especially important to provide information which will support the formulation of organisational and technical issues to consider when defining and developing a Core and Downstream REDD+ Service components and to ensure that these are fit for purpose.

In the **initial version of the document D5.1** delivered at the end of the first year of the project, the work focused on the communication with European stakeholders and the identification of the relevant international entities to contact in the context of the project, with criteria including the type of support which is provided to the stakeholders in the area of FM EO and specifically the REDD+ policy. This deliverable presented the list of organisations / initiatives to be contacted outlining their role in the REDD+ process and identifying relevant contact points, with main inputs being the outcomes from WP1 and WP2. Initial contacts were made with some of these organisations and their feedbacks on the idea of a future Copernicus REDD+ Service Component was documented in the document.

In the present **D5.2**, the feedbacks from the International Initiatives identified in D5.1 were continued to be collected though conducting guided interviews and other indirect discussions. The meetings took the form of a teleconference (due to the COVID-19 crisis) during which the technical and organizational components proposed by the project were presented by the consortium partners, followed by guided interviews and discussions allowing to compile feedback and potential collaborative framework from these international agencies and initiatives.

A first synthesis of the feedbacks received on the proposed initial design (see WP3, WP7 and WP8) from these meetings, as well as from the participants to the learning exercises (see WP4) held in the second half of year 2020 is provided at the end of the current document, identifying any initial potential collaborative opportunities. The final version of the deliverable is due at the end of the project at month 37 and will constitute the final version of the deliverable.

2 Initial Technical and Organizational Component of Copernicus REDD+ and FM Service

2.1 Findings from Task 1

2.1.1 Requirements for REDD+ FM in International and European Policy Segments

Global and national Forest Monitoring (FM) requirements are related to Sustainable Forest Management (SFM), climate change mitigation and adaptation efforts, and wider land monitoring for Green House Gas (GHG) assessments; and are evolving rapidly. In particular, REDD+ is a key driver in forest monitoring needs in tropical developing countries. Monitoring and reporting are carried out according to the performance scheme under which it is being implemented, for example the World Bank Forest Carbon Partnership Facility (FCPF), Green Climate Fund (GCF), or voluntary standards. Requirements do vary although several common needs can be identified such as that EO data are an essential data source and uncertainties should be assessed and considered for all approaches.

Many other monitoring needs stem from national reporting requirements for a number of international policies related to climate change. These include reporting requirements related to United Nations Framework Convention on Climate Change (UNFCCC), Nationally Determined Contributions (NDCs), biennial GHG updates, and regular global stock takes, which all countries and the international community have to respond to. There is some urgency as this regular reporting is expected soon, specifically the first set of revised NDCs should be submitted in 2020, and the first global stock take will take place in 2023. International reporting under these mechanisms should follow the guidelines as specified in the IPCC GPG, including the 2019 refinements. These refined guidelines provide improved advice on the role of EO data for Activity Data (AD) estimation and biomass monitoring (for emissions factor (EF) production). Related to this, recent transparency requirements (i.e. the Enhanced Transparency Framework (ETF)) also increase the needs of countries and stakeholders related to accountability for climate action and performance. One key element of the ETF is the call for consistency among the various reporting mechanisms (i.e. Green House Gas Inventory (GHGI), Biennial Transparency Reports (BTR), NDCs, National Communications, etc.). This includes a need for consistency between national GHG reporting and mitigation policy options/contributions.

Some monitoring needs have broader objectives than climate change, such as Sustainable Development Goals (SDGs), and a number are focused specifically on forests such as compliance with voluntary efforts in both the forest and land use sector (i.e. voluntary commitments / performance-based schemes, the Forest Law Enforcement Governance and Trade (FLEGT), High Conservation Value (HCV), High Carbon Stock (HCS), Roundtable for Sustainable Palm Oil (RSPO), Round Table on Responsible Soy (RTRS), Zero Deforestation (ZD) commitments, etc.) and forest certification schemes (i.e. Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), etc.). Other monitoring needs relate to national / local land use planning such as the assessment of forest resources (i.e. timber production, ecosystem services, etc.). This tends to be more relevant in Europe, where guiding principles of forest management are outlined in the European Forest Policy Strategy from 2013, which includes SFM, the multifunctional role of forests, and resource efficiency. Forests are also seen as having a role as public amenities, biodiversity reservoirs, and climate regulators, and this requires extensive and regularly updated information, which certain EO data and products can provide.

2.1.2 User Requirements

A broad stakeholder assessment was carried out, which gathering information on specific User needs for FM, which were often very much related to policy requirements. A number of stakeholders responsible for data collection, analysis and reporting were involved in discussions, and these stakeholders covered a wider range of stakeholder types including Country representatives, Non-Governmental Organizations (NGOs), Private Sector, International Initiatives, the Research and Scientific Community, and Donors. Many stakeholders had multiple interests in a Service, and nearly all were potential Users, with some also being developers of capacities, as well as donors. Others also played a supporting role, developing guidance and providing capacity building for Users. Since the early stages of this project, these stakeholders have been sensitized to the project, and have been invited to be involved in a number of different ways. A Stakeholder workshop held in June 2019 involved 34 participants from 21 institutions. Potential users of a Copernicus REDD+ and FM Service Component were also invited to fill out a stakeholder questionnaire and provided feedback on a potential Service Component. Developers of specific capacities were also invited to fill out a questionnaire to provide information on the use and maturity of their capacities, as well as involvement in projects which supported FM or REDD+ monitoring goals. This questionnaire was open and was circulated in the consortium's networks including to the Global Forest Observations Initiative (GFOI), so reached a large audience. Many of the organizations/ international initiatives discussed in this deliverable were consulted as part of this User assessment.

Although there was a variety of needs noted for Users within these Stakeholder groups, there is broad consensus on a number of needs.

All Users require data including processed, analysis-ready satellite time series data, and thematic products for forest changes and forest characteristics (*i.e.* biomass, canopy cover, etc.). In a GHG reporting context (including for REDD+), information which can contribute to both AD and EF development is a key need. Long-term data continuity and the availability of open and transparent information was essential for all stakeholders. In general, for AD, a spatial resolution of <30 m and temporal resolution of <3 years was required across all stakeholders. Providing thematic information beyond forest area and changes is important including specifically information on forest degradation and broader forest-related land use changes. For biomass and EF data, the Above Ground Biomass (AGB) pool was the most useful to stakeholders, however, information on soil and other carbon pools was also considered useful. Most stakeholders seek information on Intergovernmental Panel on Climate Change (IPCC) Tier 2 or 3 level. Data on biomass burning was also requested. A number of stakeholders requested Very High Resolution (VHR) imagery or ground data, which is useful for the validation of estimates based on space-based products.

The intended Service should provide novel data in order to overcome some of the current challenges in FM experiences by the Users. Technical challenges include monitoring dry seasonal forests, reducing uncertainties in EFs and in parameters useful for commercial forestry operations, monitoring degradation, distinguishing between tree crops (*i.e.* Oil Palm), plantations and natural forests, and accessing early warning forest change information, which is actionable.

Considering these needs, including some currently unmet needs, most stakeholders encouraged the development of a Copernicus global forest monitoring Component if it is targeted at their needs and it provides a long-term, easy-to-access, and open set of products and services. Given the number and variability of potential contributions to such a Service, the following data and products were proposed as potential Core elements of a Service Component, and are listed in priority order in terms of the stakeholders, which would find them either useful or very useful (%):

- 1) Analysis ready image mosaics (87%),
- 2) Forest and land cover/use (change) map (86%),
- 3) Biomass and change map (85%),
- 4) Forest type maps (including plantations) (85%),
- 5) Cause of deforestation/driver map (76%),
- 6) Forest tree cover density and forest mask (76%).

In addition to these, users also requested:

- A Sentinel-based Near-Real-Time (NRT) deforestation monitoring system,
- High Resolution (HR) / VHR optical dataset (<5m spatial resolution) with multiple bands, which is also suitable for validation,
- Ground data (i.e. existing plot data compiled and made available for validation purposes) (as Copernicus provides in Europe),
- Products on degradation drivers – both biotic and abiotic: fire (also burned areas), pests, diseases, fuelwood collection, thinning, logging and other disturbance/forest damage drivers. They should be aligned with the IPCC classes,
- Products on biodiversity, ecosystems, and key habitats,
- Products on main forest structural variables (i.e. dominant species, height, volume, etc.) which would support assessments of forest resources.

Users provided information on the technical specifications of the above products and one of the key findings was that they should be adaptable to different countries definitions of degradation to meet users' requirements.

The following paragraphs summarize the outcomes from WP1 (D1.1) and WP2 (D2.1).

Because the capacities of stakeholders for taking up Copernicus products and services are heterogeneous and require attention, a global Service is different than one focusing only on Europe where most Users and stakeholders tend to have higher capacities than those in developing countries.

As reported in previous paragraphs, the Core products from the expected Copernicus REDD+ Service should be provided quickly for users who require ready to use data; or provided with a certain flexibility to be adapted/tuned by Users for their needs or created by service providers in the context of Downstream Service provision to others. The delivery of data and information should therefore be adaptable to country definitions and circumstances and providing open-source solutions and platforms behind products will allow Users to adapt them to their needs. Utilizing existing platforms, which Users are already familiar with, and have documentation and support might be helpful in this respect. Related to this, the integration of a capacity building Component is fundamental to address challenges for data use and which should be addressed if not by Copernicus, then by others. A lack of infrastructure, capacity, and internet access in order to retrieve and utilize large volumes of data means that it must be assured that there is an outreach to countries so that they are able to use and access data efficiently within the proposed platform. Finally, in order to ensure uptake of services delivered under a future Copernicus Service Component, User engagement throughout the process to develop and implement a Service will be essential. Several opportunities exist in order to guarantee that stakeholders are involved in the process, including regular interaction to gather new User needs and co-creation of products where Users can also test and validate products using local validation data, so that they can be improved and made fit for use. Case studies in which the products are used in an operational context would demonstrate the utility of such a Service.

2.1.3 Assessment of Existing Technical Capacities in EO based FM in Europe

Capacities for global forest monitoring are increasing, as new satellites are launched and more data becomes available. Novel methods and tools are continuously being developed to process and understand data, with new cloud computing and other infrastructures being used for the analysis of large data volumes. Europe in particular has a wide and growing ecosystem of Earth Observation data supply, product development and service providers. Capacity is defined as the technical and organizational ability to implement the envisaged REDD+ and global forest monitoring Service Component. The following types of capacities were systematically assessed:

- Availability and provision of EO Data and Ancillary Data and their suitability for Forest Monitoring / REDD+,
- Geospatial Products of potential relevance for the Forest Monitoring and REDD+ Component
- Existing methods/ algorithms and tools for the processing EO Data into geospatial data products for Forest Monitoring/ REDD+,

- Data processing infrastructure, platforms and services,
- Production capacities to implement complex and big data workflows for product generation (relevant project experiences in for EO FM).

A number of capacities were identified which are useful for wide range of tasks related to REDD+ and FM needs. Many are well-developed capacities, which have been demonstrated and used for reporting purposes around the globe. Many are well-developed capacities, which have been demonstrated and used for reporting purposes around the globe. These capacities were assessed in terms of their level of maturity, and this was based on the Criteria for Consistently Assessing Levels of Maturity (CALM) framework established by Global Forest Observations Initiative (GFOI). The framework was adapted for the purposes of this project, and is detailed in D2.2.

Firstly, a wide range of high and very high resolution EO data and Ancillary data suitable for FM are publicly or commercially available. Freely available datasets include those from the Copernicus Programme's Sentinel Satellites. These passive and active remote sensing systems provide massive amounts of continuous optical and Radar EO imagery in the high to medium resolution range globally on a day-to-day basis, and can be considered as an essential base for a Core Copernicus REDD+ and FM Service Component. In addition to this, other datasets, including the Landsat satellites and European contributing missions are useful. This includes commercial VHR data, which is particularly useful from the context of calibration, training and validation in the Core and Downstream context.

Geospatial Products are also of relevance for FM and REDD+ needs. Capacities of these products include analysis ready EO imagery based on the Sentinel datasets (*e.g.* Sentinel-2 Global Mosaic (S2GM)). Even though these datasets are not currently globally available, the potential to produce these globally has been demonstrated. Existing Copernicus Land Monitoring Components (some currently only available at the European level) such as forest status maps are mature for forest and tree cover monitoring (*e.g.* the European HR layers). Copernicus Global Land Cover maps are available, but resolution is lower than requested by most users. Demonstration projects, which will provide Sentinel-based higher resolution land cover products are in progress (*i.e.* ESA World Cover). Global biomass maps are evolving operationally but remain at the lower levels of maturity. For near real time alerts, several methodological options exist, which utilize both optical and radar dense time series data (and are discussed in the methods section of the report), however operational products are not yet in existence except for Global Forest Watch (GFW) Global Land Analysis & Discovery (GLAD) Alerts.

Both methods (*i.e.* algorithms and approaches) and tools (*i.e.* ready to use software solutions) are available and are utilized in the context of FM. Image processing toolboxes including Sentinel Application Platform (SNAP) and Orfeo Toolbox (OTB) are useful for all essential pre-processing tasks for EO data. Both SNAP and OTB are fully open source and freely available for use, containing mature pre-processing and analysis methods, which have been tested at scale. Tools which can be used for specific tasks such as time-series analysis exist (*e.g.* Breaks For Additive Season and Trend (BFAST), and probability chain) as well as those specifically used for disturbance monitoring (Forest Cover Disturbance Monitoring (FCDM) methods) and near-real time (NRT) approaches (and Sentinel-based Radar Forest Cover Loss alerts). Many of the algorithms are available in Google Earth Engine (GEE) and System for Earth Observation Data Acquisition, Processing and Analysis for Land Monitoring (SEPAL) so can be used as stand-alone tools or taken and adapted and scaled-up to operability. Other general toolboxes include Joint Research Centre of the European Commission (JRC)'s impact toolbox and Food and Agriculture Organization of the United Nations (FAO)'s OpenFORIS tools which can be used for a number of EO related tasks specifically in the domain of FM. These represent easy-to use toolboxes which can be ready for use at the national or regional level.

A number of European and non-European Service and Infrastructure / Platforms were assessed, which include both online or local systems to access, process and derive EO related data for FM purposes. These infrastructures can be used in the development of a Core product, or in Downstream Service provision. In Europe options are now available including the Forestry- (Thematic Exploitation Platform) TEP initiated and still partially funded by ESA, as well as FAO's SEPAL. There are also the Copernicus Data Infrastructure Access Service (C-DIAS)s -five platforms- under Copernicus and they are already, to varying degrees operational, and contain large amounts of EO data and a variety of tools and applications which can be used to process and download the data. Outside Europe, other options exist.

GEE and AWS are well-known platforms which are established for the processing of large amounts of data, and GEE along with SEPAL have been demonstrated and used in a number of REDD+ countries for reporting.

In addition to data, methods and platforms, European EO Service Provider and Research Community has demonstrated capacity to implement complex and big data workflows for product generation in large scale projects. Relevant projects have been carried out in a number of, if not all REDD+ countries. In addition to the development of products, methods and tools, they have also been demonstrated in country scenarios and integrated into workflows, for example National Forest Monitoring Systems (NFMS) and REDD+ monitoring, reporting and verifying (MRV) systems. This demonstrated experience is essential for the implementation of the Copernicus Forest Monitoring and REDD+ Service Component.

2.2 Initial Technical and Organizational Elements and Design Options for REDD+ Service Component

Building on the experiences of the work packages WP1 and WP2, where general user requirements have been collected and where the existing technical capacities for EO based forest monitoring have been reviewed as reported in previous sections, the main technical elements needed for a Forest Monitoring System for Measurement, Reporting, and Verification under REDD+ and/ or for SFM were identified.

WP2 resulted in a list of potentially suitable forest monitoring concepts, which was further condensed using a benchmarking procedure in the D3.1 report from WP3 of this project. That procedure selected concepts with the best ‘fit-to-purpose’ level for REDD+ related forest monitoring tasks based on various performance criteria, including requirements for technical REDD+ reporting, requirements raised during the stakeholder consultation as well as aspects of operationality. For the final selection of the most appropriate products, criteria on the thematic potential to fulfil internationally agreed definitions were included, e.g. criteria on forest definition, on land use categories, on activity data or on IPCC Approach and Tier levels. The CALM level from WP2 was used as indication for the maturity and degree of operationality of different concepts.

The benchmarking approach therefore resulted in the pre-selection of several forest monitoring concepts/ products of potential interest: (i) Sentinel-2 composites, (ii) Tree Cover Density, (iii) Seasonality Products, (iv) Tropical Moist Forest dataset, (v) Forest Canopy Disturbance Monitoring concept, (vi) Breaks For Additive Season and Trend, and (vii) RADAR Forest Cover Loss Alerts concept.

Within WP4 it was originally planned to present and validate these pre-selected forest monitoring key concepts/ products during the ‘Demonstration Cases’ and ‘Learning Exercises’ in the context of (physical) regional workshops to be held during first half of 2020 in the selected regions. However, due to the ongoing Coronavirus pandemic, new solutions had to be developed to organize virtual workshops in order to reach the same goal.

Seven regional workshops took place online with 15 countries from several tropical regions (South-East Asia, East Africa, Central Africa, South Africa, and South America). In total, about 100 participants from 35 institutions were actively attending these webinars including national actors active in forest monitoring and management (Ministries, National Forest Inventory or Climatic/ Environmental services in charge of REDD+ reporting) as well as several regional institutions.

Finally, nine products/ datasets selected for the Learning Exercises in the Initial Design were presented as potential components for a Copernicus REDD+ Service. The products were grouped into above mentioned four concepts: (i) Analysis Ready Sentinel-2 Data (S2GM, JRC-L1C-S2), (ii) Forest/ Tree Cover Status Maps (TCD, FTY, TMF-Status), (iii) Forest Change Maps (TMF-Change, BFAST), and (iv) Forest Disturbance and Alerting (FCDM, BAYTS).

The organisational elements of the potential REDD+ Service were tested during the Learning Exercises include (i) the Infrastructure and Cloud-based Services, (ii) the Data Access Capabilities and (iii) the Collaborative Framework. The evaluation was performed through demonstrations using a C-DIAS Platform as well as a presentation of an example for a process analysis interface for reporting Activity Data with related carbon emissions, thereby analysing the data access capabilities via User feedback.

The Collaborative Framework was assessed by analysing the User acceptance to potentially integrate Copernicus Forest Monitoring and REDD+ services and products in existing country workflows. The implementation of in-country technical activities has to go along capacity building programmes in order to ensure long-term sustainability.

The User participation during these webinars was very active with interactions following the presentations and the demonstrations of the various products. The replacement of physical workshops by online webinars due to COVID-19 related travel restrictions, posed a variety of additional challenges. These were successfully solved by compressing the workshop agenda, by adapting the hands-on session and by using an online expert questionnaire. The approach for the User feedback collection included three components: (1) individual guided interview, (2) demonstration with a geoportal ad-hoc solution, and (3) online questionnaire.

3 Conditions of Interaction with International Initiatives

In the context of a future Copernicus REDD+ Service the organizational aspects as well as the Service implementation and products delivery to the developing countries will have to be organized in a **consultative manner** between the main stakeholders in Europe and the international initiatives supporting the REDD+ implementation as well as the countries implementing the policy process to avoid duplication of effort and a viable user uptake. In this context key issues to raise include: user needs and products/services at global, regional and national scales; technical specifications of the products and agreed on quality control/standards for production and mechanisms for service delivery (i.e. via C-DIAS and/or other cloud Platforms).

There are already many initiatives focusing on forest monitoring at global level supporting to various degrees forest management in developing countries. It is thus an important step in the project approach to link with current initiatives to avoid duplication of work and raise awareness of the Copernicus programme in the international arena.

The main stakeholders in Europe and the interaction with Consortium are described in section 3.1, the guidelines for the interaction with international initiatives are given in section 3.2, and the interactions with these international initiatives are detailed in the section 3.3.

3.1 EU Copernicus Stakeholders

The following European Commission services and other EU agencies are targeted as key EU stakeholders for a potential Copernicus REDD+ Component:

- DG DEFIS (Directorate General for Defense Industry and Space)
- DG CLIMA (Directorate General for Climate action)
- DG DEVCO (Directorate-General for International Cooperation and Development) – DG DEVCO will become DG INTPA (Directorate-General for International Partnership) from mid-February 2021
- DG ENV (Directorate General for Environment)
- JRC (Joint Research Centre)
- ESA (European Space Agency)

The interactions with these key EU stakeholders are aimed at presenting the main concept of a potential Copernicus REDD+ Component and at defining the frame conditions for interaction with international initiatives. In the first phase and in close collaboration with WP6 “Communication, Dissemination and Exploitation”, the focus was to emphasize the role of the REDDCopernicus project in an official Communication of the European Commission and to present the initial design and the outcomes of

completed WPs to a few key DGs. It has to be noted that the Joint Research Centre is considered as a key stakeholder and is a partner in the REDDCopernicus project.

Roles of the European Commission services in the Copernicus programme

Copernicus is the European system for monitoring the Earth and is coordinated and managed by the European Commission (see <https://ec.europa.eu/growth/sectors/space/copernicus/>). The Copernicus programme is managed by DG DEFIS. The development of the observation infrastructure is performed under the aegis of the European Space Agency for the space Component and by the European Environment Agency and EU countries for the in-situ Component.

Other DGs (CLIMA, INTPA, ENV, JRC) have good knowledge of the Copernicus programme. This is particularly the case for the Copernicus Climate and Land services. DG CLIMA, INTPA (ex DEVCO) and ENV are regularly consulted by DG DEFIS for any Component of the Climate or Land Services that can be of relevance to them. These DGs are keen to provide feedback on the proposed REDD+ Service Component. Indeed, DG CLIMA, DEVCO and ENV already participated to the first key milestone meeting of REDDCopernicus on 30 January 2020.

Copernicus REDD+ Service Component Officially Mentioned in a Communication of the European Commission

As mentioned in D6.1 which was due early in the life span of the project (month 3, i.e. April 2019), the European Commission was in the process of developing a Communication to step up EU action against deforestation and forest degradation which was due for adoption by summer 2019.

JRC was contributing directly to the Communication (F. Achard was the JRC contact point in the EC Inter-Service Group (ISG)) and the Copernicus programme office was consulted in the preparation of the Communication (through JRC and DG GROW contact points in the ISG). The interaction with EC services during the ISG meetings for the preparation of the EC Communication led to the mentioning of “the feasibility of developing a Copernicus REDD+ Service Component” in this new Communication which was officially adopted on 23 July 2019 by the European Commission (see Figure 1). This Communication presents a new framework for protecting and restoring the world’s forests titled “Stepping up EU Action to Protect and Restore the World’s Forests”, in which one of the 15 key actions will consist in the exploration of “the feasibility of developing a Copernicus REDD+ Service Component to strengthen the existing global or national forest-monitoring systems, as well as to establish long-term European capacity and leadership in this domain”. This key action that falls under priority 5 of the Communication (“Support better availability and quality of information on forests and supply chains”) has been included in the Communication at the request of JRC and GROW in relation to its planned implementation through the REDDCopernicus Project.

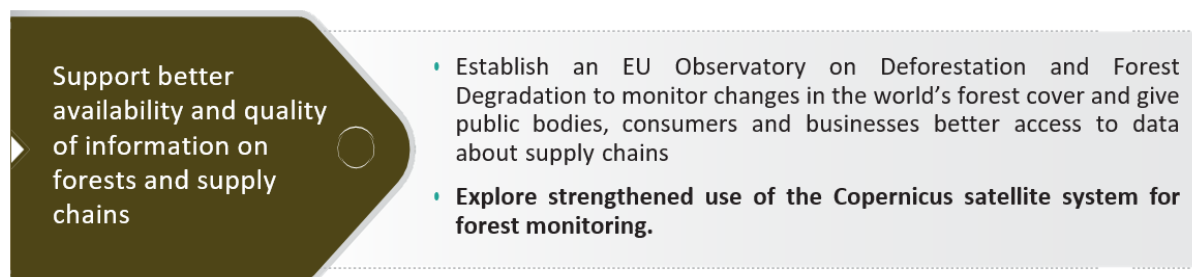


Figure 1: Extract from the EC factsheet entitled “Protecting and restoring the world’s forests: stepping up EU action to halt deforestation and forest degradation” published on 23 July 2019

This Communication (COM(2019) 352) includes also the establishment on an EU Observatory on deforestation and forest degradation. The objective of this Observatory is to provide easy-to-understand data and information linking changes in the world’s forest cover to EU demand/ trade for commodities and products to a wide audience, fostering better understanding of the threats to forests among the public, consumer and business sector. A web-based online platform will be developed by JRC to provide easy-to-understand data and information linking deforestation, forest degradation, and changes in the world’s forest cover to EU demand/ trade for commodities and products to a wide audience.

Find more on the Communication (2019) on stepping up EU action to protect and restore the world's forests (COM(2019) 352) at: https://ec.europa.eu/info/publications/eu-communication-2019-stepping-up-eu-action-protect-and-restore-worlds-forests_en

Initial Design Workshop, REA premises, 14 November 2019

In close collaboration with WP6, the REDDCopernicus Project Consortium organized a half day workshop in Brussels on 14 November 2019 where the first findings of the project were presented to the DG GROW, the ESA member of the advisory board and REA, where the Workshop was hosted. The objectives of the workshop were to present and discuss the outcomes with European Commission services to get their first feedbacks and comments. Policy officers in charge of REDD+ at DG CLIMA, DG DEVCO and DG ENV had been invited to this workshop, but due to lack of availability could not attend.



Figure 2: Participants to the Initial Design Workshop held on 14 November 2019

During this workshop on 14 November, the Consortium Partners presented the results of the Policy Review and Stakeholder Requirements Assessment and the Assessment of European Capacity for Earth Observation based Forest Monitoring. The project has identified the requirements of both International and European Policy Segments, including European Commission Services.

The initial design of the Copernicus Forest Monitoring and REDD+ Service Component was also presented. The presentations covered the selection approach for the design options, the options themselves as well as the analysis of the organisational and financial framework for the implementation of the Service Component. These initial outcomes were discussed with DG GROW and REA in detail and useful suggestions for the initial design of the Service Component were made, including the following main conclusions:

- Making the link between the policy requirements and the products more visible,
- Providing a matrix to check the ‘fit for purpose’ of the datasets,
- Clarify the definition of NRT (Near Real Time),
- Need to consider a clear delineation between Core and Downstream Services,
- Do not underestimate the IPR issue raised by CLS (SIRS at the time) in the presentation of WP5.

The feedbacks from DG GROW and REA and valuable discussions during the initial Design Workshop were very useful and allowed the Consortium to revise and improve its approach and deliverables due for the first milestones.

Feedbacks from DG CLIMA, DEVCO and ENV from first key milestone meeting held on 30 Jan 2020 at REA premises

Following a suggestion from REA during the Initial Design Workshop, the Consortium organised a short synthesis presentation (1.5 h duration) at the beginning of the Periodic Review meeting on 30 January 2020. The key stakeholder DGs (GROW, CLIMA, DEVCO and ENV) were invited for this synthesis presentation to learn about the first project outcomes, in particular the initial design of the Copernicus REDD+ Service Component, and to provide feedbacks.

The guests from the EC DGs were: M. Massart (DG DEFIS), N. Boelling (DG ENV), M. Cherlet (DG JRC), L. Broussole (DG DEVCO), and R. Colditz (DG CLIMA).

After an Introduction to REDDCopernicus Project and Objectives, the Initial Design of a Copernicus REDD+ Service Component was presented with the following Activities and Results:

User requirements: Results of Surveys and User Workshop

European Capacity for EO Forest Monitoring and REDD+

Initial Design of a Copernicus REDD+ Service Component

DG ENV commented about the need to better identify the utility of the Downstream Component. This comment was not back up by DEFIS considering that the focus of this project should be more on the utility of the Core product. This issue would need to be further addressed by the Consortium. DG CLIMA and DEVCO supported the initial concept of a REDD+ Service Component.

Interests of the European Commission services in a potential REDD+ Component

A few policy DGs (CLIMA, INTPA, ENV) do not have a specific platform for disseminating spatial data and products. DEFIS has the full responsibility of the Copernicus programme including for managing the distribution of data and products of the Core services. DG INTPA (ex DG DEVCO) provides financial support to REDD+ and FLEGT projects in developing countries, e.g. through the GCCA+ programme (Global Climate Change Alliance+, see following Table). Downstream services, such as capacity building activities to enhance the use of Core Copernicus products and to adapt those to local situations, can be potentially supported within such projects. DG ENV and INTPA are co-leading (with DG AGRI) the implementation of the actions that are presented under the Communication on stepping up EU action to protect and restore the world's forests (COM(2019) 352). Other DGs are contributing to the action plan of this Communication, in particular DG DEFIS for the the feasibility of developing a Copernicus REDD+ Service Component and JRC for the implementation of an EU Observatory on deforestation and forest degradation with support from DG CLIMA and DG ENV.

Table 1. Description of the Global Climate Change Alliance+ initiative - illustrating the role of DG INTPA in supporting Downstream projects

Name of the initiative	Global Climate Change Alliance+ (GCCA+)
Point of Contact	http://www.gcca.eu/
Initiative starting date	The GCCA was born in 2008
Initiative ending date	
Geographical area of action	The focus is on the most vulnerable countries, the ones with the smallest carbon footprint who at the same time suffer the most from climate change, namely Least Developed Countries (LDCs) and Small Island Developing States (SIDS). By end of 2018, the

	programme is today funding close to 70 support actions in more than 60 countries, including 37 LDCs and 36 SIDS across Africa, Asia, Caribbean and the Pacific.
Objectives	
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	By the end of 2018, the initiative contributed to the implementation of over 50 national climate change strategies, 26 UNFCCC related strategies and programmes and 20 awareness campaigns in over 50 countries. In addition, GCCA+ interventions have also contributed to the restoration of protective forests in eight countries (Bangladesh, Benin, Eastern Caribbean, Mauritius, Suriname, Gambia, Cape Verde, Mozambique); Early Warning Systems for climate related natural hazards in five countries (Bangladesh, Benin, Lesotho, Ethiopia, Cape Verde) and in the Pacific Region; promotion of efficient and clean cooking stoves in seven countries (Djibouti, Guinea Bissau, Lesotho, Sierra Leone, Tanzania, Togo and Uganda); and enhanced access to climate change financing in 20 countries.
Project funding volume	GCCA+ commitments total EUR 750 million over the period 2007-2020, making it one of the largest climate initiatives in the world. Its budget has increased from EUR 317.5 million in the first phase (2007-2014) to EUR 420 million in the second phase (2014-2020).

3.2 Guidelines for Interactions with Internationals Initiatives

Since the beginning of the project in early 2019 and though the assessments performed in WPs 1 & 2, there has already been quite an extensive level of interactions with stakeholders through online surveys, questionnaires and meetings/workshop. Therefore, the strategy for collecting information for the current WP about a potential coordination with internationals initiatives is to review existing documentation and interviews notes during events to which the Consortium members have participated and other external meetings.

It has been agreed between the Consortium members a list of main issues that needs to be covered ensuring the following topics are discussed:

- 1- Knowledge of Copernicus:** Through the long experience of the consortium members in the field of remote sensing in a multitude of countries, and with a multitude of different entities types, it appeared that all the stakeholders outside Europe are not necessarily aware of the existence of the Copernicus programme, and of the free access to data from the Sentinel constellations. In order to ensure a successful future for REDD+ Component in the Copernicus programme and ensure user uptake, it is of primary importance that stakeholders are aware of this programme. During the collection of feedbacks, the level of knowledge of the Copernicus programme will be documented.
- 2- Existing interaction with Copernicus and/or other EU supported EO Programme/activities:** Among the initiatives working in the FM sector, there are some for which Copernicus is known and are already in interaction with this programme, and/or with another European programme (e.g. EU FLEGT). The existing interaction with European programme considered in this document can be of different types: upstream through a collaboration on the development of a European product/ supported activity by the involvement of the entity in a Consortium, or the provision of data or funding for example, or more

Downstream though the use of a European concept (dataset/tool/method) in the FM activity which is practiced by the entity. An existing interaction with any of European activity suggests that the concerned entities will be more likely to be aware of either Copernicus or even future development of REDD+ Service. For the entities which are not currently interacting or which are not aware of European activities in the FM EO sector, it is likely that the interaction will give them the opportunity to know about this topic and will certainly bring new users to European services and also possibly to future REDD+ services if the added value is proved for them.

- 3- Potential for Provision of feedback on proposed Service Component and its definition:** The potential to give an official or unofficial opinion on the proposed Service depends on the stakeholders and their willingness to participate in the development of the Service and definition, to make it as useful as possible regarding their needs. In this second version of the deliverable, the feedback can be provided on the organizational and technical aspects of the future Service. It is also important to know if the stakeholders wish to be kept informed, traducing their interest in the Service. A communication is already in place through the WP6 in which a frequent update of a project website is planned, but which also foresees to create brochures.
- 4- Potential for contributing/disseminating Core Service Components:** The contribution envisaged can be of different types and is seen as important for the Consortium. The initiative can complement existing and future REDD Core products in FM EO by providing datasets/products, methods or tools or funding to the Service, or also validate the products from the future Service Component. The disseminating of the Core Service components can be done through dissemination of the product on a platform to make it available and easily useable, or more generally speaking, though the dissemination of concept of the Core Service to the network of the initiative to raise awareness of the Service.
- 5- Interest/willingness to provide financial support to enhance Service Component:** The future Service Component will be composed of a Core Service which could be derived into Downstream Services adaptable to local situations by local stakeholders. At the end of this second year of the project life-span (March 2021), it is foreseen that the Core Service should be financed by the Copernicus programme. However, Downstream Services are not foreseen to be financed by the Copernicus programme. Therefore, the identification of potential Downstream Services as well as source of funding for them should be sought.
- 6- Interest/willingness to support CORE Service Component development and/or to foster Downstream / Capacity building activities (including financial and/or technical support):** The budget available for developing the Service Component is not yet fully known and potentially not sufficient. Therefore, the possibility for donor agencies to provide additional funding to develop the Core Service Component and also the required capacity building efforts should be considered.

The meetings take the form of a teleconference (due to the sanitary crisis) during which the technical and organizational components proposed by the project are presented by the consortium partner, followed by guided interviews allowing to compile feedback and potential collaborative framework from these international agencies and initiatives.

3.3 Interaction with International Initiatives

The list/subsections below is/are purely indicative and represent a starting point. This document is the second version of the deliverable, and does not need to be exhaustive. It will be completed during the course of the project as the feedbacks are collected and the technical and organisational specifications of the Service will be strengthened.

Each of the relevant entities presented in the following paragraphs are supporting one or more initiatives in the forest/REDD+ sector. Each of them is presented and it is explained in what extent they could have an interest or have already an interest in the future Copernicus REDD+ Service. Then, one of the main

initiatives that they support is described following the template and descriptions presented in Table 2 below.

Table 2. Template for the description of relevant initiatives.

Name of the initiative	Initiative supported by the initiative in the forest/REDD+ sector
Point of Contact	Point of contact in the initiative
Initiative starting date	Starting date of the initiative described
Initiative ending date	Ending date of the initiative described
Geographical area of action	Initiative geographical application
Objectives	What are the goals of the initiatives?
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	How is the initiative shared?
Project funding volume	How is the initiative funded? What is the know volume of funding?
Other comment	Other relevant comment to report
Outputs	What is the initiative producing?

The organisations / initiatives listed are grouped according to the classification that was identified as part of WP1 starting with Financiers, Donor and Development Agencies followed by Technical and Scientific Organisations and Finally International Initiatives.

3.3.1 Financiers, Donors and Development Agencies

3.3.1.1 AFD

Sources:

<https://www.afd.fr/fr>

<http://www.osfaco.org/>

<https://www.ignfi.fr/fr/portfolio-item/observation-spatiale-des-forets-dafrique-centrale-et-de-louest-osfaco/>

The Agence Française de Développement (AFD) Group funds, supports and accelerates “the transition to a fairer and more sustainable world”. Focusing on climate, biodiversity, peace, education, urban development, health and governance, AFD carry out more than 4 4,000 projects in France’s overseas departments and territories and another 115 countries. Two of these sectors of activity are important in the context of REDDCopernicus project as they deal directly with REDD+ policy areas: climate and biodiversity. AFD financed for example the project “Supporting sustainable forest management” in Democratic Republic of Congo from 2010 to 2015. The next paragraphs detail further these two keys AFD funding sectors for REDDCopernicus.

AFD - Climate Sector¹

Since 2005, the climate has been a priority for AFD, and since 2017, the entire AFD Group undertook to make its activity be 100% compatible with the Paris Agreement. Being “100% Paris Agreement” implies analyzing each of the Group’s interventions to see that they are consistent with long-term low-carbon and resilient development in the country where they are implemented. This analysis is rounded out by an assessment of the level to which AFD investments are exposed to climate risks, be they physical or related to low-carbon transition policies. In order to go even further in co-building in climate matters with its partner countries, **AFD is setting up the “2050 Facility” dedicated to developing long-term low-carbon and resilient development strategies** that the COP21 has asked all countries to produce by 2020. This commitment comes in addition to another one existing in the group dated from 2012: that **50% of annual financing goes to projects that have a direct and beneficial impact on the climate.**

Furthermore, AFD has been accredited to the Green Climate Fund since 2015, allowing AFD to do more for the climate. In 2018, the AFD Group committed 4.8 billion Euros of financing for the climate, through 124 projects. This level of commitment brought the total of the Group’s commitments since 2005 for projects co-benefiting the climate to more than 33.8 billion Euros.

AFD - Biodiversity Sector²

It is a general aim of the AFD group to take action in favor of biodiversity: the group supports its restoration when ecosystems have been degraded and its protection when they are under threat. To secure these initiatives over the long term, AFD backs actions dedicated to defining, extending and managing marine and terrestrial protected areas. AFD also encourages responsible, participatory land use planning. AFD group promotes better management of natural areas, sustainable methods of using resources (forests, fishing, agriculture, hunting) and enhancing the value of products from these uses. AFD therefore supports, at national or regional level the sustainable management of forests with forest policies that enable the protection of ecosystems, the renewal of exploitable species and the fair division of forestry products. **In 2018, the amount of AFD funding devoted to the biodiversity activities reached €446 million.**

AFD acts in partnership with all the key organizations: International Union for Conservation of Nature (IUCN), Institute for Sustainable Development and International Relations (IDDRI), NGOs like WWF France and Conservation International, Wildlife Conservation Society, etc. Not forgetting the French Facility for Global Environment (FFEM), a preferred partner of AFD for biodiversity funding.

The project was presented to AFD during a meeting in Paris on July 2019. AFD indicated that they can see the complementarity of the proposed Copernicus FM and REDD+ Service Component with the envisaged action in this sector. This is very timely as AFD is planning to fund a new project focusing on Forest and agricultural monitoring in Central and West Africa focusing on capacity building. The activities of the new project can potentially build on the planned Copernicus FM and REDD+ Service Component. However, direct discussion with AFD on how they may like to contribute to a future Service Component have not yet taken place and will be pursued during the last year of the project as opportunities arise. AFD is connected to the Space sector through CNES and also some interactions with ESA, thus have some awareness about the Copernicus Programme.

One example of initiative financed by AFD in the forest sector is the Spatial Observation of Forests in Central and West Africa project (OSFACO), which is presented in the Table 3 below. In addition, AFD is preparing a new programme to reinforce capacity in West and Central Africa in relation to EO and the REDDCopernicus initiative was of particular interest in this context. A future Copernicus Service

¹ AFD climate sector, read online on December 2019, <https://www.afd.fr/en/page-thematique-axe/climate>

² AFD biodiversity sector, read online on December 2019, <https://www.afd.fr/en/page-thematique-axe/biodiversity>

Component can potentially be considered in setting the design of the project which could then focus on developing applications at national level.

Table 3: Description of OSFACO initiative.

Name of the initiative	Spatial Observation of Forests in Central and West Africa project (OSFACO)
Point of Contact	Aurélien GUINGAND Project team leader - Biodiversity - Forests - Protected areas Agriculture, Rural Development and Biodiversity Division
Initiative starting date	2011
Initiative ending date	Not known
Geographical area of action	Cameroon, Gabon, RoC, DRC, CAR, Benin, Guinea, Côte d'Ivoire
Objectives	<p>The OSFACO project aims to improve knowledge of past and present dynamics in terms of land use and land use change in several Central and Western African countries using spatial observation tools.</p> <p>The project has also the aims to strengthen and broaden local expertise and the appropriation of satellite imagery in the design, implementation and monitoring of public policies for sustainable spatial planning. There are 8 beneficiary African countries (3 in West Africa, 5 in Central Africa) in which 20 research projects are financed and monitored by OSFACO. It also includes the equipment of the technical services of the target ministries (GIS and remote sensing hardware and software) in at least 3 countries and support the mapping of more than 700,000 km² (3 countries).</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Provision of satellite images, support for local mapping production, promotion of the use of satellite imagery.
Project funding volume	AFD, French Global Environment Facility (FFEM)
Other comment	/
Outputs	n.a.

3.3.1.2 AusAID

Sources:

<https://dfat.gov.au/aid/Pages/australias-aid-program.aspx>

Indirect discussions with Niki Fitzgerald, Australian Government, as part of the interview/meeting during GFOI Leads Teleconference, 20.01.2021. See Section 3.3.3.3 and Annexe 6 for details. Niki Fitzgerald is the Assistant Director (technical) of the Australian Government Department of the Environment, and is currently chair of the GFOI Leads Group.

The Australian Aid Programme is part of the Australian Government's Department of Foreign Affairs and Trade. AusAID focusses on two development outcomes: supporting private sector development and strengthening human development. In light of a changing world, the programme is evolving. Today, many developing countries are growing rapidly, with aid representing an increasingly small proportion of development finance. To be effective in this new context, AusAID is becoming more innovative and catalytic, leveraging other drivers for development, such as private sector investment and domestic finance. They are recasting their aid programme in light of this new development paradigm.

AusAID is part of GFOI's Leads group, and has the responsibility of driving its direction. GFOI has already been informed about the project, and the main aims were presented at the last GFOI plenary in 2019. GFOI as a network of organizations can provide feedback on proposed Service Component and its definition. This feedback can be given by organizations involved in GFOI including national governments in REDD+ countries, donor organizations, NGOs, international organizations and space agencies. GFOI can also support the dissemination of the Core Service Components, and can foster Downstream Service provision. Capacity building as one key element in GFOI can occur. More information about GFOI can be found in Table 4.

Table 4: Description of the GFOI initiative.

Name of the initiative	Global Forest Observations Initiative (GFOI)
Point of Contact	Tom Harvey, Manager, Global Forest Observations Initiative Office
Initiative starting date	2011
Initiative ending date	Ongoing
Geographical area of action	Global, with a focus on REDD+ countries
Objectives	<p>The Global Forest Observations Initiative (GFOI) is an informal partnership to coordinate international support to developing countries on forest monitoring and greenhouse gas (GHG) accounting for the purposes of REDD+ and related forums. Through collaborative action, GFOI partners seek to accelerate developing country progress in improved forest monitoring and GHG accounting. Partners coordinate their activities which together make it possible to provide a more holistic and coherent package of support to developing countries than any one international partner could provide alone.</p> <p>Specific activities include:</p> <p>Facilitating country-led assessments of their forest monitoring needs and gaps</p> <ul style="list-style-type: none"> • Harmonized work planning to address country-identified priorities. • Collaborative implementation of forest monitoring support, including: <ul style="list-style-type: none"> ○ Complementary and consistent capacity building ○ Development and dissemination of user-friendly guidance for REDD+

	<ul style="list-style-type: none"> ○ Supporting the availability and accessibility of remote-sensing data and other key datasets and tools ○ Coordinating research and development (R&D) activities to fill knowledge gaps, address obstacles to progress and align the work of the research community with developing-country needs. ● Fostering a diverse network of experts and practitioners to support developing countries in a targeted and cohesive manner. ● Facilitating information sharing between partners to avoid duplications and overlap. <p>http://www.fao.org/gfoi/overview/en/</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	The informal partnership of countries and institutions has an annual meeting, and also organizes regular activities through its partners
Project funding volume	Not known
Other comment	/
Outputs	Major outputs include the Methods and Guidance Document and the REDDCompass

3.3.1.3 DFID

The Department for International Development (DFID) was identified as a key donor for REDD+, but there have not been any direct interactions so far. Contact with UK governments was made during the GFOI plenary in 2019 and although DFID is one of the supporting organizations for these activities, representatives from Department for Business, Energy and Industrial Strategy (BEIS, Section 3.3.1.4) were the counterparts involved in GFOI activities. Direct discussion will be pursued during the last year of the project as opportunities arise.

3.3.1.4 BEIS

Source:

<https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about>

Indirect discussions with Rachel Flint and Fiona Stringer, BEIS, UK Government, as part of the interview/meeting during GFOI Leads Teleconference, 20.01.2021. See Section 3.3.3.3 and Annexe 6 for details. Rachel Flint is the Greenhouse Gas Inventory Team: International Reporting and Earth Observations lead for BEIS, and Fiona Stringer is Senior Policy Advisor and Programme Manager on REDD+, (Forests, Land-Use and Carbon Markets, International Climate Finance) in BEIS.

The UK Department for Business, Energy & Industrial Strategy (BEIS) (formerly Department for Business, Innovation and Skills (BIS) and the Department of Energy and Climate Change (DECC)) has the priorities in 2019 - 2020 to deliver an ambitious Industrial Strategy, maximize investment opportunities and bolster UK interests, promote competitive markets and responsible business practices, ensure the UK has a reliable, low cost and clean energy system, and build a flexible, innovative, collaborative and business-facing department.

As the UK government is also part of the GFOI Leads group and recently this role has been fulfilled by BEIS, the same potential for co-operation for BEIS as AusAID applies (see section 3.3.1.2). Direct discussion will be pursued during the last year of the project as opportunities arise.

BEIS is also one of the major funders of the Forests 2020 programme (Table 5) along with the Global Challenges Research Fund (GCRF), which is relevant in the context of REDDCopernicus as it aims to improve tropical forest monitoring. Richard Tipper is Project Manager and has been involved in GFOI activities, and in 2018 attended the annual GFOI plenary and presented his work on forests.

Table 5: Description of Forests 2020 initiative.

Name of the initiative	Forests 2020
Point of Contact	Richard Tipper, Project Manager from Ecometrica
Initiative starting date	2016
Initiative ending date	n.a.
Geographical area of action	Indonesia, Brazil, Colombia, Mexico, Ghana and Kenya
Objectives	Forests 2020 is a major investment by the UK Space Agency, as part of the International Partnerships Programme (IPP), to help protect and restore up to 300 million hectares of tropical forests by improving forest monitoring in six partner countries through advanced uses of satellite data. The partner countries are Indonesia, Brazil, Colombia, Mexico, Ghana and Kenya. In each country they are working with national institutions, researchers and NGOs to improve forest monitoring at local, regional and national levels. https://ecometrica.com/space/forests2020
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	n.a.
Project funding volume	GBP 152 m
Other comment	n.a.
Outputs	Planned outputs will be improved forest monitoring systems: e.g. improved methods and tools for faster, more accurate detection of forest change, better access to information by end-users and by combining the latest satellite data with useful contextual information.

3.3.1.5 WB

Following sources were used:

Websites:

<https://www.worldbank.org/>

<https://www.worldbank.org/en/topic/climatechange/brief/world-bank-carbon-funds-facilities>

<http://www.worldbank.org/en/topic/forests>

<https://www.biocarbonfund-isfl.org/#>
[http://climateinitiativesplatform.org/index.php/BioCarbon_Fund_Initiative_for_Sustainable_Forest_Landscapes_\(ISFL\)](http://climateinitiativesplatform.org/index.php/BioCarbon_Fund_Initiative_for_Sustainable_Forest_Landscapes_(ISFL))

Literature:

Lujan, B., Silva-Chávez; Braña-Varela, J., Meyer, C., Schaap, B., García-Espinosa, M. and Krilasevic, E. (2018). Mapping Forest Finance. A Landscape of Available Sources of Finance for REDD+ and Climate Action in Forests. Environmental Defense Fund, report available online at: edf.org/mappingforestfinance.

Established in 1944, the World Bank Group is headquartered in Washington, D.C. (USA). They have more than 10,000 employees in more than 120 offices worldwide. The World Bank is a vital source of financial and technical assistance to developing countries around the world. It is not a bank in the ordinary sense but a unique partnership to reduce poverty and support development.

The World Bank's Climate Change Fund Management Unit is home to climate finance initiatives that deliver innovative and scalable climate and environmental action. With 6 billion US Dollar in capital these initiatives:

- Create partnership to develop new financial instruments for low-carbon, climate-resilient development;
- Build supportive policy and regulatory environments to help lower the cost of capital and dismantle barriers to projects; and
- Catalyze private sector capital to finance and scale-up climate action.

These climate finance funds take three approaches:

- *Sustainable Forest and Land Use*
The Forest Carbon Partnership Facility (FCPF) and the BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) focus on sustainable forest and land use. These funds guide readiness and implementation of REDD+, including testing purchase of REDD+ credits and incentivizing the development and implementation of sustainable land use activities.
- *National Policy*
The Transformative Carbon Asset Facility (TCAF) works with national policy makers to help shape environmental, energy, and climate change policy to reach meaningful scale and create a lasting, transformative social impact.
- *Portfolio of Programmes*
The Carbon Initiative for Development has a portfolio of programmes that support similar emissions reduction projects, often small-scale at the household level. It has developed a Standardized Crediting Framework – a new approach to crediting emission reductions in the post-Kyoto era.

The Unit also includes climate change and environment programmes administered through the World Bank with the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Multilateral Fund for the Implementation of the Montreal Protocol, and the Pilot Programme for Climate Resilience.

The World Bank's carbon finance initiatives have supported activities in 78 countries and have made 2 billion USD in Emissions Reduction Payments since the first carbon fund (Prototype Carbon Fund) was launched in 1999.

Especially the The Forest Carbon Partnership Facility (FCPF) and the BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) are of interest in the context of the REDDCopernicus project objectives.

The Forest Carbon Partnership Facility (FCPF)

The Forest Carbon Partnership Facility (FCPF) is described in Section 3.3.1.6, where feedbacks in the future service are also reported from a meeting with the identified point of contact.

BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL)

The BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) is a multilateral fund, supported by donor governments and managed by the World Bank. It promotes reducing GHG emissions from the land sector, from REDD+, and from sustainable agriculture, as well as smarter land-use planning, policies, and practices.

The ISFL supports programmes in Colombia, Ethiopia, Indonesia, Mexico, and Zambia. It provides technical assistance to support the design of programmes that impact multiple sectors of the economy and results-based payments to incentivize and sustain programme activities. Currently there is a large network of governments, businesses, civil society, and local communities working to advance the land use carbon agenda internationally and ISFL aims to contribute to this momentum. It does so by creating a portfolio of programmes that will promote sustainable agriculture, forestry, and smarter land-use practices in an integrated approach. See Table 7 for description.

ISFL is supported by Germany, Norway, Switzerland, the United Kingdom (Department for Business, Energy and Industrial Strategy and Department for Environment, Food and Rural Affairs), and the United States. It has 360 million US Dollar in fund capital (Table 6).

Table 6: Description of the BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) Funding.

ISFL provides countries	
Upfront Finance (BioCF _{plus}) 134 million US Dollar	Results-based Finance (BioCF T3) 226 million US Dollar
<ul style="list-style-type: none"> • Supports countries to make improvements to their enabling environment for sustainable land use. • Supports piloting of activities and key partnerships, including engagements with the private sector. • Provides countries with resources to develop systems for monitoring, reporting, and verifying reductions in GHG emissions to prepare jurisdictions for payments. 	<ul style="list-style-type: none"> • Payments give countries incentives to shift to a sustainable development trajectory in each jurisdiction. • Payments can be used to sustain successful interventions to sustainable land use in each jurisdiction.

Table 7: Description of ISFL initiative.

Name of the initiative	BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL)
Point of Contact	<p><i>Contact:</i> Ellysar Baroudy Lead Carbon Finance Specialist, Sustainable Development Network, Coordinator FCPF and BioCarbon Fund E-mail: ebaroudy@worldbank.org</p> <p><i>Websites:</i> ISFL: https://www.biocarbonfund-isfl.org/ World Bank: http://www.worldbank.org/en/topic/forests</p>

Initiative starting date	November 2013
Initiative ending date	2030
Geographical area of action	<i>Scale:</i> Jurisdictional and national Global, Asia and the Pacific, Latin America and the Caribbean, Africa. Currently programmes in Colombia, Ethiopia, Indonesia, Mexico, and Zambia are supported.
Objectives	The ISFL aims to catalyse the development of a low-carbon rural economy in each of its programme areas that will simultaneously result in livelihood opportunities for communities and an overall reduction in emissions from the land. The ISFL will achieve its objective of GHG emission reductions, while also addressing poverty and unsustainable land use, through four key design elements: <ul style="list-style-type: none"> • Working at Scale • Leveraging Partnerships • Incentivising Results • Building on Experience
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Websites: https://www.biocarbonfund-isfl.org/ http://www.worldbank.org/en/topic/forests
Project funding volume	<i>Type:</i> Public-multilateral <i>Funding Mechanism:</i> Grant and loans (BioCF <i>plus</i>) and results-based payments (BioCF T3) <i>Current Funding:</i> 360 Million US Dollar (Upfront Finance (BioCF <i>plus</i>) 134 million US Dollar and Results-based Finance (BioCF T3) 226 million US Dollar) <i>Administrative Organisation:</i> The World Bank
Other comment	<i>Access:</i> BioCF <i>plus</i> : ISFL countries are selected on the basis of their engagement and capacity for large-scale programmes like REDD+ Readiness, enabling environment and governance, and agriculture drivers of land use change. BioCF T3: Once the technical analysis and programme design of a proposed project are completed, then a Letter of Intent (LoI) for the purchase of verified emission reductions is signed with the government. Following that, both a grant agreement and Emission Reductions Payment Agreement (ERPA) will be signed with the government. <i>Challenges:</i> BioCF <i>plus</i> : A primary challenge is the timeline of the ISFL. Due to the innovative and cross-sectoral nature of ISFL programmes, governments must demonstrate that they have the appropriate

	<p>strategies in place to abide by the approach of the ISFL. As such, ISFL programmes have taken more time to develop and negotiate with recipient countries than was initially anticipated. The timeline for completing the design, therefore, varies depending on the country in question and can take months to years.</p> <p>BioCF T3: The results-based payments provided by the ISFL is intended to create a positive feedback loop in which public and private actors create an enabling environment to generate a reduction in GHG emissions. This system, however, depends on the ability of jurisdictions to continue to generate results, sell verified emission reductions, and reinvest in interventions that are successful.</p>
<p>Outputs</p>	<p>The ISFL will seek to engage relevant stakeholders in programme countries, taking into consideration the existing mechanisms in the country, including the FCPF, UN-REDD, the UNFCCC, as well as agriculture, energy, infrastructure, and other relevant stakeholder groups working in each landscape. Priority will be given to already organised groups of stakeholders and other initiatives such as broader national climate change platforms. In case where other land-use based projects supported by the World Bank and other partners are established, the ISFL programme will identify them for effective engagement including building on their structures of engagement, as appropriate.</p>

3.3.1.6 WB Forest Programmes

This Section presents in addition to the World Bank’s Forest Carbon Partnership Facility (FCPF) mechanism, the BioCarbon Fund and the most recent forest related financing mechanism PROGREEN. These financing mechanisms are the key forest related funding sources from the Bank and would have an interest in a future Copernicus REDD+ product/Service.

Following sources were used:

Websites:

- <https://www.forestcarbonpartnership.org/>
- <http://www.worldbank.org/en/topic/forests>
- <https://climatefundsupdate.org/the-funds/forest-carbon-partnership-facility/>

Literature:

Lujan, B., Silva-Chávez; Braña-Varela, J., Meyer, C., Schaap, B., García-Espinosa, M. and Krilasevic, E. (2018). Mapping Forest Finance. A Landscape of Available Sources of Finance for REDD+ and Climate Action in Forests. Environmental Defense Fund, report available online at: edf.org/mappingforestfinance.

The Forest Carbon Partnership Facility (FCPF) is a global partnership of governments, businesses, civil society, and Indigenous Peoples focused on reducing emissions from deforestation and forest degradation, forest carbon stock conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries (REDD+).

Launched in 2008, FCPF now works with 47 developing countries across Africa, Asia, and Latin America and the Caribbean (Table 8), along with 17 donors (Table 9) that have made contributions and commitments totaling 1.3 billion US Dollar. The FCPF support REDD+ efforts through its Readiness and Carbon Funds and the administrative organization is The World Bank. These Funds are supported by government and non-government entities, including private companies that take a minimum financial contribution of five million US Dollar (Table 9).

Table 8: Countries (47) participating in the Forest Carbon Partnership Facility (FCPF).

Africa (18)	Latin America (18)	Asia-Pacific (11)
Burkina Faso, Cameroon, Central African Republic, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Liberia, Madagascar, Mozambique, Nigeria, Sudan, Tanzania, Togo, Uganda	Argentina, Belize, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Uruguay	Bhutan, Cambodia, Fiji, Indonesia, Lao PDR, Nepal, Pakistan, Papua New Guinea, Thailand, Vanuatu, Vietnam

Table 9: Donors/Contributors of the Forest Carbon Partnership Facility's (FCPF) Readiness and Carbon Funds.

Readiness Fund Contributors	
European Commission, Australia, Canada, Denmark, Finland, France, Germany (MMZ, BMU), Italy, Japan (MAFF, MOF), Netherlands, Norway, Spain, Switzerland, United Kingdom (DFID, DECC), United States of America	
Carbon Fund Contributors	
Public Sector	Private Sector & NGOs
European Commission, Australia, Canada, France, Germany (BMZ, BMU), Norway, Switzerland, United Kingdom (DFID, DECC), United States of America	BP Technology Ventures Inc., The Nature Conservancy

FCPF Readiness Fund

The FCPF Readiness Fund helps countries set up the building blocks to implement REDD+. This includes designing national REDD+ strategies, developing Reference Emission Levels (RELs), designing Measurement, Reporting, and Verification (MRV) systems and setting up national REDD+ management arrangements, including proper environmental and social safeguards. Current funding: 400 million US Dollars.

The first step for interested countries is to submit a Readiness Plan Idea Note (R-PIN) to the FCPF. The next step is for selected countries to prepare their Readiness Plan, which is a framework for a country to define a clear approach, budget, and schedule to undertake REDD+ activities. Readiness activities include:

- Adopting national REDD+ strategies
- Developing RELs
- Designing MRV systems
- Setting up environmental and social safeguards

The FCPF's governing body reviews and assesses Readiness Plans, and decides on the allocation of FCPF grants to countries. Readiness activities must involve a high degree of consultation with civil society and Indigenous Peoples organizations.

Table 10: Description of FCPF Readiness Fund initiative.

Name of the initiative	Forest Carbon Partnership Facility (FCPF) Readiness Fund
Point of Contact	<i>Contact:</i>

	<p>Andres Espejo, Methodology specialist - Natural Resources Engineer, Forests and Landscapes Climate Finance, Climate Change Group, aespejo@worldbank.org</p> <p>AND</p> <p>Marco Van der Linden, Technical Specialist/Consultant, Climate Change Group, mvanderlinden@worldbank.org</p> <p>Websites: FCPF: www.forestcarbonpartnership.org World Bank: http://www.worldbank.org/en/topic/forests</p>
Initiative starting date	25 June 2008
Initiative ending date	Both the Readiness Fund and the Carbon Fund are established through to 2020.
Geographical area of action	<p><i>Scale:</i> National</p> <p>Tropical and sub-tropical developing countries (currently 47).</p>
Objectives	<p>The FCPF Readiness Fund supports tropical and sub-tropical countries in preparing themselves to participate in future, large-scale, system of positive incentives for REDD+.</p> <p>This includes designing national REDD+ strategies, developing RELs, designing MRV systems and setting up national REDD+ management arrangements, including proper environmental and social safeguards.</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	<p>Websites: www.forestcarbonpartnership.org http://www.worldbank.org/en/topic/forests</p>
Project funding volume	<p><i>Type:</i> Public-multilateral</p> <p><i>Funding Mechanism:</i> Grant-based.</p> <p><i>Current Funding:</i> 400 million US Dollars</p> <p><i>Administrative Organisation:</i> The World Bank</p>
Other comment	<p><i>Conditions for participating in the Readiness Fund:</i></p> <ol style="list-style-type: none"> Being and eligible REDD country. An eligible REDD country is: <ul style="list-style-type: none"> A Borrowing Member State of the IBRD or IDA; and Located in the tropical or sub-tropical area. Relevance of country in the REDD+ context. Priority should be given to countries with the following characteristics: <ul style="list-style-type: none"> Significant forest area and carbon stock; High importance of forests in the national economy; and High current or projected forest degradation rates. Quality of the Readiness Plan Idea Note (R-PIN): <ul style="list-style-type: none"> Evaluation of R-PIN quality includes the extent of programme ownership by the government and relevant stakeholders, coherence

	<p>with national or sectoral strategies, and feasibility to reduce deforestation and forest degradation.</p> <p>4. Geographic and biome balance:</p> <ul style="list-style-type: none"> • Selection takes into account the need to balance experience and learning across different continents and across the world’s main forest biomes. <p>5. Variety of approaches:</p> <ul style="list-style-type: none"> • Consideration is given to approaches that can contribute to the learning objective of the FCPF. <p><i>Challenges:</i></p> <p>Primary challenges are slow disbursement rates, limited transparency of disbursement, and insufficient private sector interest and investment. Further, Countries seeking to access more funding under the Readiness Fund also find it challenging to meet additional criteria.</p>
<p>Outputs</p>	<p>The Readiness Fund helps prepare developing countries for participating in a future, large-scale, system of positive incentives for REDD+. This includes support for:</p> <ul style="list-style-type: none"> • Developing national reference scenarios for REDD+; • Adopting a national REDD+ strategy that reduces emissions, conserves biodiversity and enhances the livelihoods of forest-dependent indigenous peoples and other forest dwellers; and • Designing and implementing accurate measurements, monitoring and verification systems to enable reporting on emissions from deforestation and forest degradation.

FCPF Carbon Fund

The Carbon Fund is set up to pilot incentive payments for REDD+ efforts in developing countries. FCPF participant countries that have made significant progress in their REDD+ readiness endeavors may be selected to participate in the Carbon Fund, which became fully operational in May 2011. Current funding: 900 million US Dollars.

Carbon payments are designed to help countries and their stakeholders achieve long-term sustainability in financing forest conservation. They are intended to help reduce climate change impacts from forest loss and degradation by making forests more valuable standing than cut down. The Carbon Fund remunerates participant countries in accordance with negotiated contracts for verifiable Emission Reductions (ERs).

Table 11: Description of FCPF Carbon Fund initiative.

<p>Name of the initiative</p>	<p>Forest Carbon Partnership Facility (FCPF) Carbon Fund</p>
<p>Point of Contact</p>	<p><i>Contact:</i></p> <p>Andres Espejo, Methodology specialist - Natural Resources Engineer, Forests and Landscapes Climate Finance, Climate Change Group aespejo@worldbank.org</p> <p>AND</p> <p>Marco Van der Linden, Technical Specialist/Consultant, Climate Change Group, mvanderlinden@worldbank.org</p> <p><i>Websites:</i></p>

	<p>FCPF: www.forestcarbonpartnership.org World Bank: http://www.worldbank.org/en/topic/forests</p>
Initiative starting date	May 2011
Initiative ending date	Both the Readiness Fund and the Carbon Fund are established through to 2020
Geographical area of action	<p><i>Scale:</i> National and jurisdictional</p> <p>A few countries that have successfully participated in the Readiness Fund may be selected, on a voluntary basis, to participate in the Carbon Fund.</p>
Objectives	The FCPF Carbon Fund pilots results-based payments to countries that have advanced through REDD+ readiness and implementation and have achieved verifiable emission reductions in their forests and broader land-use sectors.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	<p><i>Websites:</i></p> <p>www.forestcarbonpartnership.org http://www.worldbank.org/en/topic/forests</p>
Project funding volume	<p><i>Type:</i> Public- and private-multilateral</p> <p><i>Funding Mechanism:</i> Funds are delivered in exchange for emission reductions</p> <p><i>Current Funding:</i> 900 million US Dollars</p> <p><i>Administrative Organisation:</i> The World Bank</p>
Other comment	<p><i>Conditions for participating in the Carbon Fund:</i></p> <p>Countries that have made considerable progress towards REDD+ readiness submit programme proposals that are assessed according to the following criteria:</p> <ul style="list-style-type: none"> • Potential for generating high quality sustainable emission reductions and social and environmental benefits; • Scale of implementation; • Consistency with emerging compliance standards under the UNFCCC and other regimes; • Potential to generate learning value for the FCPF and other participants; • Clear and transparent ‘benefit sharing’ mechanism with broad community support; and • Transparent stakeholder consultations. <p><i>Challenges:</i></p> <p>Countries interested in accessing Carbon Fund resources must first demonstrate readiness according to the FCPF Readiness procedures which could be challenging for countries with limited capacity.</p>
Outputs	The Carbon Fund provides payments for verified emission reductions from REDD+ programmes in countries that have made considerable progress towards REDD+ readiness. Assistance is divided into four main categories:

	<ul style="list-style-type: none"> • General Economic Policies and Regulations (taxation, subsidies, rural credit, certification, law enforcement). • Forest Policies and Regulations (taxation, subsidies, certification, concession regimes, securing land tenure and land rights, forest law, governance and enforcement, zoning, protected areas, Payments For Environmental Services (PES). • Forest Management (forest fires, reduced impact logging, reforestation). • Rural Development (community development, rural electrification, community forestry).
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Biocarbon Fund

The BioCarbon Initiative for Sustainable Forest Landscapes (ISFL) fund is the second forestry focused fund managed by the World Bank. It became operational in 2013 and has acquired \$355 million in funding capital from Germany, Norway, United Kingdom, Switzerland and the United States of America. The overall objective of the ISFL is to reduce GHG emissions while addressing issues of poverty and unsustainable land use. It aims to do this through the creation of a portfolio of programs which will promote sustainable agriculture, forestry and more intelligent land-use practices. The broad aim of each program will be to transform rural areas and communities through protection of natural forests, restoration of degraded lands and the enhancement of agricultural productivity. The ISFL is also aware of the role of private sector in the implementation of its programs and the long-term success in solving the problem of deforestation and so is prioritizing partnerships with private sector in all of its programs.

The BioCFplus is a grant-based fund which finances technical assistance and capacity building activities in each of the ISFL programs. It also provides the finances to establish an enabling environment for sustainable land use, the development of MRV systems and supports advisory Service programs to attract private sector engagement. The BioCF Tranche 3 much like the Carbon Fund covers results-based payments for verified reductions in GHG emissions through an ERPA.

Currently there are 5 country programs operating under the ISFL which include Colombia, Ethiopia, Indonesia, Mexico and Zambia. One of the key aspects of these programs which set them apart from other Bank funded initiatives are that they operate across a “jurisdictional level” or what is considered a single geographic or political sub-national unit (e.g., state, province, etc.). Besides Indonesia each of the country programs receives funding from the ISFL as well as from a separate co-financing scheme.

PROGREEN Global Partnership for Sustainable and Resilient Landscapes

PROGREEN is the third forestry focused fund managed by the World Bank. “It is a World Bank Multi-Donor Trust Fund that has been created to support countries’ efforts to improve livelihoods while tackling declining biodiversity, loss of forests, deteriorating land fertility and increasing risks such as uncontrolled forest fires” (Source: <https://www.worldbank.org/en/programs/progreen>). It is also the newest of the three World Bank programs having only been launched on the 23rd of September 2019 in partnership with Germany. Germany as the seed funder for PROGREEN has contributed 200 million Euros in order to kickstart the program with the goal of eventually raising \$1 billion from other donor countries. PROGREEN will focus on three priority areas:

- Management of Forests and Land-based Ecosystems: “will increase the area of land under integrated management to improve livelihoods, support economic development, and maintain and restore ecosystem services.”
- Management of Land Use Changes from Agriculture: “will reduce the demand for land conversion to agriculture through improved management of agricultural lands.”

- Management of Landscapes Involving Select Sectors: “will reduce land-use change driven by sectors beyond agriculture such as infrastructure, mining and transport.”³

Whilst the main WB Experts interviewed were from the FCPF Programme (see Minutes of discussion in Annexe 5), additional information on WB programmes and their potential to use EO data for forest monitoring will be described in the output of Work Package 9, as the Bank has a major role to play in both enhancing the use of a Copernicus REDD+ Service and its wider dissemination globally.

The main WB Experts interviewed were Andres Espejo and Marco Van den Linden from the Forest Carbon Partnership Facility (FCPF) Programme; both Bank Experts have been involved with implementation of REDD+ projects in the Readiness Phase. They also have a strong knowledge on implementation of different components of the Monitoring, Reporting and Verification (MRV); A. Espejo especially is involved with GFOI and has an understanding on EO applications for forest monitoring. Whilst they had a high interest in the products presented for a potential Copernicus Core REDD+ Service they were very much focused on the utility of products and a potential Core Service at national level and for countries preparing their FRELs. In this context, they noted that global products such as Global Forest Watch had not been able to provide countries with accurate AD figures and thus they both emphasized the need for documented and high accuracy assessment figures in any future Core Service. They also noted the Bank could not provide supplementary funding for a Copernicus Core REDD+ Service but they would be able to actively support the dissemination of a Core Service, and if countries requested Downstream services the Bank could finance these applications within the framework of the REDD+ funded programmes.

3.3.1.7 GEF

Sources:

<https://www.thegef.org/about-us>

<https://www.thegef.org/topics/forests>

Interview/meeting with Tuukka Castrén from WB for GEF, on the 04.02.2021

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit in the International Bank for Reconstruction and Development (IBRD or World Bank) as a pilot program in order to assist in the protection of the global environment and promote thereby environmentally sound and sustainable economic development, by resolution of the Executive Directors of the World Bank and related interagency arrangements between the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank⁴. The World Bank serves as the GEF Trustee, administering the GEF Trust Fund (contributions by donors). Among its responsibilities, it helps mobilize resources for the Trust Fund; disburses funds to GEF Agencies; prepares financial reports on investments and use of resources; and monitors application of budgetary and project funds⁵.

Since then, the GEF has provided close to \$20 billion in grants and mobilized an additional \$107 billion in co-financing for more than 4,700 projects in 170 countries. Through its Small Grants Programme, the GEF has provided support to nearly 24,000 civil society and community initiatives in 128 countries. The GEF provides funding to assist developing countries in meeting the objectives of international environmental conventions. The GEF serves as a "financial mechanism" to five conventions: Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change

³ <https://www.worldbank.org/en/programs/progreen/overview>

⁴ https://www.thegef.org/sites/default/files/publications/GEF_Instrument-Interior-March23.2015_1.pdf

⁵ <https://www.thegef.org/about/organization>

(UNFCCC), Stockholm Convention on Persistent Organic Pollutants (POPs), UN Convention to Combat Desertification (UNCCD), and Minamata Convention on Mercury.

GEF area of activities includes the biodiversity, the chemicals and waste, the climate change, the forests, the international waters and the land degradation. In the forest area, GEF has funded at least 380 forest-related projects since its inception in 1992. The GEF's Sustainable Forest Management Impact Program, seeks to maintain the ecological integrity of entire biomes by concentrating efforts, focus, and investments, as well as ensuring strong regional cross-border coordination. The Impact Program will address the drivers of forest loss and degradation through strategies aimed at creating a better enabling environment for forest governance; supporting rational land use planning across mixed-use landscapes; strengthening the management and financing of protected areas; clarifying land tenure and other relevant policies; supporting the management of commercial and subsistence agriculture lands to reduce pressure on adjoining forests; and utilizing financial mechanisms and incentives for sustainable forest management.

GEF was then identified as a key donor for REDD+ though the different initiatives in the forest sector they support, and this was discussed during the interview with Tuukka Castrén from WB, which is the point of contact identified for GEF.

Tuukka Castrén has been a senior forestry specialist in the World Bank based in Washington since 2008. He has worked mostly on issues related to forest governance, finance and use of ICT and other technology. He was member of the team managing the Program on Forests (PROFOR), a multi-donor trust fund housed at the World Bank. After that he worked on the World Bank's forest portfolio in the Europe and Central Asia Region – mainly in South Caucasus and Western Balkans before recently moving to the Eastern Africa unit. Mr. Castrén has been the task team leader for the Satellite Monitoring for Forest Management project since its inception. He was also involved in the implementation of some GEF funded projects. More information can be found in the minutes of the meeting in Annexe 1.

He was interviewed during the second year of the project (04.02.2021) to provide his feedback on the different topics mentioned in section 3.2, and any additional comment he may have about the presentation of the future Service. Mr. Castrén knows mostly about the Copernicus Programme through the availability of Sentinel data. He added that this is his own view, not the WB Group view which is a big organization, and that we could have to ask to someone from the climate desk on this topic to get a better representational answer on many of the questions (see also section 3.3.1.6 to read other answers from WB representatives). After the presentation of the future Service, Mr. Castrén estimated that it will be valuable for WB activities, and sees the main interest in the Downstream Service, where he thinks the uptake still has to be made by the tropical countries. He said that the future Service portfolio could be used as part of projects from WB portfolio, and it is of interest to use the Service since it will allow not to “start working from scratch” with the countries counterparts, which is often the case. Additionally, he indicated that there could be possibility to support capacity building activities (including financial and/or technical support) though WB activities, as part of Downstream activities. On the other hand, being funded by trust funds that are themselves funded often by EU member states, he indicated that WB could not fund the future Core Service.

Additionally to the points raised during the guided interview, other comments were provided by Tuukka Castrén, which are useful for the implementation of the project and the future Service. He said that one of the issues the WB is facing when supporting countries with capacity building activities, is the issue of ownership of the data from the local stakeholders which are rather reluctant to provide the data before they find kind any forms of added value in the Service/product facilitating their work on their forest policies. It was also reached the point that it is important that the Service will not only deal with REDD+ policy, but also with other forest policies, and added that when dealing with those policies, the question of how the local/field data and global EO-datasets could be combined should be considered. However, he also raised the lack of solution existing globally to deal with the issues of measurement of forest regrowth and also with the identification of the drivers of the forest cover loss or forest degradation, e.g. distinguishing illegal deforestation from managed forest.

3.3.1.8 GCF

Sources:

<https://www.greenclimate.fund/who-we-are/about-the-fund>

<https://www.greenclimate.fund/gcf101/empowering-countries/readiness-support#faq-how-much-can-a-country-access>

<https://redd.unfccc.int/>

Interview/meeting with Juan Chang, GCF, on the 28.01.2021

The Green Climate Fund (GCF) is a global fund created to support the efforts of developing countries to respond to the challenge of climate change. GCF helps developing countries limit or reduce their greenhouse gas (GHG) emissions and adapt to climate change. It seeks to promote a paradigm shift to low-emission and climate-resilient development, taking into account the needs of nations that are particularly vulnerable to climate change impacts.

The general concept for GCF was first proposed at the Conference of the Parties (COP) to the UNFCCC in Copenhagen, Denmark (COP 15) in 2009. Then, it was set up by the 194 countries who were parties to the UNFCCC in 2010, as part of the Convention's financial mechanism. It aims to deliver equal amounts of funding to mitigation and adaptation, while being guided by the Convention's principles and provisions. When the Paris Agreement was reached in 2015, the GCF was given an important role in serving the agreement and supporting the goal of keeping climate change well below 2 degrees Celsius. The Fund's investments can be in the form of grants, loans, equity or guarantees.

GCF Funding for REDD+ Phases

GCF has developed an initial strategic plan to guide its ongoing work. The plan was endorsed by the Board at its twelfth meeting in March 2016. The strategy sets out an Action Plan based on five strategic measures that the Board intends to promote. One of the operational priorities is GCF pipeline development which includes the introduction of the “**results-based payments for REDD+**”, and the evaluation of how results-based payments could apply to other sectors of GCF's activities. This is of interest in the context of REDDCopernicus objectives: GCF offers support for REDD+ across all three phases. GCF funding for REDD+ includes support for forests as part of a wider landscape. This includes increasing resilience and enhancing livelihoods of the most vulnerable people, communities, and regions; increasing people's health and well-being; enhancing food and water security; and improving the resilience of ecosystems and ecosystem services.

The vehicle to support direct access to the GCF is called the Readiness and Preparatory Support Programme (the Readiness Programme). This Programme provides resources for strengthening the institutional capacities of NDAs⁶ or focal points and Direct Access Entities⁷ to efficiently engage with the Fund. Resources may be provided in the form of grants or technical assistance. Some examples of REDD+ activities that could be supported through the GCF readiness programme are listed and detailed in Annex VII from the document “Decisions of the Board - Thirteenth meeting of the Board, 28-30 June 2016”⁸. It includes: the establishing and strengthening of National Designated Authorities (NDAs) or Focal Points (FPs); the strategic framework, including the preparation of country programmes; the support for accreditation and accredited direct access entities; the information sharing,

⁶ NDAs: Government institutions that serve as the interface between each country and the Fund.

⁷ Direct Access Entity: Institutions that apply for accreditation through the direct access modality.

⁸ GCF/B.13/32/Rev.01, 10/08/2016, access online on December 2019:

https://www.greenclimate.fund/documents/20182/226888/GCF_B.13_32_Rev.01_-_Decisions_of_the_Board_thirteenth_meeting_of_the_Board_28-30_June_2016.pdf/c93a0291-28c1-4bfc-bc22-cf4c590c3c83

experience exchange and learning; and the formulation of national adaptation plans and/or planning processes.

Possible activities that can be financed in the context of the GCF modalities for financing REDD+ are phase 1 of REDD+ which includes the development of national strategies or action plans, policies and measures, and other capacity building activities; the phase 2 which includes the implementation of national policies and measures and national strategies or action plans, which might involve additional capacity building, technology development and transfer and results-based demonstration activities; and the phase 3 for which GCF will provide financing in the form of grants and concessional lending, and through other modalities, instruments, or facilities as may be approved by the Board.

As of 2018, 135 countries were engaged with GCF, which represented 92% of the countries that have communicated their initial designations of NDA/FP to the GCF, regarding to this, the Readiness Programme is set to become the largest global support Programme made available to developing countries to enhance access to climate finance in support of their efforts to combat climate change (GCF/B.22/08⁹).

Examples of REDD+ projects funded by GCF: REDD+ Results-based payments in Paraguay for the period 2015-2017, Ecuador REDD+ RBP for results period 2014, Chile REDD+ Results-based Payments for results period 2014-2016.

Table 12: Description of GCF Readiness and Preparatory Support Programme initiative.

Name of the initiative	GCF Readiness and Preparatory Support Programme
Point of Contact	Within the GCF Secretariat the Country Programming Division is responsible for Readiness Support. Email: countries@gcfund.org Website: https://www.greenclimate.fund/gcf101/empowering-countries/readiness-support
Initiative starting date	2011
Initiative ending date	Estimation of grants approvals until 2021 and associated budget is already planned (GCF/B.18/32), and no ending date is foreseen.
Geographical area of action	All developing countries can access the programme, and the Fund aims to ensure that at least 50 per cent of the readiness support available goes to particularly vulnerable countries, including Least Developed Countries (LDCs), Small Island Developing States (SIDS) and African States. The requests for funding must be initiated by a NDA or focal point from each of these.
Objectives	The GCF provides support to maintain and amplify efforts to implement the early phases of REDD+ in recognition that REDD+ offers a cross-cutting approach to contribute to global efforts to reduce emissions and contribute to low-emission and

⁹ GCF/B.22/08, 01/02/2019, access online on December 2019:

https://www.greenclimate.fund/documents/20182/1424894/GCF_B.22_08_-_Readiness_and_Preparatory_Support_Programme_Strategy_for_2019-2021_and_Work_Programme_2019.pdf/34b15586-5492-1a7c-3534-b580d53b7acd

	climate resilient development pathways in developing countries, while simultaneously generating local benefits, which in some cases could assist with adaptation to climate change.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Financial and technical support to the countries in the implementation of their REDD+ processes.
Project funding volume	As of 2018 ¹⁰ , the Readiness programme provides up to USD 1 million per country per year for all readiness activities (except for adaptation planning), and up to USD 3 million per country for the formulation of National Adaptation Plans (NAPs) and/or other adaptation planning processes. Countries may submit multiple requests over durations based on the needs of the country.
Other comment	The programme aims to support five outcomes connected to the programme objectives: strengthening country capacity, engaging stakeholders in consultative processes, realizing direct access, providing access to finance, and mobilizing the private sector. These outcomes are contained in Section 2 of the Readiness and Preparatory Support Proposal Template (logical framework).
Outputs	The outputs of the programme correspond to the success of its objectives.

Through these activities, GCF would certainly be interested in supporting the future REDD+ Service, and this was confirmed during the meeting that the project had with Juan Chang which is the point of contact identified.

Juan Chang is the principal Specialist in Forests and Land Use at the Green Climate Fund, and he was interviewed during the second year of the project (28.01.2021) to provide his feedback on the different topics mentioned in section 3.2, and any additional comment he may have about the presentation of the future Service. He indicated that GCF has only a limited knowledge/interaction of Copernicus Programme, neither with EU in terms of funding, however, they have more interaction at the policy level with the European Commission. Nevertheless, after the presentation of the Service was made, GCF indicated that even if the future Service will be really useful for countries, it is up to the country to choose the tool they will use for their FM, and a presentation of a concrete case will help to convince them to use this Service. GCF has three main domains of funding for FM: the awareness raising which includes capacity buildings and regular project cycle; and the Result Based scheme which ran out of funding last year and will be updated by the end of 2021. The future REDD+ Service could be used for these two domains. The funding from GCF to the countries is linked to the quality of the results/reporting, and the level of uncertainty of the products they reach. As it is important to have a certain level quality for reporting, GCF sees the high value of the future Service in this topic. GCF is also working on a new scored based programme which will allow the countries to participate in this type of programme. GCF will be in a position to provide feedbacks on the future Service, considering that the teams always want to be up to date on what is going on in the sector. However, despite they could not fund the Core Service, they could rather support the countries for Downstream sector though

¹⁰ GCF readiness and preparatory support guidebook, June 2018, online access on December 2019 : [https://www.greenclimate.fund/documents/20182/574766/Guidelines - Readiness and Preparatory Support Guidebook.pdf/9eea580f-a109-4d90-b281-c54695114772](https://www.greenclimate.fund/documents/20182/574766/Guidelines_-_Readiness_and_Preparatory_Support_Guidebook.pdf/9eea580f-a109-4d90-b281-c54695114772)

capacity building for example, and it was mentioned that a new funding will be available at the end 2021 (about one million dollars per year) to support countries.

Additionally to the points raised during the guided interview, Juan Chang indicated that GCF is currently trying to encourage African countries to move ahead with their REDD+ policies and that it would be desirable if the Consortium will support these countries. This is a very positive point in terms of support of the future service though funding of Downstream services since this is a shared objective and that the Service will provide this type of encouragement to tropical countries including African countries. Therefore financing by GCF could be guaranteed.

The minutes of the meeting can be found in Annexe 2.

3.3.1.9 IKI/BMU

Following sources were used:

Websites:

<https://www.z-u-g.org/en/responsibilities-and-tasks/international-climate-initiative-iki/>
<https://www.international-climate-initiative.com/en>
<https://www.international-climate-initiative.com/en/issues/natural-carbon-sinksredd/>

The International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has been financing climate and biodiversity projects in developing and newly industrializing countries, as well as in countries in transition since 2008. The IKI has supported over 600 projects and programmes throughout the world, with total funding of more than 2.7 billion Euros. In the beginning its financial resources came from the proceeds of actioning allowances under the emission trading scheme. Later, to ensure financial continuity funds were made available through the Special Energy and Climate Fund. Both funding mechanisms are now part of the Federal Environment Ministry's regular budget. IKI places clear emphasis on climate change mitigation, adaptation to the impacts of climate change and the protection of biological diversity and funds projects in the following funding areas:

- Mitigating greenhouse gas emissions
- Adapting to the impacts of climate change
- Conserving natural carbon sinks with a focus on reducing emissions from deforestation and forest degradation (REDD+)
- Conserving biological diversity

The Secretariat of the IKI supports the BMU in implementation of the IKI and is operated by the BMU's project management company Zukunft – Umwelt – Gesellschaft (ZUG) gGmbH.

Especially the funding area 'Conserving natural carbon sinks with a focus on reducing emissions from deforestation and forest degradation (REDD+)' is of interest in the context of the REDDCopernicus project objectives.

IKI Funding Area: Conserving Natural Carbon Sinks with a Focus on Reducing Emissions from Deforestation and Forest Degradation (REDD+)

In this Funding Area the IKI supports partner countries in particular in implementing the international REDD+ mechanism as well as projects to support the approach of Forest Landscape Restoration (FLR) as part of the Bonn Challenge. At the time of writing (October 2019), 157 projects had been approved in this area (<https://www.international-climate-initiative.com/en/projects/>).

IKI focusses in this Funding Area on the implementation of national REDD+ and FLR strategies, especially within the framework of an implementation of the Nationally Determined Contributions (NDCs), in particular on the support of sustainable business models and mobilization of private investments. Here especially synergies between forest protection and conservation of biological diversity play an important role along with emissions reductions and adaptation to the impacts of climate change. Lessons learned from IKI projects serve as input to international policy discussions and

negotiations, particularly within the context of the UNFCCC and the CBD. Further, experience collected through IKI projects also feed into multilateral REDD+ initiatives such as The World Bank's FCPF (see Section 3.3.1.6). Increasingly important is the support of countries in the preparation of project pipelines in the area of REDD+/FLR for the Green Climate Fund (GCF) (see Section 3.3.1.8). Finally, IKI also finances activities aimed at emission reductions and carbon sequestration in other ecosystems not covered by REDD+ (e.g. marshes, boreal forests, and savannahs).

However, direct discussion with IKI on how they may like to contribute to a future Service Component have not yet taken place and will be pursued during the last year of the project as opportunities arise.

Table 13: Description of Germany's International Climate Initiative.

Name of the initiative	Germany's International Climate Initiative (IKI) Funding Area: Conserving natural carbon sinks with a focus on reducing emissions from deforestation and forest degradation (REDD+)
Point of Contact	<i>Contact:</i> IKI Secretariat Zukunft – Umwelt – Gesellschaft (ZUG) gGmbH Köthener Straße 4 D-10963 Berlin Telephone: +49 30 700 181 222 E-mail: iki-secretariat@z-u-g.org <i>Websites:</i> https://www.z-u-g.org/en/responsibilities-and-tasks/international-climate-initiative-iki/ https://www.international-climate-initiative.com/en/issues/natural-carbon-sinksredd/
Initiative starting date	2008
Initiative ending date	No ending date
Geographical area of action	Funding of projects and programmes in partner countries in the context of REDD+ and FLR.
Objectives	The objective is to support partner countries in particular in implementing the international REDD+ mechanism as well as projects to support the approach of FLR as part of the Bonn Challenge.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	<i>Websites:</i> https://www.z-u-g.org/en/responsibilities-and-tasks/international-climate-initiative-iki/ https://www.international-climate-initiative.com/en/issues/natural-carbon-sinksredd/
Project funding volume	<i>Type:</i> Public-bilateral <i>Funding Mechanism:</i> Special Energy and climate Fund (German Federal Environment Ministry) <i>Current Funding:</i> IKI as a whole has supported over 600 projects and programmes throughout the world, with total funding of more than 2.7 billion Euros. 900 million US Dollars. At the time of writing (October

	2019), 157 projects had been approved in this specific Funding Area (https://www.international-climate-initiative.com/en/projects/). <i>Administrative Organisation:</i> Zukunft – Umwelt – Gesellschaft (ZUG) gGmbH
Other comment	Especially synergies between forest protection and conservation of biological diversity play an important role along with emission reductions and adaptation to the impacts of climate change. Lessons learned from IKI projects serve as input to international policy discussions and negotiations, particularly within the context of the UNFCCC and the CBD. Further, experience collected through IKI projects also feed into multilateral REDD+ initiatives such as The World Bank’s Forest Carbon Partnership Facility (FCPF). Increasingly important is the support of countries in the preparation of project pipelines in the area of REDD+/FLR for the GCF. Finally, IKI also finances activities aimed at emission reductions and carbon sequestration in other ecosystems not covered by REDD+ (e.g. marshes, boreal forests, and savannahs).
Outputs	IKI focusses in this Funding Area on the implementation of national REDD+ and FLR strategies, especially within the framework of an implementation of NDCs, in particular on the support of sustainable business models and mobilization of private investments.

3.3.1.10 JICA

Sources:

<https://www.jica.go.jp/english/countries/asia/index.html>

The Japan International Cooperation Agency (JICA) is a governmental agency that coordinates development assistance for the government of Japan. JICA provides bilateral aid in the form of Technical Cooperation, ODA Loans and Grant Aid, addressing a large number of development fields, including ‘Natural Environment Conservation’.

In the context of ‘Natural Environment Conservation’, JICA supports technical cooperation projects on ‘Climate Change Measures through Sustainable Forestry Management and Ecosystems Conservation’. For instance, in Southeast Asia (e.g. Cambodia, Laos, Vietnam), JICA has long-standing experience in providing technical assistance in the context of forest inventory, forest monitoring and REDD+.

The F-REDD project in Laos is one example of technical cooperation. F-REDD is aiming at strengthening capacity for Sustainable Forest Management (SFM) through the incorporation of REDD+ into the sector strategy and improved forest resource information. A major objective of F-REDD is to quantify emission reductions and removals resulting from the implementation of the REDD+ activities at national scale by using the National Forest Monitoring System (NFMS). There is ongoing collaboration with JRC, where F-REDD is interested in RS derived forest canopy disturbance products as input to national assessments, complementary to NFMS.

JICA projects supporting activities related to REDD+ and SFM are therefore potential users of Copernicus REDD+ Service products. Whilst not expected to fund Core products of a Copernicus REDD+ Service Component, JICA projects may be in a position to finance products from a related Downstream Service for national-scale applications. Direct discussion will be pursued during the last year of the project as opportunities arise.

Table 14: Description of the Japan International Cooperation Agency.

Name of the initiative	Japan International Cooperation Agency (JICA)
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Name of the initiative	HQ in Japan and national JICA offices in developing countries
Point of Contact	n.a.
Initiative starting date	n.a.
Initiative ending date	Global – focus on developing countries and emerging markets
Geographical area of action	JICA coordinates development assistance for the government of Japan, providing bilateral aid in the form of Technical Cooperation, ODA Loans and Grant Aid. In the context of ‘Natural Environment Conservation’, JICA supports technical cooperation projects on ‘Climate Change Measures through Sustainable Forestry Management and Ecosystems Conservation’, including REDD+.
Objectives	Project reports. Brochure, Newsletter https://www.jica.go.jp/project/english/laos/018/index.html
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Funded by Japan government
Project funding volume	n.a.
Other comment	n.a.

3.3.1.11 KFW/GIZ

Following *sources were used*:

Websites:

<https://www.kfw-entwicklungsbank.de/International-financing/KfW-Entwicklungsbank/>
<https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Topics/Climate/REDD/>
<https://www.giz.de/en/worldwide/33356.html>

Literature:

Lujan, B., Silva-Chávez; Braña-Varela, J., Meyer, C., Schaap, B., García-Espinosa, M. and Krilasevic, E. (2018). Mapping Forest Finance. A Landscape of Available Sources of Finance for REDD+ and Climate Action in Forests. Environmental Defense Fund report available online at: edf.org/mappingforestfinance.

Interview/meeting with Mr. T. Schönfeld, Mr. S. Schopferer, Mr. J. Schielein and Mr. K. Köhnlein from WB, on January 2021.

The KfW Development Bank has been assisting the German Federal Government to achieve its goals in development policy and international development cooperation for more than 50 years. On behalf of the German Federal Government, and primarily the Federal Ministry for Economic Cooperation and Development (BMZ), KfW finances and supports programmes and projects that mainly involve the public sector players in developing countries and emerging economies – from their conception and execution to monitoring their success.

REDD Early Movers (REM) Programme

The REDD Early Movers (REM) was officially launched at the Rio +20 Conference in June 2012 by the BMZ. This German Official Development Assistance (ODA) initiative rewards pioneers of forest protection and climate change mitigation. REM provides performance-based payments for verified emission reductions from deforestation prevention, thereby managing REDD+ in line with the decisions agreed to in context of the UNFCCC. The global REM programme provides the overarching framework for the different REM country programmes. It is jointly implemented by KfW and GIZ. So far, the REM programme has been implemented in following three countries: Brazilian states of Acre and Mato Grosso, Colombia, and Ecuador.

In recent years, the governments of Germany, Norway, and the United Kingdom (GNU) have formed a partnership to address deforestation and promote forest restoration. The GNU partners endorsed the 'New York Declaration on Forests' and the 'Paris Leaders' Statement on Forest and Climate', which include commitments towards cutting natural forest loss in half by 2020, striving to end deforestation by 2030, restoring forests and croplands on a large scale, and REDD+. REM is among several important instruments the GNU will use to deliver on its intentions to scale up financial support for REDD+.

Table 15: Description of the REDD Early Movers (REM) Programme initiative.

Name of the initiative	REDD Early Movers (REM) Programme
Point of Contact	Dr. Christiane Ehringhaus, REM Co-ordinator, Christiane.Ehringhaus@kfw.de Website: https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Topics/Climate/REDD/
Initiative starting date	June 2012
Initiative ending date	2019
Geographical area of action	<i>Scale:</i> National and jurisdictional REM programme has been implemented in following three countries: Brazilian states of Acre and Mato Grosso, Colombia, and Ecuador.
Objectives	This initiative was developed to promote forest conservation by providing financial support to close the pre-2020 funding gap that currently exists in the REDD+ process in pioneer countries or regions that are already taking initiative to protect forests.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Website: https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Topics/Climate/REDD/
Project funding volume	<i>Type:</i> Public-bilateral <i>Funding Mechanism:</i> Results-based payments <i>Current Funding:</i> In 2018 funding pledged or committed under REM totaled 66 million US Dollars <i>Administrative Organisation:</i> KfW and GIZ
Other comment	<i>Access:</i> REM countries need to have already taken action to protect forests and have in place: <ul style="list-style-type: none"> • Advanced MRV systems;

	<ul style="list-style-type: none"> • Initial benefit-sharing arrangements; • Technical conditions, enabling policy and institutional environments to ensure efficient forest conservation; and • Large-scale forest conservation programmes at a subnational or national level, with the potential to be rapidly developed into performance-based REDD+ programmes. <p><i>Challenges:</i></p> <p>In order to access REM funds, sub-national and biome approaches must be coherently integrated and aligned with national strategies and policy goals that are related to reducing emissions and avoiding deforestation. These requirements could provide difficult for certain countries to meet, depending on their capacity.</p>
Outputs	<p>This German ODA initiative rewards pioneers of forest protection and climate change mitigation. REM provides performance-based payments for verified emission reductions from deforestation prevention, thereby managing REDD+ in line with the decisions agreed to in context of the UNFCCC.</p>

In January 2021, GAF interviewed 4 Experts from the Kreditanstalt für Wiederaufbau (KfW) the German Development Bank; Mr. T. Schönfeld, Mr. S. Schopferer, Mr. J. Schielein are all involved in supporting the implementation of REDD+ Projects especially linked to the REM programme. Additionally Mr. K. Köhnlein the Portfolio Manager for REDD REM for Brazil and Colombia was also part of the interview. The KfW team did not have much background knowledge on the Copernicus programme; typically as with other financiers there has been a heavy reliance on commercial EO data providers such as Planet. For example, they are currently funding a project in Mato Grosso Brazil, implemented by Planet and using the VHR data for a NRT Forest Project covering 900,000 km². Nevertheless, the KfW team showed high interest in the products (as noted by the numerous technical questions posed during the interview-see Minutes in Annexe 3) and were also interested to know the difference between the future Copernicus Core REDD+ Service and the GFW data. In this context, they emphasized the need for accuracy figures to be provided for a Core REDD+ Service. Also like other donors they could not provide supplementary funds for a Core Service but could support Downstream services as well as support in awareness raising of such a Service.

3.3.1.12 NORAD - NICFI

Sources:

<https://www.regjeringen.no/en/topics/climate-and-environment/climate/climate-and-forest-initiative/kos-innsikt/hvorfor-norsk-regnskogsatsing/id2076569/>

<https://norad.no/en/front/about-norad/five-main-tasks/>

Interview/meeting with Ellen Bruzelius Backer, Policy Director for Environmental Integrity at Klima- og miljødepartementet, Norwegian Government as part of the interview/meeting during GFOI Leads Teleconference, 20.01.2021. See Section 3.3.3.3 and Annexe 6 for details.

Norwegian Agency for Development Cooperation (NORAD) is a directorate under the Norwegian Ministry of Foreign Affairs. NORAD provides expert advice about development and aid to foreign services and works together with a range of other players in development assistance. In order to provide good and relevant advice it is important to understand the context in which the development aid must work. Norad draws on the best expert groups in Norway and has substantial knowledge and know-how on subjects ranging from health and education to climate, **environment**, energy and human rights in recipient countries.

One of the thematic areas in Norwegian development policy is the “Climate Change and Environment”, which includes many programmes/initiatives/policies such as the Norway’s International Climate and Forest Initiative (NICFI). This initiative is relevant to contact in the context of the future Copernicus REDD+/FM Service because it could provide funds for the development of the Core and even of the Downstream Service. NICFI is already funding countries and their FM projects, supporting them to reach their REDD+ requirements and other climate engagements, though the investment of billions of dollars to detecting deforestation in the tropics and addressing global climate change. NICFI is also part of the GFOI Leads group and currently are chair of the Leads. Thus, as with AusAID and BEIS, there are opportunities for their involvement with REDDCopernicus.

Norway’s International Climate and Forest Initiative (NICFI)

At Bali (COP13) the Norwegian Prime Minister launched NICFI, an initiative which seeks to achieve cost-effective and verifiable reductions in greenhouse gas emissions from deforestation and forest degradation in developing countries (REDD), and applies to all types of tropical forests. Reducing such emissions could deliver a quarter of the climate change mitigation the world needs to stay on a two degrees warming pathway towards 2030. By end of 2014, NICFI had disbursed 14 billion NOK (i.e. approximatively 1’400’000’000 €) to REDD+. See Table 16 for further description of NICFI.

The Secretariat for the initiative is based in the Norwegian Ministry of the Climate and Environment (KLD). Norad is actively supporting the initiative by providing technical assistance to the secretariat, reviewing specific programme activities and funding schemes and participating in joint missions. Norad is managing a support scheme for support to civil society organizations under the Climate and Forest Initiative.

NICFI works closely with committed developing countries, multilateral organizations and banks, and civil society; and has the following key objectives, adopted by the Norwegian parliament:

1. To contribute to the inclusion of REDD+ under the UN Framework Convention on Climate Change (UNFCCC).
2. To contribute to early actions for measurable emission reductions from deforestation and forest degradation.
3. To promote the conservation of primary forests, due to their particular importance as carbon stores and for their biological diversity.

Since its inception in April 2008, NICFI has established a series of ground-breaking partnerships with key forest countries and contributed to significant advances in the development of a REDD+ framework under the UN Framework Convention on Climate Change (UNFCCC).

The current grant period under the NICFI for civil society will end in 2020 and includes 39 organisations.

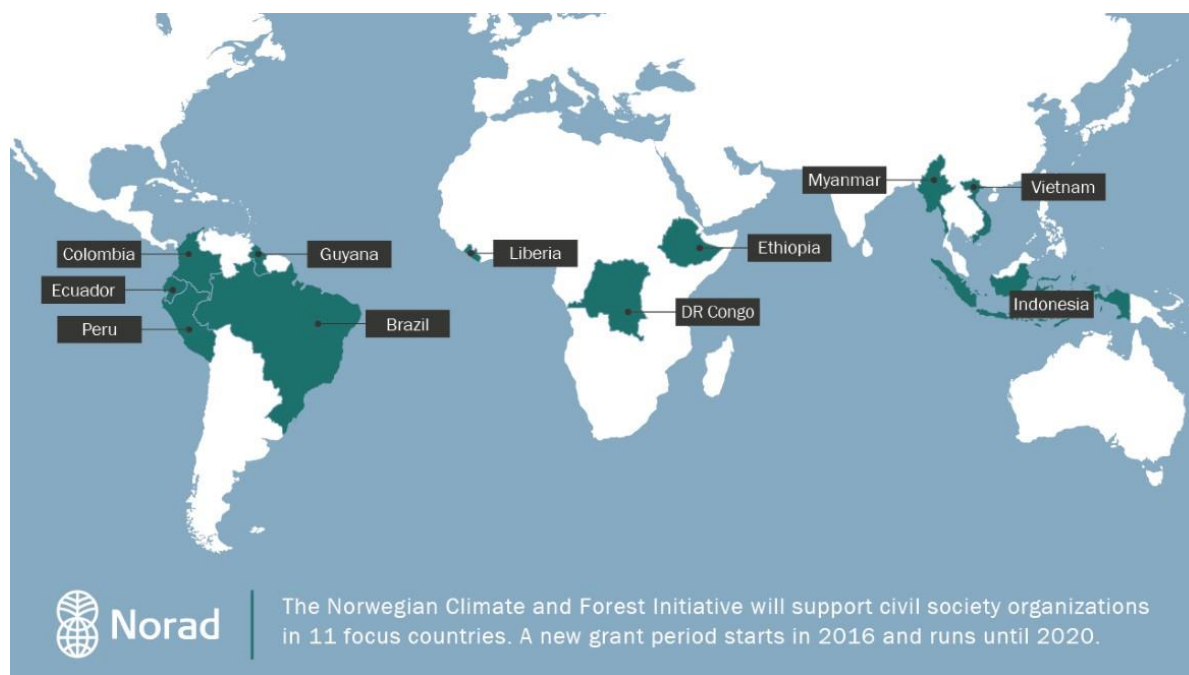


Figure 3: NICFI supports civil society organizations in 11 focus countries in the grant period 2016-2020 (source: NORAD website, on December 2019).

The call for proposals for the next grant period starting in 2021 was initially foreseen to be launched on 1 October 2019, however, due to delays in the planning of the next grant period, the call has been slightly delayed. Norad foresees to publish the call towards the end of 2019.

Specifically, the Norwegian Ministry of Climate and Environment have committed to purchase and freely distribute high resolution satellite imagery to all tropical countries¹¹ and this could support the Core Service provision from Copernicus.

NICFI has already been involved in providing feedback to the Stakeholder Survey on the Potential Copernicus Forest Monitoring and REDD+ Service Component (see D1.1 of this project). They indicated an interest in seeing a pioneering strategy which is leading the way towards better support for REDD+ implementation.

NICFI Partnerships and Funding

Many partnerships have been developed between NICFI and tropical forest countries, for example with Colombia, Indonesia, Guyana, Peru, Liberia, Ethiopia, Vietnam, Tanzania and Mexico.

NICFI also has a successful partnership with **Brazil** which is its largest recipient of REDD+ funding. From 2008-2017, NICFI has supported Brazil to reduce its annual average deforestation in the Amazon by almost 65 percent compared to 1996-2005. This is the largest cut in greenhouse gas emissions the world has witnessed over the past decade. NICFI has disbursed 8,3 billion NOK¹² (i.e. approximately 827'000'000 €) to the Amazon Fund (between 2006 and 2017). During the climate summit (COP21) in Paris on November 2015 the Governments of Brazil and Norway announced that they will continue the fight against deforestation in Brazil through the extension of their climate and forest partnership until 2020.

¹¹ <http://www.fao.org/gfoi/news-events/news/detail/en/c/1200315/>

¹² Norway government, payments to the Amazon fund, read online on December 2019: <https://www.regjeringen.no/en/topics/climate-and-environment/climate/climate-and-forest-initiative/kos-innsikt/brazil-and-the-amazon-fund/id734166/?expand=factbox2621141>

NICFI also supports the **Congo Basin** for the reduction of deforestation through different initiatives. The largest one is the Central African Forest Initiative (CAFI), joined by Norway as donor in September 2015. In April 2016, the CAFI Executive Board and the Minister of Finance of the Democratic Republic of Congo signed a letter of intent (LOI) of 200 million USD to address deforestation and forest degradation in the country and to promote sustainable development. This LOI is the first signed between CAFI and a country of the Central Africa region, and the largest one ever concluded on REDD+ in Africa. In September 2019, an historic 150 million USD agreement was announced between Gabon and Norway via the CAFI. For the first time, an African country will be rewarded in a 10-year deal for both reducing its greenhouse gas emissions from deforestation and degradation, and absorptions of carbon dioxide by natural forests. The partnership provides Gabon with a major incentive for cutting greenhouse gases by setting a carbon price floor at 10 USD per certified ton¹³.

Table 16: Description of NICFI initiative.

Name of the initiative	Norway's International Climate and Forest Initiative (NICFI)
Point of Contact	Ellen Bruzelius Backer, Policy Director – Environmental Integrity, The Government of Norway's International Climate and Forest Initiative, Norwegian Ministry of Climate and Environment, Chair of the GFOI Leads Group
Initiative starting date	2008
Initiative ending date	While the initiative was originally thought to last until 2020, the Norwegian government has since promised to extend it through 2030 ¹⁴
Geographical area of action	11 countries: Colombia, Ecuador, Peru, Guyana, Brazil, Liberia, DR Congo, Ethiopia, Myanmar, Indonesia, Vietnam.
Objectives	Reducing deforestation is an important instrument to achieve the objectives of the Paris Agreement. After ten years of concerted efforts, Norway now aims to focus on countries with large tropical forests and countries proving results. Norway has so far supported efforts to reduce deforestation in more than 70 countries. 11 countries are part of the 2016-2020 portfolio.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Working closely with partner countries, multilateral channels, civil society and indigenous peoples through a number of activities.
Project funding volume	Norway's Prime Minister Jens Stoltenberg announced at the UNFCCC Climate Change Summit COP13 (on December 2007)

¹³ CAFI online, read on November 2019 : <https://www.cafi.org/content/cafi/en/home/all-news/gabon--first-in-africa-to-receiving-payments-for-preserved-rainf.html>

¹⁴ NORAD online, read on November 2019: <https://norad.no/en/front/thematic-areas/climate-change-and-environment/norways-international-climate-and-forest-initiative-nicfi/norways-international-climate-and-forest-initiative/>

	that Norway would allocate up to 3 billion NOK ¹⁵ (i.e. approximately 300'000'000€) annually to reduce deforestation. To this end, the Government of Norway's International Climate and Forest Initiative works closely with committed developing countries, multilateral organizations and banks, and civil society.
Other comment	/
Outputs	The outputs of the programme correspond to the success of its objectives.

3.3.1.13 USAID

Source:

<https://www.usaid.gov/what-we-do>

Interview/meeting with Evan Notman Senior Forest and Climate Change Specialist - Sustainable Landscapes team lead, USAID, as part of the interview/meeting during GFOI Leads Teleconference, 20.01.2021. See Section 3.3.3.3 and Annexe 6 for details.

USAID is the world's premier international development agency and a catalytic actor driving development results. USAID's work advances U.S. national security and economic prosperity, demonstrates American generosity, and promotes a path to recipient self-reliance and resilience. The purpose of foreign aid should be ending the need for its existence, and providing development assistance to help partner countries on their own development journey to self-reliance – looking at ways to help lift lives, build communities, and establish self-sufficiency. USAID demonstrates America's good will around the world; increases global stability by addressing the root causes of violence; opens new markets and generates opportunity for trade; creates innovative solutions for once unsolvable development challenges; saves lives; and advances democracy, governance, and peace.

Julianne Aukema from USAID is the SilvaCarbon Steering Committee Co-Chair, and in this capacity, supports and participates in GFOI activities. Links between USAID and REDDCopernicus can therefore be achieved as for the other GFOI partners/leads. One other relevant project from USAID is the Sustainable Landscapes initiative (Table 17). Direct discussion with USAID on how they may like to contribute to a future Service Component will be pursued during the last year of the project as opportunities arise.

Table 17: Description of Sustainable: Sustainable Landscapes initiative.

Name of the initiative	Sustainable Landscapes (SL)
Point of Contact	Julianne Aukema, USAID, SilvaCarbon Steering Committee Co-Chair
Initiative starting date	Not known
Initiative ending date	Not known
Geographical area of action	Global

¹⁵ NORAD online, read on November 2019 : <https://norad.no/en/front/thematic-areas/climate-change-and-environment/norways-international-climate-and-forest-initiative-nicfi/norways-international-climate-and-forest-initiative/>

Objectives	<p>The land use sector—including deforestation and the degradation of forest—accounts for one-quarter of global greenhouse gas emissions. Agriculture is the major driver of deforestation, resulting in direct emissions from on-farm practices, as well as indirect emissions from land use conversion. Human well-being and sustainable development are underpinned by well-managed lands and natural resources. Thus, Sustainable Landscapes programmes focus on places where forest carbon storage is high and where risk of deforestation may be great. Indeed, guiding the evolution of broad landscape mosaics is integral to a country’s holistic low emissions development.</p> <p>USAID supports activities that reduce land-based emissions—from mangroves, to savannas, to agricultural fields. Partnering with governments, USAID is assisting in planning and implementing policies to address drivers of land-based emissions. By building capacity for rigorous, transparent monitoring of forest and carbon stocks, USAID supports REDD+ project development. Other activities work to identify better practices and on-the-ground opportunities for low-emissions agriculture.</p> <p>https://www.climatelinks.org/sustainable-landscapes</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Providing direct technical assistance to countries, and support for low emission sustainable land -use practices.
Project funding volume	USD 15 Million
Other comment	
Outputs	Various

3.3.2 Technical and Scientific Organizations

3.3.2.1 CIFOR – ICRAF

Sources:

<https://www.cifor.org/about-cifor/>

<http://www.worldagroforestry.org/about>

Questionnaire (as part of WP1) from Niki De Sy and Amy Duchelle (CIFOR) received on 16.09.2020.

The Center for International Forestry Research (CIFOR) is a non-profit, scientific institution that conducts research on the most pressing challenges of forest and landscape management around the world. Using a global, multidisciplinary approach, they aim to improve human well-being, protect the environment, and increase equity. To do so, CIFOR conducts innovative research, develops partners’ capacity, and actively engages in dialogue with all stakeholders to inform policies and practices that affect forests and people. One of the major programmes at CIFOR is the Global Comparative Study on REDD+ (Table 18).

World Agroforestry (ICRAF) is a center of science and development excellence that harnesses the benefits of trees for people and the environment. Leveraging the world’s largest repository of agroforestry science and information, they develop knowledge practices, from farmers’ fields to the

global sphere, to ensure food security and environmental sustainability. ICRAF is the only institution that does globally significant agroforestry research in and for all of the developing tropics. Knowledge produced by ICRAF enables governments, development agencies and farmers to utilize the power of trees to make farming and livelihoods more environmentally, socially and economically sustainable at scales. One of the relevant initiatives of ICRAF is the ASB Partnership for Tropical Forest Margins (Table 19).

Table 18: Description of Global Comparative Study on REDD+.

Name of the initiative	Global Comparative Study on REDD+ (GCS REDD+)
Point of Contact	Niki De Sy, postdoctoral researcher at Wageningen University, as part of CIFOR's global comparative study on REDD+. Amy Duchelle, CIFOR.
Initiative starting date	2016 (current phase)
Initiative ending date	2020 (fourth phase envisioned for 2021-2025, pending funding)
Geographical area of action	Global
Objectives	The Global Comparative Study on REDD+ (GCS REDD+) builds on more than two decades of CIFOR research efforts to understand the causes of deforestation and forest degradation, and the analysis of effectiveness, efficiency and equity of policies related to forests and climate change. The first phase focused on design issues and aimed to build strong research-based knowledge. The second phase generated new knowledge to inform and facilitate process of transformational change within the REDD+ policy arena and worked to understand performance of REDD+ policy processes, measures and practices. The project is now in its third phase, which supports REDD+ decision makers by assessing REDD+ impact and providing critical analysis of REDD+ in terms of effectiveness, efficiency and equity (3Es). A fourth phase is envisioned for 2021-2025, which includes a focus on achieving transparency and accountability in forest and land use monitoring, and developing a deforestation and forest degradation diagnostic framework and policy scenarios in six priority countries. https://www.cifor.org/gcs/about-gcs-redd/
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Providing information (technical assessments etc.) on performance of REDD+ etc. Knowledge sharing through dissemination of research findings and broad stakeholder engagement is a Core Component of the initiative.
Project funding volume	Approximately 10,400,000 EURO (100,000,000 NOK)
Other comment	
Outputs	Largely policy briefs, books and scientific journal articles.

Table 19: Description of the ASB Partnership for Tropical Forest Margins Initiative.

Name of the initiative	ASB Partnership for Tropical Forest Margins
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Point of Contact	Peter Minang, Science Domain Leader, Environmental Services at the World Agroforestry Centre (ICRAF) and the ASB Partnership for the Tropical Forest Margins Meine van Noordwijk, Chief Science Advisor at ICRAF
Initiative starting date	Established in 1994 as "Alternatives to Slash-and-Burn". Since 2008 ASB has evolved to the "Partnership of the Tropical Forest Margins"
Initiative ending date	Not known
Geographical area of action	Global
Objectives	<p>The ASB Partnership is comprised of a multi-disciplinary, cross-sectoral team of public institutions, NGOs, Universities, national and international organisations and local communities. The partnership uses a participatory approach in which local ecological knowledge is integrated with science to test the practicality of established conventional theories and seek livelihood alternatives that enhance wellbeing and environmental conservation.</p> <p>Current research is focused on reducing greenhouse gas emissions from land use change, such as deforestation and agricultural expansion, while enhancing potential for people to improve their livelihoods and the local resource base on which they depend. ASB is working at the interface of science and policy, evaluating how international-level agreements can be translated into appropriate policies and incentives to change behaviour on the ground.</p> <p>https://www.asb.cgiar.org/page/partnership</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	It is a global network and focuses on building close relationships with research and development partners to produce multidisciplinary research teams. Communication and dissemination activities are part of the impact strategy.
Project funding volume	Not known
Other comment	
Outputs	Varied

CIFOR is well placed to provide feedback on proposed Service Component and its definition. For CIFOR as users, an important consideration for the Service is to provide on the one hand standardization of certain services and products (e.g use of IPCC categories) so that reporting according to international requirement is easier (e.g. PA, GHG inventories). On the other hand, services or products with more flexibility are needed for more local (e.g. subnational and national) monitoring needs. This is also important for innovation and research. In addition to access to products, availability on processing services (e.g. via SEPAL) is important.

In addition, through the GCS REDD+ and there is a potential for the dissemination of Core Service Components. CIFOR has links with a number of countries and have headquarters in Bogor, Indonesia, with offices in Nairobi, Kenya; Yaounde, Cameroon; Lima, Peru and Bonn, Germany, so can be useful partners in regional activities. CIFOR could be a partner for capacity building activities around the Service, as they work closely with local to national stakeholders on building forest monitoring

capacities. This includes topics such as transparent monitoring, REDD+ impact assessments, support for national forest monitoring and improving emission factors for the land use sector, and the construction of land use policy scenarios.

3.3.2.2 JPL

Sources:

<https://www.jpl.nasa.gov/about/>

<https://science.jpl.nasa.gov/EarthScience/CarbonCycleEcosystems/index.cfm>

The Jet Propulsion Laboratory (JPL) is an American research facility that carries out robotic space and Earth science missions. JPL helped open the Space Age by developing America's first Earth-orbiting science satellite, creating the first successful interplanetary spacecraft, and sending robotic missions to study all the planets in the solar system as well as asteroids, comets and Earth's moon. In addition to its missions, JPL developed and manages NASA's Deep Space Network, a worldwide system of antennas that communicates with interplanetary spacecraft. JPL is a federally funded research and development center managed for NASA by California Institute of Technology (Caltech). From the long history of leaders drawn from the university's faculty to joint programmes and appointments, JPL's intellectual environment and identity are profoundly shaped by its role as part of Caltech.

JPL Research areas include studying the nature of the Martian surface, the causes and mitigation of ozone depletion and global warming in Earth's atmosphere, the search for life in and the nature and evolution of the universe - all vital issues related to NASA's mission. Scientists in the Division conduct theoretical and experimental studies leading to new missions. They are engaged in the development of new instrumentation and in the analysis of data, publishing new scientific knowledge, and in the communication of that knowledge to the general public.

One of the areas of research conducted is the Earth Science, which includes a group on the Carbon Cycle and Ecosystems. The Carbon Cycle and Ecosystems Focus Area includes the following programs: (i) Terrestrial Ecology, (ii) Ocean Biology and Biogeochemistry, (iii) Land Cover/ Land Use Change; (iv) Biological Diversity; and Ecological Forecasting and Water Resources (part of the Applied Sciences Program). Their overarching science goal is to detect and predict changes in Earth's ecosystems and biogeochemical cycles, including land cover, biological diversity, and the global carbon cycle. There are studying LCLUC and the Terrestrial ecology, both using remote sensing data, which could be of interest in the context of REDD+ future Service. However, direct discussions with JPL on how they may like to contribute to a future Service Component have not yet taken place but will be pursued during the last year of the project as opportunities arise.

3.3.2.3 UMD

Source:

<https://glad.umd.edu/projects/global-forest-watch>

The Global Land Analysis and Discovery laboratory within the University of Maryland is led by Prof. M. Hansen. One of the main projects is to develop global tree cover change data products based on Landsat satellite imagery, which will be available for display and download on the Global Forest Watch web platform.

The forest change data production, led by M. Hansen has been instrumental in demonstrating the value of globally produced forest status and change datasets. These datasets are hosted on WRI's Global Forest Watch web platform (Table 20).

As part of GFOI's Early Warning collaboration, Mikaela Weisse from WRI participates in GFOI activities and has been leading this aspect of GFOI's work for a number of years. As such Mikaela is aware of the REDDCopernicus project, and also participated in the two stakeholder surveys for Deliverable 1.1 and 2.2 of this project, as well as the stakeholder workshop (Deliverable 2.1 of this project). We have therefore had the opportunity to know how REDDCopernicus would fit in with WRI's activities, and these findings have been elaborated in those deliverables.

Table 20: Description of the Global Forest Change Dataset Initiative.

Name of the initiative	Hansen global forest change dataset
Point of Contact	Mikaela Weisse, Manager and lead of GFW's strategy and partnerships for satellite-based forest monitoring Matthew Hansen, Professor of Remote Sensing, Department of Geographical Sciences, University of Maryland
Initiative starting date	The dataset provides historical data from 2000, the initiative was launched in 2013.
Initiative ending date	Not known
Geographical area of action	Global
Objectives	Results from time-series analysis of Landsat images characterizing forest extent and change.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	GFW platform
Project funding volume	Not known
Other comment	
Outputs	Global data products on forest status and change.

3.3.2.4 VTT

Sources:

<https://www.vttresearch.com/>

<https://f-tep.com/>

Interview/meeting with Jukka Miettinen, VTT, on the 22.07.2020

VTT Technical Research Centre of Finland Ltd is a state owned and controlled non-profit limited liability company established by law and operating under the ownership steering of the Finnish Ministry of Employment and the Economy. VTT is a Research and Technology Organization (RTO) whose activities are focused on three areas: Knowledge intensive products and services, Smart industry and energy systems, and Solutions for natural resources and environment. The Remote Sensing team on VTT has internationally recognized expertise in forestry/land cover applications, winter navigation, traffic monitoring, forest fire detection as well as cloud based EO data processing and analysis. VTT has a staff of over 2000 people. VTT is ranked among the leading European RTOs.

The VTT Remote Sensing team has extensive knowledge of all aspects of the Copernicus programme and long history of involvement in its development. VTT is currently involved in the REDDCopernicus project, with its main focus on the European Sustainable Forest Management (SFM) monitoring components of the project. Examples of former cooperation include e.g. the FP7 NorthState project (Enabling Intelligent Copernicus Services for Carbon and Water Balance Modeling of Northern Forest Ecosystems) and the GIO Land project (GMES Initial Operations 2011-2013 Land Monitoring Services).

The VTT remote sensing team involved in the REDDCopernicus will be in a good position to provide feedback on the proposed Service components and participate in their design. Through the Forestry Thematic Exploitation Platform (Table 21), VTT will also have the capability to participate in the dissemination and further processing of the Core Service components, making them available and easily usable for users on the online platform.

Furthermore, the Forestry TEP platform is well suited for development, offering and marketing of Copernicus Downstream services developed by either VTT or third parties. The Forestry TEP platform is specifically designed as application platform, and its main source of data is Copernicus satellite data and Core services. The platform can also be used for capacity building in the context of REDD+ and sustainable forest management. Although not financially, VTT will be able to support enhancement of Service components on the Forestry TEP platform or utilization of the platform for capacity building purposes.

Table 21: Description of Forestry Thematic Exploitation Platform (F-TEP).

Name of the initiative	Forestry Thematic Exploitation Platform (F-TEP)
Point of Contact	Dr. Jukka Miettinen, Senior Scientist, VTT
Initiative starting date	2015
Initiative ending date	n.a.
Geographical area of action	Global
Objectives	<p>The Forestry Thematic Exploitation Platform (Forestry TEP) was originally set up in a project commissioned by the European Space Agency (ESA), as one of several TEP platforms to facilitate more effective use of Copernicus and other data in support of forest ecosystem monitoring and sustainable forest management. The platform is operated by VTT Technical Research Centre of Finland Ltd., in cooperation with CGI in UK and it currently runs on one of the Copernicus Data and Information Access Services (namely CREODIAS).</p> <p>Forestry TEP aims to offer a platform for commercial, governmental and research users in the forestry sector globally to efficiently access satellite data based processing services and tools for generating value-added information products. It can be applied to conduct all types of REDD+ and forest monitoring related remote sensing-based processing and analysis. It allows users to use existing processing services or create and implement their own algorithms for any task, utilizing the datasets available in DIAS, or uploaded by the user. In addition to the graphical user interface, it can be accessed automatically by other systems through WMS/WFS and REST API access points.</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Online platform (https://f-tep.com/). Currently (Dec 2020) free of charge. Pricing scheme in preparation.
Project funding volume	The platform is still partially funded by ESA, with the goal of becoming fully self-sustained within a few years.
Other comment	n.a.

Outputs	Enables users to create their outputs on the platform. These outputs can be further processed on the platform or downloaded to users' own computers.
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3.3.2.5 JAXA

Sources:

https://www.eorc.jaxa.jp/ALOS/en/kyoto/kyoto_index.htm

Interview/meeting with Dr. Takeo Tadono and Dr. Osamu Ochiai, JAXA EORC, 21.07.2020

The Japan Aerospace Exploration Agency (JAXA) is responsible for the Japanese government's overall aerospace development and utilization. JAXA conducts integrated operations from basic research and development, to utilization. The ALOS Kyoto & Carbon (K&C) Initiative is an international collaborative research project led by JAXA Earth Observation Research Center (EORC) since 2001 (Table 22). The project focuses on defining and optimizing provision of data products and validated thematic information derived from in-situ and satellite sensor data, in particular L-band radar data. In the studies conducted under the Kyoto & Carbon Initiative, methods utilizing a combination of JAXA and Copernicus data for tropical forest and land cover classification have been developed. A key source of JAXA satellite data for the Kyoto & Carbon Initiative is the ALOS/ALOS2 programme (Table 23), which provides for example the yearly L-band mosaic.

Table 22: Description of Kyoto & Carbon Initiative

Name of the initiative	Kyoto and Carbon Initiative
Point of Contact	Dr. Takeo Tadano, Manager of ALOS series satellites research programme, Earth Observation Research Center (EORC), JAXA
Initiative starting date	2001
Initiative ending date	n.a.
Geographical area of action	Global
Objectives	The ALOS K&C Initiative is set out to support explicit and implicit data and information needs raised by international environmental Conventions, Carbon Cycle Science, Climate Change and Conservation of the environment - referred to as the "4 Cs".
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Main point of information and deliverables is the Kyoto & Carbon initiative website: https://www.eorc.jaxa.jp/ALOS/en/top/kyoto_top.htm Results are also disseminated through scientific publications.
Project funding volume	Funded by JAXA
Other comment	
Outputs	Scientific Reports

Table 23: Description of ALOS/ ALOS-2 PALSAR/ PALSAR-2 programmes.

Name of the initiative	ALOS/ALOS-2 PALSAR/PALSAR-2 programmes
Point of Contact	Dr. Takeo Tadano, Manager of ALOS series satellites research programme, Earth Observation Research Center (EORC), JAXA
Initiative starting date	2007
Initiative ending date	n.a.
Geographical area of action	Global
Objectives	<p>The Advanced Land Observing Satellite-2 (ALOS-2, "DAICHI-2") programme continues the legacy of the ALOS-1 programme. The ALOS-2 has improved capabilities in order to further fulfill social needs. These social needs include: 1) Disaster monitoring of damage areas, both in considerable detail, and when these areas may be large 2) Continuous updating of data archives related to national land and infrastructure information 3) Effective monitoring of cultivated areas 4) Global monitoring of tropical rain forests to identify carbon sinks.</p> <p>Among other datasets, PALSAR/PALSAR-2 mosaic images in 25 m spatial resolution are provided yearly for the entire globe. These products are supported by a forest/non-forest mask derived from the mosaic products. The mosaics (and forest/non-forest maps) are currently available for years 2007-2010 and 2015-2018, with continuation of the time series expected. The yearly mosaics and forest/non-forest maps are free of charge.</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	ALOS/ALOS-2 dataset homepage: https://www.eorc.jaxa.jp/ALOS/en/dataset/dataset_index.htm
Project funding volume	Funded by Japan government
Other comment	<p>There are plans to be released the whole PALSAR data and the ScanSAR mode data of PALSAR-2 free of charge from 2020 onwards.</p> <p>The successor SAR mission ALOS-4 launch is planned for Japanese fiscal year 2021 (i.e. 1.4.2021-31.3.2022)</p>
Outputs	PALSAR/PALSAR-2 data; Yearly 25 m mosaics; Yearly forest/non-forest masks

Dr. Takeo Tadono and Dr. Osamu Ochiai were interviewed during the second year of the project (21.07.2020) to provide their feedback on the different topics mentioned in section 3.2. Dr. Takeo Tadano is the Manager of ALOS series satellites research programme, Earth Observation Research Center (EORC), while Dr. Osamu Ochiai is an Associate Senior Administrator and the GFOI contact point in JAXA.

JAXA has good knowledge of the history, current status and future plans of the Copernicus programme. This is particularly the case for the Copernicus space Component, with a long history of cooperation between JAXA and ESA. The two organizations recently (2018) reviewed and confirmed their continued cooperation. The cooperation includes e.g. a commitment to providing data to help tackle global environmental issues. JAXA's ALOS/PALSAR (2006-2011) and ALOS-2/PALSAR-2 (2014-present) are contributing missions to Copernicus space Component. JAXA also collaborates in the European Space Agency Climate Change Initiative (CCI), in the development of biomass mapping approaches utilizing a combination of JAXA and ESA satellite data.

Since 2001, Earth Observation Research Center (EORC), JAXA, has been leading the ALOS Kyoto & Carbon Initiative (Table 22), an international collaborative research project focusing on defining and optimizing provision of data products and validated thematic information derived from in-situ and satellite sensor data, in particular L-band radar data. In the studies conducted under the Kyoto & Carbon Initiative, methods utilizing a combination of JAXA and Copernicus data for tropical forest and land cover classification have been developed.

Dr. Takeo Tadono from the Earth Observation Research Center (EORC), JAXA, would be interested to be kept updated on any plans for proposed new Copernicus services, and can provide unofficial feedback in case the services are closely related to their own activities. Through the ALOS/ALOS-2 programme (Table 23), JAXA provides L-band SAR data mosaics on a yearly basis, covering the entire globe. These products are accompanied with forest/non-forest mask and historical datasets (e.g. from ALOS and JERS missions) that complement existing and future Copernicus Core products in environmental monitoring and thereby contribute to the use of Copernicus Core services as well. The products are disseminated online on their dedicated website, separately from Copernicus products.

JAXA is not in a position to provide financial support for Copernicus Service Component enhancement. However, it is interested in the future Copernicus products and the possibility to use them in combination with JAXA's own products in environmental monitoring and related capacity building activities. JAXA has interest in estimating the global forest biomass and its temporal-, annual-, decadal-changes to contribute a forest management as well as global climate issues, and is therefore seeking international collaborators. The Kyoto & Carbon Initiative will continue to explore combined utilization of JAXA and Copernicus datasets. The future Copernicus REDD+ Service would provide valuable new input into this combined use of datasets.

3.3.3 International Initiatives and NGOs

3.3.3.1 CI

Sources:

[Interview with Alex Zvoleff, Senior Director of Data Science for Conservation International's Betty and Gordon Moore Center for Science, 11.09.2020](#)

<https://www.conservation.org/about>

Conservation International works to spotlight and secure the critical benefits that nature provides to humanity. Since inception, they have helped to protect more than 6 million square kilometers (2.3 million square miles) of land and sea across more than 70 countries. Currently CI has offices in 29 countries and 2,000 partners worldwide.

In the context of the Trends.Earth tool, CI would be interested as a user of the proposed products in the Core Service. Trends.Earth has been highlighted as a relevant initiative, as this supports countries at the national level to monitor SDG target 15.3 (specifically indicator SDG 15.3.1 Proportion of land that is degraded over total land area). As a technical organization, proposed products such as global analysis ready data would be well used. CI has a focus on forest restoration, alerting systems to identify illegal logging and fire monitoring. In addition, products such as new land cover maps, if they are to be part of a Service can also potentially be integrated into the Trends.Earth tool. Another opportunity to promote ant Core products through CI would be to incorporate any relevant products in <https://www.resilienceatlas.org/>.

Table 24: Description of Trends.Earth.

Name of the initiative	Trends.Earth
Point of Contact	Alex Zvoleff, Senior Director of Data Science for Conservation International's Betty and Gordon Moore Center for Science
Initiative starting date	Not known
Initiative ending date	Not known
Geographical area of action	Global
Objectives	Trends.Earth (formerly the Land Degradation Monitoring Toolbox) is a tool for monitoring changes in productivity, land cover, and soil organic carbon. The tool supports monitoring land degradation for reporting to GEF, UNCCD and SDG target 15.3, Land Degradation Neutrality (LDN)
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Free and open source toolbox which is an add-on to ArcGIS
Project funding volume	
Other comment	
Outputs	Toolbox for land degradation monitoring.

3.3.3.2 EarthWorm

Source:

<https://www.earthworm.org/our-story>

Earthworm Foundation (formerly known as The Forest Trust – TFT until 2019) has 20 years of experience in finding solutions to the major social and environmental problems that the world is facing today. Earthworm Foundation is a non-profit organization built on values and driven by the desire to positively impact the relationship between people and nature. With most of the staff operating directly on the ground where the issues are, Earthworm works with members and partners to make value chains an engine of prosperity for communities and ecosystems.

TFT foundation was created in 1999. In 2004, TFT began working with Congolaise Industrielle des Bois (CIB) in the Congo basin, one of Africa's largest timber companies, and got a 450000 ha concession certified by 2006 shortly after. The foundation also supported CIB to improve their relationship with semi-nomadic Pygmy communities who lived in forests the company managed. The Pygmy communities mapped out their lands using GPS trackers. Community members walked through their territory, highlighting important areas and plotting them in the hand-held devices.

In 2010, prompted by a damaging campaign by Greenpeace linking their suppliers with deforestation, Nestlé began to work with TFT to transform their palm oil supply chain, committing to no deforestation, leading to dozens of similar commitments of other companies. Golden Agri-Resources (GAR) soon joined as well, launching their own transformation journey. Then, in 2011, along with Greenpeace and GAR, TFT designed the **High Carbon Stock Approach** (HCS Approach), a clear methodology to identify forest in need of preservation. In 2016, the Satellite technology joined the fight against deforestation when TFT and Airbus launch a monitoring service called Starling, engineered to help companies protect forest areas and react to deforestation quickly. These two last points are important in

the context of REDDCopernicus programme, showing that Earthworm is an important foundation in the FM EO sector, and could be a strong asset to the development of the future Service by exchanging tools/methods for example and supporting REDDCopernicus project. HCS method is a key tool in the FM sector, and is described further in the Table 25.

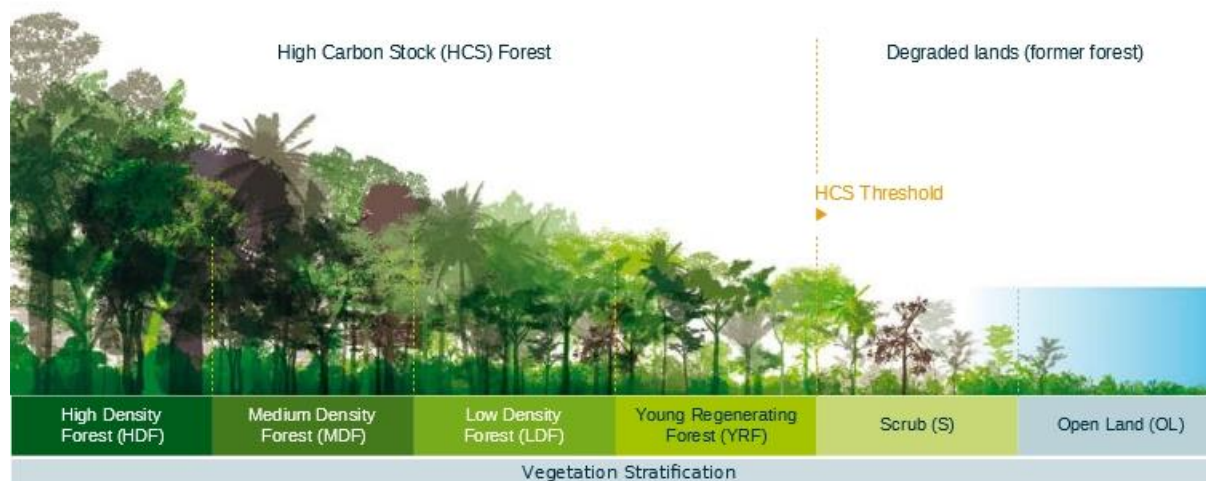


Figure 4: Identifying HCS forest: Vegetation stratification in Tropical forests (Rosoman et al., 2017)

Direct discussions with Earthworm on how they may like to contribute to a future Service Component have not yet taken place but will be pursued during the last year of the project as opportunities arise. However, HCS initiative and the Earthworm foundation could certainly provide a support regarding their activities.

Table 25: Description of the HCS Approach.

Name of the initiative	High Carbon Stock Approach (HCS Approach)
Point of Contact	http://highcarbonstock.org/
Initiative starting date	2011: TFT designed with Greenpeace and GAR the HCS Approach. April 2015: first version of the HCS Approach Toolkit released. May 2017: The HCS Approach Toolkit Version 2.0: Putting No Deforestation into Practice released.
Initiative ending date	Not known
Geographical area of action	Global
Objectives	The HCS Approach is a methodology that distinguishes forest areas for protection from degraded lands with low carbon and biodiversity values that may be developed. The methodology was developed with the aim to ensure a practical, transparent, robust, and scientifically credible approach that is widely accepted to implement commitments to halt deforestation in the tropics, while ensuring the rights and livelihoods of local peoples are respected. The amount of carbon and biodiversity stored within an area of land varies according to the type of vegetative cover. The HCS Approach stratifies the vegetation in an area of land into six different classes using analyses of satellite data and ground

	<p>survey measurements. These six classes are: High Density Forest, Medium Density Forest, Low Density Forest, Young Regenerating Forest, Scrub, and Cleared/ Open Land. The first four classes are considered potential High Carbon Stock forests.</p> <p>The HCS Approach is a breakthrough for plantation companies and manufacturers who are committed to breaking the link between deforestation and land development in their operations and supply chains. It is a relatively simple tool that plantation companies can use for new developments while ensuring that forests are protected from conversion. Identification of HCS forests can also help governments fulfil commitments to reduce greenhouse gas emissions resulting from deforestation because it allows the mapping of forest areas that should be conserved (thus preventing GHG emissions).</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Methodology. HCS resource site www.highcarbonstock.org .
Project funding volume	n.a.
Other comment	Hundreds of major brands, commodity traders, manufacturers, plantation companies, banks and investors have made No Deforestation commitments, and many have already agreed to protect High Conservation Value (HCV) areas.
Outputs	n.a.

3.3.3.3 GFOI

Sources:

<http://www.fao.org/gfoi/overview/leads-group/en/>

Interview/meeting during GFOI Leads Teleconference, see Annexe 6 for list of participants, 20.01.2021. Tom Harvey and Sarah Maulo from the GFOI office were present.

GFOI is a partnership of many organizations which are also addressed separately in this deliverable (see sections 3.3.1.2, 3.3.1.3, 3.3.1.4, 3.3.1.5, 3.3.1.12, 3.3.1.13 for partner contributions to GFOI) and is a key stakeholder for REDDCopernicus. As a network of organizations, it is a key partner for dissemination and promotion of Core Services. This network, and the GFOI office, can also provide feedback on the proposed Services.

GFOI also has a number of initiatives which are relevant in the context of REDDCopernicus. These include the Methods and Guidance Document (see Table 26) and Research and Development Coordination Component¹⁶ (led by WU) activities (see Table 27). These activities work to provide guidance which could support the use of Core products in practice.

¹⁶ <http://www.fao.org/gfoi/components/research-and-development-coordination/en/>

One relevant principle which GFOI promotes, is the need to avoid replication of work, but to build on existing progress. As part of this, integration with platforms such as SEPAL¹⁷ would be crucial. Other efforts to build upon would be the forthcoming MRV Time platform which is in development at the time of writing. This platform aims to provide clear links between relevant REDD+ MRV actions (*i.e.* those described in REDDCompass¹⁸), and available tools, data and products which can support those actions.

Table 26: Description of the GFOI MGD.

Name of the initiative	Global Forest Observations Initiative (GFOI) Methods and Guidance Document
Point of Contact	Tom Harvey, Manager, Global Forest Observations Initiative Office
Initiative starting date	2014 (V1 publication date)
Initiative ending date	Ongoing, V3 published 2020
Geographical area of action	Global, with a focus on REDD+ countries
Objectives	<p>The MGD provides user-friendly guidance for linking UNFCCC decisions related to REDD+ Measurement, Reporting, and Verification (MRV) with IPCC guidance, since in general, the IPCC guidelines and guidance do not identify REDD+ activities. Specifically, advice is presented on the production of reliable, replicable estimates on change in forest cover and associated emissions for reporting on international agreements, based on the accumulated experience of the joint use of remotely sensed and ground-based data.</p> <p>The MGD is updated periodically by the authors under the guidance of the MGD Advisory Board.</p> <p>https://www.reddcompass.org/download-the-mgd</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	The MGD itself can be downloaded through the links on the GFOI website.
Project funding volume	Not known
Other comment	/
Outputs	Updates of the MGD and interim guidance published as Rapid Response Modules

¹⁷ <https://sepal.io/>

¹⁸ www.reddcompass.org

Table 27: Description of the GFOI R&D activities.

Name of the initiative	Global Forest Observations Initiative (GFOI) Research and Development Coordination Component (GFOI R&D) activities
Point of Contact	Martin Herold and Sarah Carter, Managers of the GFOI R&D Coordination Component Tom Harvey, Manager, Global Forest Observations Initiative Office
Initiative starting date	Approx. 2014
Initiative ending date	Ongoing
Geographical area of action	Global, with a focus on REDD+ countries
Objectives	The GFOI R&D Coordination Component works to address methodological and technical issues that are obstacles to progress in developing countries' forest monitoring and GHG accounting efforts. The Component fosters a community of experts to identify science and technologies that can reduce uncertainties and improve the efficiency of forest monitoring efforts; thus addressing unmet country needs.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Regular expert meetings are held, and the group meets during the annual GFOI Plenaries where the priority research list are updated, priority topics are addressed, and new relevant research promoted.
Project funding volume	Currently 0. Previously this was funded by ESA.
Other comment	/
Outputs	Guidance on R&D topics, list of R&D priority topics, contributions to MGD and other GFOI activities.

GFOI is guided by a Leads Group which functions as a quasi-board for the Initiative. They consult frequently with one another and make decisions by consensus. The leads set the direction of GFOI, and also ensure that their organization actively participates in GFOI activities. During a GFOI Leads meeting early 2021, the REDDCopernicus project was presented, and feedback on technical and organizational aspects of the proposed Service Component as well as an indication of willingness to participate in coordination of a Service Component was sought. Representatives from all lead organizations were present: governments of Australia, Germany, Norway, the United Kingdom and the United States, the international Committee on Earth Observation Satellites (CEOS), the European Space Agency (ESA), the Food and Agriculture Organization of the United Nations (FAO), and the World Bank.

In general, the Leads representatives were very interested and would like to be kept updated about progress within REDDCopernicus, with many organizations already engaged in the project through participation in WP2. They are happy to provide feedback on the proposed Service Component, and to be engaged should it be developed. The need to avoid overlap of efforts (a key part of the GFOI ethos) was highlighted, and the potential to integrate existing tools (such as SNAP), and to make use of existing platforms (i.e. SEPAL) was suggested. The organization of a workshop for WP10 of REDDCopernicus as part of GFOI activities was agreed.

Evolving requirements for carbon offsetting, as well as EU policy requirements were noted, and a system which works to support transparent assessments and also third party verification was proposed.

Further meetings with GFOI and REDDCopernicus was suggested, and will be organized before the end of the project.

Minutes from the Leads meeting can be found in Annexe 6.

3.3.3.4 WRI

Source:

<https://www.wri.org/our-work>

Questionnaire (as part of WP1) filled out by Mikaela Weisse, GFW, 28.08.2020

The World Resources Institute (WRI) is a global research organization that spans more than 60 countries, with offices in the United States, China, India, Brazil, Indonesia and more. More than 1,000 experts and staff work closely with leaders to turn big ideas into action to sustain WRI natural resources—the foundation of economic opportunity and human well-being. WRI work focuses on seven critical issues at the intersection of environment and development: climate, energy, food, forests, water, cities and the ocean. WRI is currently the host of the Global Forest Watch platform (Table 28). See also section 3.3.2.3 (UMD).

Table 28: Description of the Global Forest Watch Initiative (GFW).

Name of the initiative	Global Forest Watch (GFW)
Point of Contact	Mikaela Weisse, Manager and lead of GFW's strategy and partnerships for satellite-based forest monitoring
Initiative starting date	1997
Initiative ending date	Ongoing
Geographical area of action	Global
Objectives	Global Forest Watch (GFW) is an online platform that provides data and tools for monitoring forests. By harnessing cutting-edge technology, GFW allows anyone to access near real-time information about where and how forests are changing around the world. GFW is a means for the public to access data, not create their own data (a data repository/portal). Data in the platform includes forest cover, loss and gain, and a Landsat-based alert system for tree cover loss (GLAD Alerts), among others.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Interactive platform, plus capacity building activities
Project funding volume	Funding in excess of 1.5 Million EUR
Other comment	Information was derived from Capacities questionnaire (see WP2 of this project)
Outputs	Platform to make forest change data accessible Development of Geospatial Product(s)

Mikaela Weisse¹⁹, manager and lead of GFW's strategy and partnerships for satellite-based forest monitoring was contacted and provided the following feedback.

WRI is well placed to provide further feedback on the potential Service design as well as on preliminary/completed potential products.

In terms of disseminating any Service Components, depending on the scope, quality, added value, and relevance of products created through REDDCopernicus, they may want to share them through the Global Forest Watch platform to their over 3 million unique users. GFW has the capacity to display spatial data, derive statistics at a variety of levels, provide email subscriptions to new changes, and include data in their offline mobile application. Specific requests for data inclusion outside the normal scope of GFW would require additional funding. Utilising this platform rather than developing a competing tool should be considered for the Service.

In terms of enhancing the Service Component, if products are added to the Global Forest Watch platform, WRI will be able to provide some amount of capacity building and training materials for users. For funding of Core components, there is Potential for co-funding of certain products depending on shared priorities. For example, Global Forest Watch has already provided funding for WU to develop RADAR-based alerts²⁰, which could be built upon as part of this Service. Though note that GFW is not a funder – rather they fundraise for products from other donors.

3.3.3.5 FAO/UN-REDD

Following sources were used:

Websites:

<https://www.un-redd.org/>

Literature:

Lujan, B., Silva-Chávez; Braña-Varela, J., Meyer, C., Schaap, B., García-Espinosa, M. and Krilasevic, E. (2018). Mapping Forest Finance. A Landscape of Available Sources of Finance for REDD+ and Climate Action in Forests. Environmental Defense Fund, report available online at: edf.org/mappingforestfinance.

The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) was launched in 2008 and builds on the convening capacity and technical expertise of the FAO, UNDP, and UNEP. The overall goal is to reduce forest emissions and enhance carbon stocks in forests while contributing to national sustainable development. Over 60 partner countries from Africa, Asia-Pacific, Latin America participate in the Programme (Table 29).

UN-REDD supports partner countries through:

- Direct support to the design and implementation of National REDD+ Programmes;
- Complementary tailored support to national REDD+ actions; and
- Technical capacity building support through sharing of expertise, common approaches, analyses, methodologies, tools, data, best practices, and facilitated South-South knowledge sharing.

The UN-REDD Programme depends entirely on voluntary funds. Donor countries include the European Commission and the governments of Denmark, Japan, Luxembourg, Norway, Spain, and Switzerland with Norway providing a significant portion of the funds. Donor support to the UN-REDD Programme total more than 280 million US Dollar.

¹⁹ <https://www.wri.org/profile/mikaela-weisse>

²⁰ <https://gena.users.earthengine.app/view/raddalert>

Direct discussions with FAO/UN-REDD on how they may like to contribute to a future Service Component have not yet taken place and will be pursued during the last year of the project as opportunities arise.

Table 29: Partner countries (65) participating in the UN-REDD Programme.

Africa (28)	Asia-Pacific (20)	Latin America and the Caribbean (17)
Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Guinea Bissau, Kenya, Liberia, Madagascar, Malawi, Morocco, Nigeria, South Sudan, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe	Bangladesh, Bhutan, Cambodia, Fiji, India, Indonesia, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Vanuatu, Viet Nam	Argentina, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, Surinam

Table 30: Description of the UN-REDD Programme.

Name of the initiative	The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD)
Point of Contact	<i>Contact:</i> Dr. Inge Jonckheere, Team leader Satellite Land Monitoring Systems, Remote Sensing & Earth Observation, NFM Team, Forestry Dept <i>Website:</i> https://www.un-redd.org/
Initiative starting date	2008
Initiative ending date	ongoing
Geographical area of action	<i>Scale:</i> National 65 partner countries from Africa, Asia-Pacific, Latin America participate in the Programme.
Objectives	The UN-REDD Programme supports nationally led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples, and other forest-dependent communities, in the implementation of REDD+ activities agreed under the UNFCCC.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	<i>Website:</i> https://www.un-redd.org/ http://www.fao.org/redd/initiatives/un-redd/en/ https://www.mm.undp.org/content/myanmar/en/home/projects/un-redd.html https://www.unenvironment.org/explore-topics/climate-change/what-we-do/redd

<p>Project funding volume</p>	<p><i>Type:</i> Public-multilateral <i>Funding Mechanism:</i> Grants <i>Current Funding:</i> more than 280 million US Dollar <i>Administrative Organisations:</i> FAO, UNDP, and UNEP</p>
<p>Other comment</p>	<p><i>Access:</i> Countries can receive direct support, but the majority of activities are executed through the UN agency offices in the countries. Current UN-REDD country programmes are being financed for a set of activities, but no new country programmes are anticipated to be financed in the future. However, countries can request targeted funding for one or a small set of activities to support one part or multiple parts of their readiness programmes.</p> <p><i>Challenges:</i> One challenge that has been cited is that there is a lack of clear guidance regarding country and activity selection under this mechanism. As a result, interested countries may not be aware of all requirements. Improving transparency could help increase the effectiveness of the UN-REDD Programme.</p>
<p>Outputs</p>	<p>UN-REDD supports partner countries through:</p> <ul style="list-style-type: none"> • Direct support to the design and implementation of National REDD+ Programmes; • Complementary tailored support to national REDD+ actions; and • Technical capacity building support through sharing of expertise, common approaches, analyses, methodologies, tools, data, best practices, and facilitating South-South knowledge sharing.

3.3.3.6 Greenpeace

Source:

<https://www.greenpeace.fr/connaitre-greenpeace/mission/>

Interview/meeting with Adrien Corvisy, Greenpeace France, on the 04.02.2021

Greenpeace is an international network of independent organizations that act according to the principles of non-violence to protect the environment, biodiversity and promote peace. It is based on a movement of committed citizens to build a sustainable and equitable world. Greenpeace is present in 55 countries, on all continents and oceans through its 28 national and regional offices and three boats. It has more than three million members and more than 36,000 volunteers worldwide. Greenpeace goal is to ensure the ability of the earth to nurture life in all its diversity, though the protection of biodiversity in all its forms, the prevention of pollution and abuse of the earth's ocean, land, air and fresh water, the ending of all nuclear threats and though the promotion of peace, global disarmament and non-violence.

Greenpeace is important to contact in the context of REDDCopernicus project because they are well known by the public, and are involved in many environmental fields, including the forest sector though many actions (e.g. "save the Amazon", "Forest are life"), press articles, publications/reports and stories.

In early 2019²¹, Greenpeace wrote to more than 50 companies asking them to demonstrate their progress towards ending deforestation by disclosing their commodity suppliers. Of the handful that did disclose the information, all source from traders or producers linked to forest destruction, no company was able to demonstrate meaningful effort to end links to deforestation.

One of the important actions leads by Greenpeace, together with Earthworm and Golden Agri-Resources (GAR), is the creation of the HCV Approach, which is already described in section 3.3.3.2.

Adrien Corvisy which is GIS Specialist in the Greenpeace France Office since 2015, works on many different thematic such as air quality, agriculture/alimentation, but also forest monitoring. He was interviewed during the second year of the project (04.02.2021) to provide his feedback on the different topics listed in section 3.2, and any additional comment he may have about the presentation of the future Service. He has himself a good knowledge of Copernicus Programme and use regularly Sentinel data, but emphasized that Greenpeace is currently developing its GIS competence in Europe and thus, he would say that his close colleagues do not know very well about this Programme since they have not this GIS competence. However, he mentioned that the Greenpeace Russia office has the lead of this competence in the Organization. In terms of interactions, he indicated that he has already used the datasets provided though the Programme and illustrated by listing projects²² in which he used the Copernicus datasets e.g. monitoring of deforestation in specific African countries. They were also planning to use the Copernicus data to monitor Methane emissions for their works.

Mr. Corvisy was enthusiastic on the fact that the Service will be long-term released and added that Greenpeace could give feedbacks in order to share its technical needs but those feedbacks could not be used as a support for any commercial product or political goal. Still, he added that it is always good for Greenpeace to know what is ongoing in the sector. On the potential for Greenpeace to disseminate the Core Service Components to its contacts and through its work, he said that if the future Service is relevant for their purposes, he will, as he does for other relevant materials available on the web, share it to the Global Mapping Hub of Greenpeace. However, Greenpeace would not be in a position to provide a financial support to enhance the Service Component. Indeed, since they are totally independent, free from any economic or political power as the organization is totally financed by private individuals and any link with an external initiative is delicate because of political/economical/ethical aspects.

Additionally to the points raised during the guided interview, other comments were provided by Mr. Corvisy, and are useful for the implementation of the project and the future Service. The fact that the products will be updated regularly is a good point, as well as the fact that it will be long term released. In terms of technical aspects, it was asked whether SAR sensors will be used or not for the production of deforestation alerting system data especially for cloudy geographical areas. It was explained that Greenpeace uses known datasets for forest monitoring, however, because of the heterogeneity of the accuracy and unclear definitions of the products provided, the use of some of these is prescribed for certain geographic areas. Regarding to this need, the future Service will provide added value because of the provision of validated data with accuracy figures, delivered with clear technical specifications and fully transparent.

The minutes of the meeting can be found in Annexe 7.

²¹ Press release dated 11/06/2019, online access on December 2019:

<https://www.greenpeace.org/international/press-release/22287/50-million-hectares-destroyed-as-companies-disregard-zero-deforestation-pledge/>

²² <https://www.greenpeace.org/static/planet4-africa-stateless/2018/10/2be53e67-2be53e67-greenpeace-africa-sudcam-report-2018-fr.pdf>

https://cdn.greenpeace.fr/site/uploads/2020/09/Cartographie_autonomie_prot%C3%A9g%C3%A9e_Land-use.pdf?_ga=2.139009265.315575687.1600764033-1903021749.1535444981

<https://maps.greenpeace.org/project/>

3.3.3.7 Forest Certification Initiatives

Sources:

<https://fsc.org/en>

<https://pefc.fi/english/>

Interview/meeting with Andrés Felipe Ramírez (FSC) and Franck Trolliet (FSC), on the 04.11.2020.

Forest certification is a mechanism for tracing and labelling timber, wood and pulp products and non-wood forest products, where the quality of forest management is evaluated using a set of standards. This is relevant to REDDCopernicus in that companies wanting to green their supply chain will require monitoring to ensure that certification can be obtained and maintained. The Forest Stewardship Council (FSC, see Table 31) and the Programme for the Endorsement of Forest Certification (PEFC, see Table 32) are two major examples. FSC was interviewed for this document, while PEFC has earlier participated in project by completing the Stakeholder Survey on the Potential Copernicus Forest Monitoring and REDD+ Service Component (see D1.1 of this project) in an interview session.

Forest Stewardship Council

Andrés Felipe Ramírez and Franck Trolliet from the Forest Stewardship Council (FSC) were interviewed during the second year of the project (04.11.2020) to provide his feedback on the different topics mentioned in section 3.2. Andrés Felipe Ramírez is a Geospatial Information Manager and Franck Trolliet is an Evaluation & Learning Officer.

The Forest Stewardship Council (FSC) is well aware of the Copernicus programme and its various product components, ranging from European high-resolution layers to the global products. However, the current specifications of the available products do not provide sufficient temporal frequency and/or thematic accuracy for FSC purposes.

Currently, the only Copernicus data/product FSC is using in their operations is Sentinel-2 imagery. But FSC maintains updated knowledge on EU (and numerous other) ongoing EO programmes, always observing what is available and whether it would fit their needs. This is to ensure that FSC uses optimal approaches for its activities. On a wider perspective, they also monitor European policies affecting certification operations (like the European Green Deal in general), to ensure that the definitions and requirements align with other major initiatives.

The FSC team would like to have more detailed information and examples of the suggested Copernicus REDD+ Component products. They would be willing to provide unofficial feedback on whether the planned products meet the needs of FSC, or what should be changed in order to make the products more useful for their purposes.

FSC is not in a position to disseminate products through their platforms but would essentially disseminate awareness of the Copernicus REDD+ Service and products if it started using them in the future in their operations. Whether this will happen, will not only depend on the usability of the Copernicus REDD+ Service, but also the availability of products from other providers. Overall, the FSC is interested in the planned Copernicus REDD+ Service and it can be regarded as a potential future user of the products and tools, to support their operations related to forest certification.

Table 31: Description of FSC GIS and Earth Observation development.

Name of the initiative	FSC GIS and Earth Observation development
Point of Contact	Andrés Felipe Ramírez, GIS and Earth Observation Officer
Initiative starting date	
Initiative ending date	n.a.
Geographical area of action	Global

Objectives	The objective of the GIS and Earth observation system development in FSC is to allow certificate bodies to guide auditing operations looking at the compliance to certification standards on the ground. The initiative is building an internal GIS portal (currently based on Sentinel-2 and Landsat 8 imagery). The system is directed to auditors and it currently detects changes on the ground using vegetation indices, to be verified by field visits. In the future, the idea is to implement new algorithms and models directly addressing compliance to certification standards. But the development is time consuming and demanding. This is why potential usable products from other providers (e.g. on tree cover density, biomass, carbon, disturbance) could be integrated into the system.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Internal FSC platform
Project funding volume	Not known
Other comment	
Outputs	Internal FSC products supporting auditing operations on the ground

Programme for the Endorsement of Forest Certification

Table 32: Description of the Programme for the Endorsement of Forest Certification.

Name of the initiative	Programme for the Endorsement of Forest Certification (PEFC)
Point of Contact	Auvo Kaivola, National Secretary, PEFC Finland
Initiative starting date	1999
Initiative ending date	n.a.
Geographical area of action	Global
Objectives	<p>PEFC is an umbrella organization, endorse national forest certification systems that have been developed through multi-stakeholder processes and tailored to local priorities and conditions.</p> <p>PEFC works throughout the entire forest supply chain to promote good practice in the forest and to ensure that forest-based products are produced with respect for the highest ecological, social and ethical standards.</p>
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	They act as a forest certification organization, both for supply chain companies and forest owners. Additionally, certification and accreditation bodies can carry out the certification.

Project funding volume	Not known
Other comment	
Outputs	Standards development, Certification of forests.

3.3.3.8 SilvaCarbon

Sources:

Indirect discussion with Sylvia Wilson from SilvaCarbon, as part of the interview/meeting during GFOI Leads Teleconference, 20.01.2021. See Section 3.3.3.3 and Annexe 6 for details.

SilvaCarbon (Table 33) co-leads (together with FAO) the capacity building Component of GFOI. In that respect, they can contribute to and have been informed about REDDCopernicus at GFOI events, as with the other GFOI partners. SilvaCarbon have provided information during the design of the project, as they responded to the Stakeholder Survey on the Potential Copernicus Forest Monitoring and REDD+ Service Component (see D1.1 of this project). Direct discussion with SilvaCarbon will be pursued during the last year of the project as opportunities arise.

Table 33: Description of SilvaCarbon.

Name of the initiative	Strengthening Capacity Worldwide for Forest and Landscape Monitoring (SilvaCarbon)
Point of Contact	Silvia Wilson, Physical Scientist, USGS, GFOI Capacity Building Component Co-Lead
Initiative starting date	Not known
Initiative ending date	Not known
Geographical area of action	Global scope, but with a focus on tropical forested countries. Current focal countries are Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Colombia, Ecuador, Peru, Bangladesh, Cambodia, Indonesia, Laos, Nepal, Philippines, Thailand, Vietnam, Cameroon, Republic of Congo, Democratic Republic of Congo
Objectives	SilvaCarbon is an interagency technical cooperation programme of the US Government to enhance the capacity of selected tropical countries to measure, monitor, and report on carbon in their forests and other lands. Drawing on expertise and resources from multiple US Government agencies and partners, the programme provides targeted technical support to countries in the process of developing and implementing national forest and landscape monitoring systems. SilvaCarbon leverages state-of-the-art science and technology to advance the generation and use of improved information related to forest and terrestrial carbon. https://www.silvacarbon.org/
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	SilvaCarbon supports national forest and landscape monitoring efforts in partner countries by working directly with in-country technical teams and programme leaders, identifying and disseminating good practices and cost-effective technologies,

	and facilitating technical cooperation at national, regional, and international levels.
Project funding volume	Not known
Other comment	
Outputs	Various

3.3.3.9 UNFCCC

Sources:

<https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>

<https://unfccc.int/about-us/about-the-secretariat>

Interview with Jenny Wong, UNFCCC, on 22.09.2020. Jenny Wong is the Programme Officer, for the Mitigation, Data and Analysis Programme of the UNFCCC Secretariat.

The United Nations Framework Convention on Climate Change (UNFCCC) entered into force on 21 March 1994. Today, it has near-universal membership. The 197 countries that have ratified the Convention are called Parties to the Convention. The UNFCCC secretariat (UN Climate Change) was established in 1992, and focuses largely on facilitating the intergovernmental climate change negotiations and provides technical expertise and assists in the analysis and review of climate change information reported by Parties and in the implementation of the Kyoto mechanisms.

Reporting for the AFOLU sector (Table 34) the most relevant for REDDCopernicus, where Services could potentially support related monitoring activities. As a Secretariat, UNFCCC does not have direct interaction with activities, however they welcome all support to increase the quality and transparency of reporting to its frameworks. Lack of coordination between agencies supporting forest monitoring is a concern, with institutional arrangements needing to link national forest monitoring systems to international processes. Capacity challenges exist and have been identified by UNFCCC and impact the quality of reporting. A Service Component which could support this process, by providing data and guidance to countries would be a positive outcome. An important consideration for a Service Component would be to reach not just the national decision makers, but also the technical experts who are working directly with the data. Since other donors are also supporting countries (i.e. JICA), the support from a European Service Component should be adding value to these existing efforts. In addition to data provision, a Service Component should be provided alongside guidance on issues such as correct application of stratified area estimation to derive statistics from the map. UNFCCC welcomed the potential of data which was free and sustainable in the long term, and would thus be a relevant support for reporting timeframes. One specific data need mentioned was emissions factor data, not just for the AGB pool, but other pools. Reporting challenges related to forest monitoring which were identified through the technical reviews are described in Section 2.3 of D10.1.

The REDD+ Web Platform²³ would be a potential dissemination outlet for any REDD+ Copernicus Services.

Table 34: Description of AFOLU

Name of the initiative	Agriculture, Forestry and Other Land Use (AFOLU)
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²³ <https://redd.unfccc.int/>

Point of Contact	Jenny Wong, Mitigation, Data and Analysis Programme, UNFCCC Secretariat
Initiative starting date	n.a.
Initiative ending date	n.a.
Geographical area of action	Global
Objectives	AFOLU is responsible for just under a quarter of anthropogenic GHG emissions. This includes human activities related to land use (LULUCF), and forest change (REDD+). The UNFCCC support a number of activities related to land use.
Method of dissemination (platform, activities / interventions, and capacity building / outreach)	Conference of the Parties (COP) and the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) through their permanent subsidiary bodies, i.e. Subsidiary Body for Scientific and Technological Advice (SBSTA) and Subsidiary Body for Implementation (SBI).
Project funding volume	n.a.
Other comment	
Outputs	Activities to reduce emissions in the land sector.

3.3.3.10 WWF

Source:

<https://www.worldwildlife.org/initiatives/forests>

Interview/meeting with Naikoa Aguilar-Amuchastegui, WWF USA, on the 27.01.2021

WWF is a non-governmental organization founded in 1961 by the British Julian Huxley. The organization has five million donors worldwide, and its operational network extends to 100 different countries. WWF was originally the acronym for World Wide Fund, but changed its name in 1986 to World Wide Fund for Nature. As its name suggests, WWF is committed to the protection and conservation of the environment in the broadest sense. The NGO's work is based on a scientific and human approach to preserving biodiversity, monitoring species conservation and setting up missions to reduce human impact on the environment. WWF work focused globally, at every level around six key areas: forests, marine, freshwater, wildlife, food and climate. In the **forest sector**, WWF is acting in many different ways:

- **Influence funding:** WWF seeks to close the gap between how much is available for forest conservation and how much is needed. WWF helped create multi-million-dollar funds to properly manage forests that are designated as protected. The funding is to train park officials about responsible forest management, buy satellite GPS collars to monitor and track endangered wildlife, and more. WWF also support REDD+ initiative. Most of WWF's work is being done in tropical rain forests, which are the most biologically diverse and complex forests on Earth—forests in the Amazon, the Congo Basin, the Greater Mekong and other regions near the equator. But it also is taking place in temperate regions, such as the Russian Far East and the United States.
- **Influence policies:** WWF helps countries assess the value of their natural resources and the services they provide, such as forests that absorb carbon and provide habitat for endangered wildlife. Decision makers use the assessments in a variety of ways, including promoting a green

economy approach—one in which the sustainable use of natural capital is integrated into a country's new plans and policies for the economy, agriculture, energy and more.

- **Stop Illegal and Unsustainable Logging:** WWF works to strengthen the US government's ability to prosecute illegal timber cases; stop illegal logging in countries that export high volumes of timber; ensure full implementation of the Lacey Act, a US law that prohibits illegal timber and timber products from entering the US market; and design rural energy programmes that rely on fuels other than firewood.
- **Motivate the Marketplace:** Through its Global Forest & Trade Network, WWF helps US companies source products from responsibly managed forests, particularly those certified by the Forest Stewardship Council (FSC). WWF also encourages them to invest directly in increasing the acreage of responsibly-managed working forest and to help increase the demand for FSC-certified products.

Though the actions led in its forest area sector, and its ability to engage stakeholders—in business, civil society, and academia—in partnerships to devise innovative solutions to the issues WWF defends, WWF is an important stakeholder to interact with in the context of REDDCopernicus future project. Naikoa Aguilar-Amuchastegui from WWF USA was identified as point of contact to discuss on how WWF may like to contribute to a future Service Component.

Naikoa Aguilar-Amuchastegui is Senior Director in Carbon Forest domain in WWF (USA). He has been working for 10 years on REDD+ in WWF network and is involved in the discussions about the Forest Monitoring. Its role is to transfer the scientific knowledge to the decision-makers. Mr. Aguilar-Amuchastegui was interviewed during the second year of the project (27.01.2021) to provide his feedback on the different topics mentioned in section 3.2, and any additional comment he may have about the presentation of the future Service. He indicated that WWF is aware about the Copernicus Program, however, beyond the use Sentinel data, WWF has no real interaction with the Programme (maybe its WWF European colleagues have more interactions). WWF would be interested to provide feedbacks on the proposed Service Component and its definition especially from the user's point of view because their teams are interested in using the data and doing the analysis, then to add conservation and social aspects on it. A second type of use envisaged would be the applied research to solve specific questions e.g. identification of oil palm plantation which is one of the first driver of deforestation. WWF could contribute/disseminate Core Service Components through its activities. In terms of possibility to fund the Service, Mr. Aguilar-Amuchastegui said that indeed, the alternatives to participate to the processes could be explored and that it can be possible to see if there are funding opportunities. It is possible to already contact the global scientific team from WWF once the Consortium share the projects objectives and examples of what could be provided under this Service. WWF would be interested also to foster the Core Service into Downstream activities, since they are used to support countries for the production of forest cover using countries definition. It would be possible to participate through the provision of capacity building, since WWF is used to provide such capacity building to countries so they can use the data themselves (this point of the uptake by the tropical countries was also raised during other meetings).

Additionally to the points raised during the guided interview, other comments were provided by WWF, which are useful for the implementation of the project and the future Service. In terms of technical aspects, WWF asked whether the Service will make use of the advantage of combining optical and SAR sensors. S1 images combined with optical products are used for WWF work (e.g. oil palm plantation monitoring), and methods that could be used for the production of the Service already exists. It was also mentioned that despite the interest of SAR sensor, one of the main challenges in its use is that there is a common difficulty to access to pre-processed images and then to make mosaics of S1 to work together with S2 or other optical data (e.g. from SPOT). Another technical point required that is not solved currently is the height measurement of trees. In terms of collaborative framework with the future Service, it is important to make it clear what kind of feedback/collaboration including participation in funding the Consortium would like to get with WWF. With the BOHN challenge business, a lot of companies are coming to work with WWF and it could offer a lot of opportunities.

The minutes of the meeting can be found in Annexe 8.

4 Feedback on Initial Concept of Copernicus REDD+ and FM Service

This chapter covers the main findings on the initial design for the future Service from the collection of feedbacks obtained both during the guided interviews conducted until the end of the second year of the project and which are presented in section 3; and during the workshops held in tropical countries as webinar during the second year of the project.

Firstly, the outcomes from the guided interviews conducted so far are discussed in section 4.1. This section will be updated and finalized at the end of the project, once all the guided interviews will have been made. Then, section 4.2 synthesis the feedbacks from the participants to the workshops sessions during which the future Service was presented as part of WP4.

As the deliverable 5 is planned to be delivered in three versions, section 4 will be finalized in D5.3.

4.1 Potential Collaborative Framework with International Initiatives

At the current stage of the project (beginning of year 3), a dozen of guided interviews, homogeneously distributed among the 3 groups of stakeholders considered (see section 3.3 and Table 35 below) have been conducted. Additionally to these specific dedicated meetings, despite the fact that year 2020 was not the most suitable to meet persons during external events due to the Covid-19 crisis, some indirect discussions with a number of the international initiatives were possible though events e.g. GFOI Leads Teleconference (see section 3.3.3.3). Nevertheless, it is planned that direct discussions with the other international initiatives not yet directly interviewed will be pursued during the last year of the project as opportunities arise, and that all of the feedbacks and the final conclusion will be included in the final version of this document.

The Table 35 below summarizes the status of the discussion reached with each of the International Initiatives.

Table 35: Synthesis on the status of the contacts made up to end of year 2 of the project.

Type of International Initiative	International Initiative	Point(s) of contact for the discussion / status
Group1: Financiers, Donors and Development Agencies	AFD	<i>Indirect discussion with A. Guingand</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	AusAID	<i>Indirect discussions with Niki Fitzgerald, Australian Government (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	DFID	Direct discussion will be pursued during the last year of the project as opportunities arise.
	BEIS	<i>Indirect discussion with F. Stringer & R. Flint (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	WB - FCPF	Andres Espejo & Marco Van den Linden <i>Additionally indirect discussion with A. Espejo (though GFOI Leads Teleconference)</i>
	GEF	Tuukka Castrén

	GCF	Juan Chang
	IKI/BMU	Direct discussion will be pursued during the last year of the project as opportunities arise.
	JICA	Direct discussion will be pursued during the last year of the project as opportunities arise.
	KFW	T. Schoenfeld, K. Koehnlein, S. Schopferer, & J. Schielein <i>Indirect discussion with K. Kallweit (though GFOI Leads Teleconference)</i>
	NORAD - NICFI	<i>Indirect discussion with E. Bruzelius Backer (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	USAID	<i>Indirect discussion with E. Notman (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	WB	Though FCPF and GEF
Group2: Technical and Scientific Organizations	CIFOR & ICRAF	Niki De Sy & Amy Duchelle
	JPL	Direct discussion will be pursued during the last year of the project as opportunities arise.
	UMD	Direct discussion will be pursued during the last year of the project as opportunities arise.
	VTT	Jukka Miettinen
	JAXA	Dr. Takeo Tadono & Dr. Osamu Ochiai <i>Additionally, indirect discussion with O. Ochiai (though GFOI Leads Teleconference)</i>
Group3: International Initiatives and NGOs	CI	Alex Zvoleff
	Earthworm	Direct discussion will be pursued during the last year of the project as opportunities arise.
	GFOI	See Annexe 6 for list of participants of the GFOI Leads Teleconference
	WRI	Mikaella Weisse
	FAO/UN-REDD	<i>Indirect discussion with J. Fox (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.
	Greenpeace	Adrien Corvisy
	FSC	Andrés Felipe Ramírez & Franck Trolliet
SilvaCarbon	<i>Indirect discussion with S. Wilson (though GFOI Leads Teleconference)</i> Direct discussion will be pursued during the last year of the project as opportunities arise.	

	UNFCCC	Jenny Wong
	WWF	Naikoa Aguilar-Amuchastegui

The sections below provide a synthesis of the feedbacks obtained so far during the guided interviews, and provide an initial insight on a potential collaborative framework with international initiatives.

This potential collaborative framework will be deeper analysed into the final version of the deliverable at the end of the project.

4.1.1 Financiers, Donors and Development Agencies

Among the stakeholders interviewed belonging to the Financiers, Donors and Development Agencies group, only a few are familiar with the Copernicus Programme, and interactions with this Programme or with any European activity are limited to the knowledge and use of Sentinel data. However, on the question of the potential for provision of feedback on the proposed Service Component and its definition, all interviewees found the Service to be promising and therefore indicated that they would like to be kept informed about the project evolution and provide their feedbacks on it. The same enthusiasm has been expressed from all respondents in relation to the potential for contributing/ disseminating Core Service Components. Regarding the interest/ willingness to provide financial support to enhance the Service Component, it was asked if there could be any mechanisms through which they could finance the Service (Core or Downstream) in case the budget was too short to fund activities that may be of interest for their works, or if any lack of budget would be restrictive for some products from the Service. All the respondents indicated that they see the interest of the future Service in relation to their activities into the Downstream sector since many of them had been involved in the countries to support local counterparts for their uptake of EO data related activities and would either see Downstream services financing or support for Downstream capacity building activities.

The meetings conducted so far were fruitful and provided to the consortium valuable insights. In terms of main outcomes emerging from this group of stakeholders, it was indicated that the future Service will allow not to initiate a work from scratch in the countries that are supported thanks to the provision of the Core products. This item of the uptake of EO data and methodologies from the local tropical stakeholders was raised several times during the interviews and is an objective for many of the stakeholders from this group, indicating that any tools / products / Service that allow the countries uptake of EO data is warmly welcomed. Additionally, they indicate that the provision of accuracy figures is important to provide added value on the Service compared to what is already existing, and that it is also important to get high accuracy in the products from the Service. When supporting countries with capacity building activities, one of the issues faced is the issue of ownership of the data from the local stakeholders which are rather reluctant to provide the data before they find kind any forms of added value in the Service/product facilitating their work on their forest policies.

Technical elements were also mentioned from some of these stakeholders: the lack of solution existing globally to deal with the issues of measurement of forest regrowth and also with the identification of the drivers of the forest cover loss or forest degradation, e.g. distinguishing illegal deforestation from managed forest.

4.1.2 Technical and Scientific Organizations

Almost all the stakeholders belonging to the technical and scientific organisations group are familiar with the Copernicus Programme and interact with European activities, in addition to using the Sentinel data. On the question of the potential for provision of feedback on the proposed Service Component and its definition, all interviewees would like to be kept informed about the project evolution and provide their feedbacks on it. The same enthusiasm has been expressed from almost all respondents in relation to the potential for contributing/ disseminating Core Service Components. Some would agree to distribute the products on their platforms, while others would rather raise awareness about the Service through their networks. Regarding the interest/ willingness to provide financial support to enhance the Service Component, it was asked if there could be any mechanisms through which they could finance

the Service (Core or Downstream) in case the budget was too short to fund activities that may be of interest for their works, or if any lack of budget would be restrictive for some products from the Service. Almost all respondents indicated that they cannot finance the Service. However, all the respondents indicated that they would be interested to support Downstream and capacity building activities, at least technically.

Additionally to the points raised by the stakeholders belonging to the Financiers, Donors and Development Agencies group, the stakeholders from Technical and Scientific Organizations group indicated that it will be interesting to analyse the possibility to use the products from the future Core Service Component with other ancillary data. The principle of transparency that is foreseen for the Service, additionally with a provision of clear definition each of the products are important aspects of the future Service is also valuable for the persons interviewed.

4.1.3 International Initiatives and NGOs

All the points of contact from this group are familiar with the Copernicus Programme and almost all interact with European activities, in addition to using the Sentinel data. All interviewees would like to be kept informed about the project evolution and provide their feedbacks on it. The same enthusiasm has been expressed from all respondents in relation to the potential for contributing/ disseminating Core Service Components. Some of them indicated that even if it is up to the countries to decide at the end what data to use, they can still indicate that the Service exists if they think it is useful, and at least talk about the Service during any internal meetings they could have. This is an important point raised since many of the International Initiatives have many desks worldwide. Identically to the group from the previous section, some initiatives would agree to distribute the products from the future Service on their platforms if they find these accurate for their purposes, while others would rather raise awareness about the Service through their networks. Regarding the interest / willingness to provide financial support to enhance the Service Component, it was asked if there could be any mechanisms through which they could finance the Service (Core or Downstream) in case the budget was too short to fund activities that may be of interest for their works, or if any lack of budget would be restrictive for some products from the Service. Almost all respondents indicated that they cannot finance the Service. Some of the persons indicated that it would be possible to decide through the provision of concrete cases which would demonstrate the utility of the Service. However, all the respondents indicated that they would be interested to support Downstream and capacity building activities, at least technically.

The meetings conducted so far with the stakeholders from this group also provided to the consortium valuable insights. The respondents were positive about the future Service and look forward to being able to use it. The fact that the project will be funded by European Member States (MS) is seen as a valuable point for a number of the respondents which see in this type of financing as a solution to avoid a number of conflicts of interest and providing credibility to the Service. Again mentioned, the principle of transparency that is foreseen for the Service, additionally with a provision of clear definition for each of the products, as well as the sustainability of the Service are important aspects of the future Service and warmly welcomed. Another organisational aspect identified and mentioned is the current lack of coordination between agencies supporting forest monitoring, with institutional arrangements needing to link national forest monitoring systems to international processes. It was also reported that there are capacity challenges existing which impact the quality of FM policy reporting. In this regard, it would be appreciable that the Service Component could support the process of reporting by providing data and guidance to countries (e.g. such as correct application of stratified area estimation to derive statistics from the map). Another important consideration for the Service Component would be to reach not just the national decision makers, but also the technical experts who are working directly with the data.

There were also some very specific technical comments. The integration of optical and SAR data streams in the product generation was also welcomed e.g. in the alerting system foreseen for the Service. However, at least one of the interviewees questioned if Sentinel 1 processed mosaics could be added in addition to the Sentinel 2 mosaics to facilitate the use of Sentinel 1 with analysis ready data. It was also mentioned that despite the interest of SAR sensor, one of the main challenges in its use is that there is a common difficulty to access to pre-processed images and then to make mosaics of S1 to work together with S2 or other optical data (e.g. from SPOT). The lack of solution existing globally to deal with the

issues of measurement of forest regrowth and tree height and also with the identification of the drivers of the forest cover loss or forest degradation, e.g. distinguishing illegal deforestation from managed forest were also raised several times. One specific data need mentioned was emissions factor data, not just for the AGB pool, but also for other pools.

4.2 Feedbacks on Learning Exercises

The User participation during the webinars was very active and Users provided appropriate and constructive feedback through the online expert questionnaire. In total, 48 questionnaires were collected, which corresponds to 71% of the 67 participants attending the workshops. As the number of institutions per region was comparable, a geographical bias of the User feedback (related to differing number of participants) could be neglected for the analysis. Moreover, different groups of Users were successfully reached with 79% from national institutes and 21% from regional centres. The analysis of User feedback revealed an important endorsement (>75% of the Users) of the five presented concepts for REDD+/SFM monitoring. The main outcomes are summarized hereafter:

- **Concepts for analysis ready satellite data (Sentinel-2):** both, the concept of single-date imagery and the concept of image composites was considered to be of similarly high relevance. In regard to the specification of resolution, the 10 m spatial resolution and the 1-year composites were found sufficient. The most preferred spectral bands are the visible bands (blue, green, red) and Near-InfraRed (NIR) bands.
- **Concepts for assessment of tree/ forest cover status maps:** All three products (TCD, FTY and TMF-Status) were found relevant. In regard to the technical specifications, the 10 m spatial resolution was regarded as sufficient, and even the 30 m spatial resolution of TMF was considered as sufficient by half of the Users. The main requested improvement requested on all presented products is to enhance the thematic accuracy on seasonal/ dry forests.
- **Concepts for assessment of forest cover change maps:** Both products (TMF-Change and BFAST) were found relevant. In regard to the specifications, the 30 m spatial resolution of TMF was considered sufficient by half of the Users, while the other half would need a higher spatial resolution. The temporal resolution of one year was found sufficient. Similar to the tree/ forest cover status maps, the main requested improvement is to enhance the thematic accuracy on dry forests and forest-savannah mosaic landscapes.
- **Concepts for assessment of forest disturbance and alerting:** Both products (FCDM and BAYTS) were found relevant. For the specifications, the 10 m spatial resolution was considered sufficient, the one-year temporal resolution ample for annual monitoring reporting and the weekly temporal resolution satisfactory for disturbance alerting systems. The main requested improvement is the separation between different drivers of degradation, as well as a temporal differentiation of the signal. Furthermore, flexibility for the setting the parameters such as the analysis period and the detection sensitivity was requested.
- **Concepts for platform and Service solutions:** Both web- and desktop-based solutions were found relevant for the Users, with a slight preference for the cloud-based web-platform. Such a platform could be directly integrated into existing work practices or decision-making cycles of most Users. The desktop-based solution was considered a real advantage for countries with lowest (or not existing) internet bandwidth due to the possibility to work also offline. Service components expected by the Users in addition to standardized data products included mainly User configurable data products, but also standardized application workflows and User configurable toolbox workflows.

The overall review clearly showed the interest of the Users for all five concepts. The combination of Concepts 1 (image) and 5 (platform) was considered crucial by the Users to get ownership of the output of the process/ production and for setting their own thresholds (e.g. Minimum Mapping Unit). The Concepts 2 (status) and 3 (change) were identified as important by other Users to meet the direct needs of MRV systems and reporting. Finally, Concept 4 (disturbance and alerting) had lower priority as this kind of monitoring has to be performed after covering all other concepts. The main area of improvements requested by the Users for direct integration into their work is a better guidance of the datasets combination for REDD+ monitoring, and detailed documentation of each product. In regard to capacity

building, the main requirement was technology/ know-how transfer, followed by infrastructure and then long-term training. Funding would be requested mainly for capacity building, but also for product integration. Some Users would use the products as they are, whereas most of them would integrate the products at different levels within their national monitoring systems: for FM maps, for NRT forest disturbance monitoring system or for land use/ cover maps.

5 Conclusions

The first version of D5 provided the identification and description of relevant international initiatives with which it is crucial to interact as part of the project. Some initial contacts were made with a number of these Organisations / Initiatives during the first year of the project and were developed in the second year and reported in the current version of the document. These initiatives represent ways to disseminate outputs from a potential Service, the Downstream capacities (related tools / methods) to ensure uptake and correct use of Services, and support in terms of capacity building so that REDD+ countries in particular can benefit. Even though there are a large number of initiatives around REDD+, very few have access to the types of services and products that are being envisaged as part of the proposed REDD+ service component despite the need already expressed as part of WP1 for this type of products and services with level of operationalisation rendered possible through the Copernicus programme. There is also a known lack of coordination between agencies supporting FM which would require institutional arrangements to link national forest monitoring systems to international processes.

In this document, the feedbacks obtained from the participants to the workshops sessions held in the second half of 2020 as part of WP4 to showcase the initial design of the future Service are also synthesized, and the overall review clearly show the interest of the Users for all five concepts as proposed for the Core Service Component.

The feedback obtained so far from discussions with the international initiatives as part of WP5 show that they are all positive about the Service as presented during the discussions and that they find it useful for their activities, confirming the level of potential interest that was felt during the initial contacts made with some of them as part of D5.1. This can already be seen as a positive outcome of this WP5 at the end of the second year, and gives a first insight into a potential framework for collaboration with these initiatives. The questions asked during the guided interviews as listed in this document allow to determine whether the international initiatives would like to be kept up-to-date and disseminate the Service. A general outcome from all the discussions is that although stakeholders wish to be kept informed about the development of the Service, they frequently mention that to disseminate the Service to their networks they will need to see that it is useful and accurate for their purposes. In any case, these interviews provided many useful elements for the development of the project, which are synthesized below.

- The future Service will allow the international initiatives not to initiate a work from scratch in the countries they support, thanks to the provision of the Core products. This item of the uptake of EO data and methodologies from the local tropical stakeholders was raised several times during the interview and is an objective for many of the international initiatives, indicating that any tools/ products/ Service that allow the countries uptake of EO data is warmly welcomed;
- The project will be funded by European Member States (MS) which is a very valuable point for some of the respondents, avoiding a number of conflicts of interest and providing credibility to the Service;
- The principle of transparency that is foreseen for the Service, additionally with a provision of clear definition each of the products are important aspects of the future Service;
- The products will be provided with accuracy figures which is a real added value compared to other existing datasets. This is an important aspect, given the legal aspects of certain studies carried out in the forest sector;
- The sustainability of the Service is very valuable.

Finally, from the feedbacks obtained so far, it seems that there is a possibility to get a potential collaborative framework with the international initiatives and an endorsement of the concept by the end-users, either through the dissemination of the Service through their own networks, or in terms of support to the countries for the uptake of EO through funding/supporting of capacity building activities. The willingness to avoid duplication of work globally was also raised. However, despite their interests in the Service, almost all the stakeholders belonging to financiers, donors and development agencies group would rather provide funding of the Downstream activities, but not in the Core Service. In terms of collaborative framework with the future Service, it was also mentioned that the Service have to make it clear what kind of feedback/collaboration including participation in funding is expected from the international initiatives.

As a conclusion, the project is rather positive about a potential collaborative framework in the future with the organisations involved in the sector, and expect to get more positive feedbacks during the last year of the project.

6 References

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7 Annexes

Annexe 1: Meeting with WB for GEF – Minutes of meeting

Date: 04.02.2021 (virtual meeting)

Participants

- **WB:** Tuukka Castrén (TC) tcastren@worldbank.org
- **SIRS/CLS:** Christophe Sannier (CS), Justine Hugé (JH), Hervis Ghomsi (HG)

1. Introductions

Tuukka Castrén has been a senior forestry specialist in the World Bank based in Washington since 2008. He has worked mostly on issues related to forest governance, finance and use of ICT and other technology. He was member of the team managing the Program on Forests (PROFOR), a multi-donor trust fund housed at the World Bank. After that he worked on the World Bank's forest portfolio in the Europe and Central Asia Region – mainly in South Caucasus and Western Balkans before recently moving to the Eastern Africa unit. Mr. Castrén has been the task team leader for the Satellite Monitoring for Forest Management project since its inception.

Before joining the Bank, Mr. Castrén worked for the Ministry for Foreign Affairs in Finland as senior adviser for economic issues, private sector development and development policy. Prior to that, he worked for private forest consulting firm.

Mr. Castrén is a Finnish national and has university degrees in both forestry and economics from the University of Helsinki.

2. Objectives of the meeting

CS indicated that the current project which is an EU funded programme (Horizon2020 with a cycle of 7 years), aims to design a pan tropical REDD+ Service which can be used for NFMS. CS asked TC if he knows about Copernicus Programme.

- TC answered that he knows mostly about the Copernicus Programme through the availability of Sentinel data. He added that this – like all answers – is his own view, not the WBG view which is a big organization, and that we could have to ask to someone from the climate desk on this topic to get a better representational answer on many of the questions.

CS presented the Copernicus Programme and indicated that the project is trying to develop/interact with international organizations to shape up the future Service which should become operational by end of the year. CS added that the objective of this meeting is to present the future programme as envisaged and to see if WB would be interested and would like to provide feedback.

3. Presentation of REDDCopernicus Project and Technical Design

CS explained that one of the outcomes of the project is to define Core and Downstream services and gave the proposed definition of this topic.

TC asked to flag during the presentation where the Consortium would like WB to provide feedback or funding.

CS presented the project and explained that Europe already provides lot of support for REDD worldwide and that there is an increasing request to avoid importing goods coming from deforestation events, and at the same time, there are a lot a requirement from the tropical countries for their forest policies, and to monitor themselves their own forest. This is therefore natural that the Commission is considering a Copernicus Global Service for REDD+ and FM, and in this context the current project is a pre-cursor to such a programme and the whole idea is to develop Core services, free and open in terms of access.

CS added that the project is a H2020 project -research programme. The main objective is to define an end-to-end operational system for these FM activities. This is not just to focus on technical aspects, but also all what is around. This includes coordination with users, relevant stakeholders and many other aspects to design an operational Service. He said that the new funds have been improved, and the future

Service aims to be long time provided. He explained that GAF is coordinating the project and that the project will make recommendations to Commission on the design of such a Service. He indicated that the project involves a Consortium of partners coming from different domain, - JRC, VTT, WU and GAF which is the leader of the project as already mentioned.

CS said that the project entered in the third and final year. During the first year, there was mainly a focus on defining the user requirement /assessment and assessing overall capacities in the FM from EO domain, and the second year was to organize workshops in a number a country which would be the users of this type of system, finally provided in a virtual format due to the COVID-19 situation. CS said one of the objectives now is to get feedbacks on the initial design from international initiatives including WB.

CS continued the presentation with a detailed recall of the technical challenges met in FM from EO. He also presented what are the known solution to address these challenges. A reminder of challenges meets in REDD+ AD reporting was also done. CS explained that there was a workshop with many stakeholders held in Ispra (Italy) in 2019 to talk about user requirements and identify priorities for these requirements.

CS listed the summary of technical capacities already existing and what is needed. TC indicated that WB is in a process to transfer their geo-projects into SEPAL (Forestry-TEP was envisaged, however, there are issues with this solution).

CS then listed and presented the products proposed in the portfolio for a future FM/REDD+ Copernicus Service and added that it is not sure at the time if the funding will allow to go for historical data. CS explained that this was presented last year to the Commission and also to the workshops (format webinars) held in tropical countries – and add that the participants were really enthusiast. The Consortium now wants to consolidate this initial design. He added that it is important that the Service foster Downstream activities from Core Service that will be provided freely, and with full transparency; and defined what the Consortium anticipates as Downstream services.

CS conclude saying that all the reports from the project available so far can be downloaded on the project website.

4. Feedbacks on the presentation

TC said that the future Service would likely be valuable for the target countries and regions.

TC asked if the Consortium is familiar with Satellite Monitoring for Forest Management (SMFM) project. He added that WB is working on this topic. TC mentioned that communications activities were launched mainly only last year (CY2020) when the products in question were finalized and indicated that he can send the material after the call to make sure we know what the WB is working on.

- CS answered that indeed the Consortium is aware that the WB works on this topic, and gave the example of WB's work in, Mozambique.
- TC indicated that indeed they are working in this country and also in Namibia and Zambia and added that the SMFM tools were developed through “co-development approach” and that the objective was to develop tools which ultimately could be used without the countries having to hire international consultants to use them or other EO tools. The project provided notable TA in Mozambique and Zambia. In Namibia, they simulated a situation where the staff is starting to use SMFM tools. The objective was to understand what would be required from the local stakeholders to allow them to start using satellite-based remote sensing tools. The scope in the promoting information management in the forest sector is forest and landscape management the wider sense of the concept: SFM is not only about REDD+, and also other aspects of FM (production, governance, etc.) should be considered as well when developing future services in addition to dealing with climate policies. He concluded that WB is globally looking for how the satellite data can be used to deal with these policies.
- CS agreed that the project's name is REDDCopernicus, however the Service objective is also to deal with any Forest policies which the Service could help. He added that the project is named REDD because this is one of the most important forest policies, but the Service will also be useful for other forest policies.

CS asked if TC think the Service will be useful.

- TC answered that indeed the Service will be absolutely useful. He added that he sees the main interest in the Downstream services, where he thinks the uptake still has to be made by the tropical countries. He indicated that when they were working on SMFM tools, initially countries were reluctant to share their forest data in the cloud (e.g. SEPAL platform) for perceived sovereignty reasons. However, countries ultimately recognized the utility of cloud-based processing platforms as these allow them to deal with such work that they are not able to do locally on their own desktop.
- CS added that this concern of process and ownership of data is an interesting point to highlight in a number of countries.

TC said another topic dealing with these forest policies was mentioned during a recent webinar on global datasets WB organized. The topic was combining local (e.g. field work) and global EO-datasets and the question of how the fields data could help was questioned.

- CS agreed that indeed, there is a need for this type of combination, and that there is also another Component which is targeted to provide in situ data. He also mentioned the initiative from Norway (i.e. NICFI, VHR provision) which could support providing more detailed satellite observations.

TC said that another important topic is how to deal with the measurement of forest regrowth and landscape restoration; this is often quite difficult to do from the space.

TC added that another important topic is to deal with the issue on distinguishing (illegal or legal) deforestation from where even-age forest management practices lead to temporary tree cover loss as part of regular forest management.

In the SMFM project, WB aimed to develop tools for the identification of drivers of changes in the forest cover. However, this was challenging and these tools are not finalized at the time. He added that basic research would be needed for that topic.

CS asked if the products from the future Service portfolio could be used as part of projects from WB portfolio, and if WB could disseminate the Core Service Component.

- TC agreed and said this would be of interest for them to use the Service if it allow not to start working from scratch with the countries counterparts.

CS asked about the interest to include CORE Service Component to foster Downstream / Capacity building activities (including financial and/or technical support) through WB activities.

- TC answered that he sees interest in the Downstream activities.

CS asked if it would be any mechanisms by which WB could help to provide financial support to enhance Service Component in case the budget was too short to fund activities e.g. if this lack of budget would be restrictive to develop some products of interest for WB activities. CS asked whether the bank only works with its clients or not.

- TC answered that he cannot think of an instrument, and that for global and/or internal WB activities, funding comes often from trust funds that are themselves funded often by EU member states. TC added that he sees more likely opportunities in the Downstream services and that this would make the work easier to do. TC gave the example of their landscape restoration program in Ethiopia which is one of the largest projects Bank has in this field. He added that the challenge is the big scale, and that measurement of regrowth is the main challenge as already mentioned before (specially in landscape measures, and dryer landscape to differentiate from phenology events).

5. End of meeting

TC agreed to review the minutes of the meeting and agreed to have this document published in one of the project's public deliverables.

TC agreed to follow up the project email inside WB to get a contact at GEF, as requested by CS.

TC requested that the Consortium present the in a webinar or a brown bag lunch (BBL) once the Service will be operational.

TC concluded that the main objective for WB is that countries will be able to use tools by themselves for their FM policies.

END OF MEETING

End of Annexe 1.

Annexe 2: Meeting with GCF – Minutes of meeting

Date: 28.01.2021 (virtual meeting)

Participants

- **GCF** : Juan Chang (JC) jchang@gcfund.org
- **CLS**: Christophe Sannier (CS), Justine Hugé (JH), Hervis Ghomsi (HG)

1. Introductions

CS presented SIRS and CLS.

2. Objectives of the meeting

CS indicated that the current project which is an EU funded programme (Horizon2020 with a cycle of 7 years), aims to design a pan tropical REDD+ Service which can be used for NFMS. CS asked if JC knows about Copernicus Programme.

- JC answered that he has only a limited knowledge/interaction of this Programme. GCF does not have so much interaction with EU in terms of funding. GCF has more interaction at the policy level with the Commission.

CS presented the Copernicus Programme and indicated that the project is trying to develop/interact with international organizations to shape up the future Service which should become operational by end of the year. CS added that the objective of this meeting is to present the future programme as envisaged and to see if GCF would be interested and would like to provide feedback.

3. Presentation of REDDCopernicus Project and Technical Design

CS presented the project and explained that Europe already provides lot of support for REDD worldwide and that there is an increasing request to avoid importing wood coming from deforestation events, and at the same time, there are a lot a requirements from the tropical countries for their forest policies, and to monitor themselves their own forest. This is therefore natural that the Commission is considering a Copernicus Global Service for REDD+ and FM, and in this context the current project is a pre-cursor to such a programme and the whole idea is to develop Core services, free and open in terms of access. He explained that GAF is coordinating the project and that the project will make recommendations to Commission on the design of such a Service. He indicated that the project involves a Consortium of partners coming from different domain, - JRC, VTT, WU and GAF which is the leader of the project as already mentioned.

CS added that the project is a H2020 project -research programme. The main objective is to define an end to end operational system for these FM activities. This is not just to focus on technical aspects, but also all what is around. This includes coordination with users, relevant stakeholders and many other aspects to design an operational Service.

CS said that the project entered in the third and final year. During the first year, there was mainly a focus on defining the user requirement /assessment and assessing overall capacities in the FM from EO domain, and the second year was to organize workshops in a number a country which would be the users of this type of system.

- JC mentioned that GCF did a similar survey in 2020 as it was done in the project in the first year -about the users requirements for REDD+.

CS continued the presentation with a recall of the challenges met in FM from EO and with the challenges in REDD reporting. He explained that there was a workshop with many stakeholders held in Ispra (Italy) in 2019 to talk about user requirements and identify priorities for these requirements. CS then listed and presented the products proposed in the portfolio for a future FM/REDD+ Copernicus Service and explained that this was presented last year to the Commission and also to the workshops (format webinars) held in tropical countries. The Consortium now wants to consolidate this initial design. He

added that it is important that the Service foster Downstream activities from Core Service that will be provided freely.

4. Feedbacks on the presentation

CS asked JC if he sees some aspects that could be relevant for the kind of project that GCF is funding.

- JC answered that the future Service will be really useful for countries indeed. However, GCF is in a position where it is up to the country to choose the tool they will use for their FM. JC said that GCF has three main domains of funding for FM: the awareness raising which includes capacity building, regular project cycle, that could be used for the countries to use their FM capacities needs; and the Result Based scheme which ran out of funding last year and will be updated by the end of this year. The future REDD+ Service could be used for these two domains. JC added that the funding from GCF to the countries is linked to the quality of the results/reporting, and the level of uncertainty of the products they reach. As it is important to have a certain level of quality for reporting, this is where JC sees the high value of the future Service. However, he maintained that this is up to the country to choose the tools they want to use and suggest that a presentation of a concrete case will help to convince the countries to use this Service.

JC added that GCF is working on a new scored based programme which will allow the countries to participate in this type of programme.

CS asked JC what would be the potential for Provision of feedback on proposed Service Component and its definition from GCF side.

- JC answered that indeed, GCF would be happy to provide feedbacks considering that the teams always want to be up to date on what is going on in the sector.

CS asked about the potential for contributing/disseminating the Core Service Components, in other words if it would be possible to make countries aware of the future Service once it will be ready.

- JC answered that as already mentioned, they can suggest to use a Service/product, but it will be up to the countries at the end to decide what they use. He added that any tools that would allow to provide better uncertainty is always welcomed.

CS mentioned that funding is often a limiting factor, and asked in the case there was a need to enhance the scope of the Service and thus to provide funding from external source, if GCF would be possibly interested to fund.

- JC answered that it could be possible through the countries.

CS mentioned that when he was talking about Downstream services, he thought about GCF as a good developer of this type of Service, though capacity building for example.

- JC answered that indeed, it is possible. It happens regularly that countries asked GCF for capacity building.

CS asked if JC had further comments on the presentation.

- JC answered that GCF is currently trying to encourage African countries to move ahead with their REDD+ policies and said that it would be desirable if the Consortium wants to support these countries.

CS asked when the new funding (as mentioned by JC earlier in the meeting) will be available.

- JC answered that this will be available at the end of the year 2021. And JC indicates that the value of the funding is one million dollars per year.
- CS added that the Consortium know countries that will be interested for sure.

5. End of meeting

JC agreed to review the minutes of the meeting and agreed to have this document published in one of the project's deliverables.

END OF MEETING

End of Annexe 2.

Annexe 3: Meeting with KfW - Summary Notes

Date: 14.01.2021

KfW Participants:

- T. Schoenfeld (Kai.Timo.Schoenfeld@kfw.de)
- K. Koehnlein (Klaus.Koehnlein@kfw.de)
- S. Schopferer (Soeren.Schopferer@kfw.de)
- J. Schielein (Johannes.Schielein@kfw.de)

GAF Participants: T. Haeusler, F. Enssle, S. Gomez

1. Introductions were made.

From the KfW side:

- Timo Schönfeld is a Forester from University of Freiburg; he worked also at the Von Thunen Institute (Germany) and worked closely with Dr. M. Kohl. Currently working in Forestry projects in KfW.
- Klaus Köhnlein-is the most senior person, and is Portfolio Manager for REDD REM for Brazil and Colombia. He has a GIS background so he's interested in the EO/GIS programmes. But he deals primarily with the financial side of projects.
- Sören Schopferer-studied wood science and was in industry and is working with T. Schoenfeld in Forestry and Landscape Management projects in Brazil and other countries.
- Johannes Schielein-works in Evaluation Department in KfW. Did PhD in Agricultural Economics and Impact Evaluation.
- Klaus Köhnlein noted that Christiane Ehringhaus who was formerly REM Programme Manager has changed position within KfW. He is her successor on the REM Programme in Brazil and Colombia.

2. Objective of meeting

S. Gomez from GAF noted that GAF has been involved in REDD+ since 2006, with a main focus on Africa (both tropical and dry forests). In the context of the current project GAF is now Co-ordinating the EU funded programme (Horizon2020) to design a pan tropical REDD+ Service which can be used for NFMS. As the project involves stakeholder engagement with financiers the objective of the current meeting is to get KfW's feedback and their perceptions on the proposed Copernicus REDD+ Service. She noted that Copernicus is the EU flagship programme with a suite of EO Sentinel satellite data that is open access.

3. Presentation of REDDCopernicus Project and Technical Design

T. Haeusler (TH) from GAF then introduced the Copernicus programme-indicated it started in 2003 from GMES and in this context he referenced the European Space Agency supported GMES Service Element for Forest Monitoring (GSE FM). He reviewed also the Copernicus Pan European datasets as operational programmes. The Commission are considering a Copernicus Global Service for REDD+, and the current project is a pre-cursor to such a programme. GAF is co-ordinating the project. The project will make recommendations to Commission on the technical design of such a Service. He presented the Partners in the project-JRC, WU, CLS, and VTT.

- Question from Klaus Köhnlein: What will be the value added in comparison with Global Forest Watch?

TH mentioned the GFW and that there are challenges using it for FRELs due to accuracy issues. EU wants also to know if there is enough capacity in Europe to produce a global Service such as GFW. Partners are JRC etc.

TH also introduced the Norwegian NICFI funded VHR data programme. Klaus Köhnlein noted they are familiar with this programme as Norway is a co-funder of the REM.

F. Enssle from GAF provided a demo which illustrated the different products.

4. Q&A Session: See separate Section

End of Annexe 3.

Annexe 4: Meeting with KfW - Main Questions

Date: 14.01.2021

KfW Participants:

- T. Schoenfeld (Kai.Timo.Schoenfeld@kfw.de)
- K. Koehnlein (Klaus.Koehnlein@kfw.de)
- S. Schopferer (Soeren.Schopferer@kfw.de)
- J. Schielein (Johannes.Schielein@kfw.de)

GAF Participants: T. Haeusler, F. Enssle, S.Gomez

Questions:

- **Johannes: Will the services be open source so that e.g. Downstream services can be adapted also by other third parties?**

Fabian: It is planned that the future Copernicus REDD Service Component will be free of charge to all users. The distribution policy will be comparable to the one that is applied to pan-European products (<https://land.copernicus.eu/pan-european>). Each provided product can be downloaded and further processed according User needs.

- **Johannes: Technical question: will it be possible to access the data and use it for our own programs e.g. via APIs?**

Fabian: The REDDCopernicus project team is proposing several modalities for a future distribution. There might be API functionalities or only simple ftp/S3 distribution. The requirements will be set by the European Commission.

- **Sören: Regarding Open Source in more general: What will be the licensing models for the Core and Downstream services?**

Fabian: The Copernicus Core services are (and will be) fully free of charge and open source.

See <https://cds.climate.copernicus.eu/api/v2/terms/static/Copernicus-Global-Land-product-licence.pdf>

*“All users of the Global Land Service products benefit from the free and open access policy as defined in the **European Union’s Copernicus regulation (N° 377/2014 of 3 April 2014) and Commission Delegated Regulation (N° 1159/2013)**. This includes lawful use reproduction, distribution, communication to the public, adaptation, modification and combination with other data and information or any combination thereof. Access and use can only be limited in rare cases of security concerns, protection of Third Party risks or risks of Service disruption.”*

Thomas: the Downstream Service is not financed by the Commission. The Users can access the Core Service free of charge and when they find it useful but would require some adjustments or further processing in order to fully meet the requirements then this would be a Downstream Service. A Downstream Service is then in the full responsibility of the User and no license conditions are on it. Users might process the Downstream by themselves, tender it out and might get support from International Financial Institutions

- **Sören: What data quality (resolution/frequency) will be available on open source data? What conditions apply on customized services?**

Fabian: The targeted quality will be set out in the tendering documents. The decisions on resolution/frequency will be based on the stakeholder feedback thus far gathered and documented in the project. To the best of my knowledge there will be only one quality standard. This is how the Core Copernicus Pan European layers are provided.

Sharon: Customised services are the subject of Downstream services which the User would have to cover costs (or tender out).

- **Sören: Will the data be hosted in an end-user friendly platform, comparable to GFW?**

Fabian: This is still tbd. The REDDCopernicus project will propose platform solutions (probably not a specific one). If and where it will be hosted is up to the decision of the EC and the tendering institution.

- **Timo: Regarding the data quality: how is the uncertainty assessed/estimated?**

Fabian: The Accuracy Assessment will be different for the different products. The Near-Real-Time information is difficult to assess, but the expected accuracies can be estimated from the modelling parameters and the algorithm setup (e.g required number of potential alerts before a disturbance is confirmed by the algorithm). The quality of any status product will be most likely assessed by using visual image interpretation of samples on VHR and Planet-Basemaps. Methods proposed by Olofsson or Sannier could be used here.

Sharon: The REDDCopernicus project will recommend to the EC that all products have an accuracy assessment process/data available.

- **Klaus: For command and control activities and legal prosecution of illegal deforestation, our partners need more and more (near) real-time analyses. Will REDDCopernicus offer such services?**

Fabian: The REDDCopernicus project is currently evaluating needs and requirements of a future Copernicus REDD Service Component. The findings and results will be proposed to the EC, which is funding the REDDCopernicus project under the H2020 framework (<https://cordis.europa.eu/project/id/821880>). One of the proposed Service is a Near-Real-Time (NRT) disturbance monitoring.

- **Johannes: Are you going to use the European Cloud processing platforms? If so, which one?**

Fabian: Cloud processing will definitely play a major role in the production process of the services. With the scope of delivering a global Service the data amount is too high for local processing. The tendering agency could pre-define a cloud environment (AWS, OTC, GEE, Azure). More likely is an open competition where the functional requirements of a platform is prescribed in the tender and the vendors can propose a solution.

- **Klaus: We are aware of the Norwegian initiative since Norway is also co-funder of REM.**
- **Johannes: will the NICFI VHR data programme be a competition to the Copernicus REDD+ programme? This was in relation to Planet providing processed datasets as well.**

Thomas indicated these programmes should not be in competition to each other but more complementary, as VHR data can be used for the accuracy assessment etc. TH said the processing of these VHR data can result in large amounts of data volume which will be challenging to use. Data quality (radiometry) between scenes and time coverages is not as constant as e.g. with Sentinel data.

Fabian: Planet Basemaps are provided at a resampled resolution of ~5m (4.78m) and are monthly delivered until 2022 (possible extension of 2 years). The radiometry of the stitched images (called quads) is variable and not as precise as the Sentinel-2 data is. Another point is the continuity of data availability. Copernicus is a long term initiatives financed by EC, whereas Planet Basemaps are provided on a contractual basis. Especially for REDD+ the consistency of products and results in-between different years is of high importance.

- **Klaus: 5 days temporal resolution might not be sufficient for real-time monitoring due to cloud cover over tropical forests**
- **Johannes: I think they use RADAR to complement**

Fabian: The current approaches for NRT monitoring do incorporate radar data. The challenges of using radar data in rough topography still exists. In flat moist tropical rainforest (e.g. Congo Basin) the results are quite good and reliable.

- **Klaus: Maybe of interest for you: KfW is funding real-time forest monitoring with Planet in Mato Grosso/Brazil on 900.000 km² (weekly alerts)**

Fabian: Yes, this is interesting. Planet has a daily coverage of earth surface, which increase the likelihood of getting cloud free pixels. Precise cloud masking could be a challenge here because residuals from cloud masking would trigger false alerts.

- **Sören -asked if the NICFI Planet data can be downloaded via GFW.**

Fabian: said there are multiple options and Platforms for downloading the Planet Basemaps data in addition to the GFW Platform. Planet provides an API, a webfront end (<https://www.planet.com/basemaps/>), SEPAL (sepal.io) has integrated the data as well.

- **Johannes notes that the Planet data could also be used also for Agriculture applications. But he also noted the problem of time-frame of availability of 4 years has its limitations.**

Thomas mentioned that the VHR data is possibly restricted to forest applications.

- **Klaus: asked about the Downstream services; can users download the Core product and further work with it?**

Thomas said yes it would be possible. This is actually the idea.

- **Klaus-We as a bank are always looking at the theory-of-change of deforestation in order to achieve positive impacts (CO₂- benefits, biodiversity etc.). Will REDDCopernicus also build "models of deforestation" to identify hotspots and drivers of deforestation (similar to the WWF Deforestation Fronts study).**

Fabian: A modeling of future scenarios or deforestation trends is not foreseen to be one of the proposed services. Such modelling would be a good example for a Downstream Service by utilising the current and historical data that will be provided by the Copernicus Core Services.

- **Johannes asked about using TCD for afforestation assessment and with what accuracy?**

Thomas said detecting afforestation (even with VHR) is challenging and require observations over some years till they become detectable. The chances are better when the areas of planned afforestation are known and when only in these hot spot areas the development of TCD is observed (similar to the EU subsidy controls in agriculture). If you use global products without pre-knowledge then it's difficult over large areas to detect afforestation within the first 1-2 years.

- **Johannes-asked about the European Platforms and the potential to use them for the Copernicus REDD+ Service.**

Sharon indicated that the Commission is currently financing Copernicus-DIAS Platforms and there are 4-5 different Consortia who are implementing them with different architecture. GAF is involved in the MUNDI DIAS and we can provide further information on this approach from the Commission.

Johannes noted this would be very useful. I'm not sure if my other colleagues are interested in that because it's quite technical. But I would be surely interested, probably also a colleague from the Agence Francaise de Development (AFD) and a person from our Service providers. They are very much into GEE at the moment but I would like to evaluate if we could not use the European alternatives.

On the topic of the difference between the Copernicus REDD+ product and the GFW, Fabian said the added value is the 10m resolution, and thus it provides a more precise and accurate dataset at local level. GFW is a good dataset but for reporting requirements, it is not adequate.

Thomas said that the project recommend to the Commission that all the Copernicus datasets will have to be accompanied by accuracy figures. This is also a difference to the GFW. The project will propose different modalities to host the Service-platforms etc but in the end it will be up to the Commission how to tender the specifications.

- **Johannes-asked about the timeline for project and launch of the Copernicus REDD+ Service?**

Thomas said that DG DEFIS has planned consultation with the Member States in a few months (they have already given a green light) and it is planned that the ITT would be launched in the second half of this year.

- **Johannes-said they are aware at KfW of the need for EO as a monitoring tool and there is a need to better integrate them into work practices. Currently their applications are always on project level and it would be useful to have a means to institutionalize the uptake of the technology. He suggested presenting the idea to the Board and BMZ to improve the overall implementation of EO into their programmes.**

Thomas: Please feel free to ask us if we can support.

- **Johannes-asked about the OPEN FORIS platform?**

Fabian: OpenForis is a suite of tools provided by FAO. The SEPAL platform is the OpenForis tool for cloud processing. There are other tools to do sampling design, collect reference data by visual interpretation and tools to calculate statistics (see: <http://www.openforis.org>).

- **Klaus: mentioned a major project in Brazil project; the project also uses GFW and Planet data. He said in Brazil there's a tendency due to current Government policies to neglect forest policy domain and this also affecting INPE's operations and budget; thus he would see a future Copernicus REDD+ programme as a potential support for INPE. He asked for a contact to JRC who are dealing with INPE.**

GAF noted that via the REDDCopernicus project that there is a high awareness of the current challenges INPE as JRC have good contacts with INPE. GAF will provide KfW the contact of Rene Beuchle from JRC.

End of Annexe 4.

Annexe 5: Meeting with WB FCPF Programme – Minutes of meeting

Date: 06.08.2020

FCPF WB Participants:

- A. Espejo (AE) (mvanderlinden@worldbank.org)
- M. Van den Linden (ML) (aespejo@worldbank.org)

GAF Participants: T. Haeulser, S. Gomez and F. Enssle

1. T. Haeusler and S. Gomez reviewed the H2020 REDDCopernicus Project Objectives. They noted that the objective of the interview was to get the Bank's views/perspective on the proposed design of the Copernicus Core REDD+ product and Service.

TH defined the terms "Core" and "Downstream" which are part of the Copernicus terminology. He also noted from the presentation the challenges of using EO for forest monitoring; as well as the challenges in REDD+ and Activity Data reporting which includes high uncertainties.

2. GAF presented the series of products that are being considered for the Copernicus Core REDD+ product.

In this context A.Espejo noted that countries reporting on REDD+ need a way to derive uncertainties from the maps they work with-ideally uncertainty at pixel level would be of high value and importance.

T.Haeusler mentioned the Norwegian supported tender for Very high Resolution (VHR) data acquisition which would then be freely available to countries and this data can then be used for area samples for the accuracy assessment.

M. van den Linden also noted that currently countries follow proposed accuracy assessment methods in the GFOI MDG which relies on the Olofson approach. Whilst the outcome of this method is the uncertainty statistics there is a need also for highly accurate Land Use change maps.

Both AE and ML were interested to know if the Tree Cover Density product which shows continuous variables can also provide accuracy figures at a pixel level such that a User would not have to undertake the sampling approach.

FE explained that the TCD product is based on VHR samples and modelling; the validation of the product still uses independent VHR samples.

AE noted that from the WB perspective it is more important to have country specific data and thus a TCD at pan-tropical level would not be very useful. The Bank would also be interested in a Core product or Service that can provide uncertainties at pixel level or a toolbox which countries can use for the accuracy assessment.

TH noted that when the product is available in the cloud the User can also undertake the uncertainty estimates using simple tools also in the cloud.

There was a discussion on the current WB activity to prepare a knowledge repository which has the objective to be a one-stop-shop for the various tools that are already available for AD assessments. It was noted that Wageningen University will evaluate the different tools for the WB repository. Interoperability of the tools is an important factor.

FE presented the Sentinel-2 mosaic and notes that users can use the data on other Platforms such as SEPAL; the S2G can be customized to period of use.

In the context of the Forest change product AE asked how countries can use this product with their national definitions. FE noted that the adjustment of the product based on specific definitions is part of the toolbox; but the issue of national definitions would be difficult to accommodate with a Core product.

3. The Interview ended with an update from WB on the status of the different programmes:

- The FCPF was to end in 2020, but AE mentioned that the programme has been extended till 2022. Thus the grants that countries have been allocated can be continued. He further noted that if countries have the resources and funds (via the Readiness funds) to use a potential REDD+ Core Service/product they can proceed but the Bank has little influence on this process.
- It is the same with the BioCarbon Initiative for Sustainable Forest Landscapes (IFSL) programme. Some countries have already signed the ERP's for results based payments.

The Bank can provide outreach and dissemination for a Copernicus Core REDD+ product but they have no possibility to co-finance such a product.

Aside from the FCPF and BioCarbon funds, the Bank is considering a new programme which would include agriculture/Carbon assessments which might have a use for global EO products. The fund will not be decided on till the 2nd semester of 2021.

ML noted that countries accessing any of the WB Carbon funds have to report to the Bank by 2025. The main objective of the Bank is to get the countries to an operational level where they do not need heavy external support. It is important that countries improve their reporting in terms of consistency. The methodology for the FRELS that the Bank has provided to the countries relies on Landsat data and at the moment they are not keen for countries to start working with new approaches as it may delay their target to operationalize them. There is an awareness from the Bank side that they will have to introduce the use of Sentinel data to the countries.

TH/SG noted the upcoming REDDCopernicus Webinars and invited them to attend. Also SG would send the public version of the D3 to AE and ML as it provides the technical specifications of the products.

End of Annexe 5.

Annexe 6: GFOI Leads Teleconference - Minutes of meeting

Date: 20.01.2021

Participants:

- Australian Government: Nikki Fitzgerald (Chair) (nikki.fitzgerald@industry.gov.au)
- CEOS: Osamu Ochiai (ochiai.osamu@jaxa.jp)
- ESA: Frank Martin Seifert (Frank.Martin.Seifert@esa.int)
- FAO: Julian Fox (Julian.Fox@fao.org)
- GIZ: Kay Kallweit
- NICFI: Ellen Bruzelius Backer (Ellen-Bruzelius.Backer@kld.dep.no)
- BEIS: Fiona Stringer, Rachel Flint (Fiona.stringer@beis.gov.uk, Rachel.Flint@beis.gov.uk)
- US Government / SilvaCarbon: Evan Notman, Sylvia Wilson (enotman@usaid.gov, snwilson@usgs.gov)
- World Bank: Andres Espejo (aespejo@worldbank.org)

Office:

- Tom Harvey and Sara Maulo (Thomas.Harvey@fao.org, Sara.Maulo@fao.org)

Guests:

- WU: Sarah Carter, Martin Herold

Apologies:

- Stephen Ward (CEOS)
- Felicity Le Quesne (UK)

Meeting

Sarah Carter introduced the REDDCopernicus project.

Frank-Martin recommended to harmonize the tool box development with existing solutions, e.g. SEPAL and noted he will make this point in the context of the Advisory Group Board.

Ellen asked how are they prioritizing activities for the assessment of research priorities within the project, and Sarah replied that they have been looking at: 1. How relevant was the research to REDD+ monitoring needs (activity data and emissions factors and estimates resulting from those); 2. Which are the users' priority needs?; and 3. Availability of upcoming research on some of these topics. The outcomes are related to data needs (e.g. plantation forests, re-growth) and the methodological side (integration of data sources and how to do these calculations correctly for instance).

Evan wanted to know how R&D priorities apply to national needs and analysis. Martin noted that the focus is not about countries and REDD+, but more on creating a platform for use of the European Commission itself, but of course countries would also benefit for climate change mitigation. All data and services by Copernicus will be free and open.

Julian suggested to have a follow up call, as it is very interesting and it would be appropriate to avoid duplications. There are many functionalities in SEPAL and they would be happy to host others from the project. Martin agreed to have it when the design document is ready, maybe also including people from the Consortium.

Andres agreed with the point raised by Frank-Martin and, noting the current proliferation of activities intended to reduce the transaction costs related to offsets, suggested to think of a central verification process in perspective. Martin agreed that this point should be taken to the Consortium and that he will organize a follow up call.

Ellen raised attention on upcoming EU legislations on “imported deforestation”, which is deforestation related to products, and due diligence of companies. They are looking for ways that private sector can ensure these criteria that they are going to apply.

End of Annexe 6.

Annexe 7: Meeting with Greenpeace – Minutes of meeting

Date: 04.02.2021 (virtual meeting)

Participants

- **Greenpeace France** : Adrien Corvisy (AC) adrien.corvisy@greenpeace.org
- **SIRS/CLS**: Christophe Sannier (CS), Justine Hugé (JH), Hervis Ghomsi (HG)

1. Introductions

From Greenpeace side: AC is GIS Specialist in the Greenpeace France Office since 2015. Its work includes many different thematic such as air quality, agriculture/alimentation, but also forest monitoring.

2. Objectives of the meeting

CS indicated that the current project which is an EU funded programme (Horizon2020 with a cycle of 7 years), aims to design a pan tropical REDD+ Service which can be used for NFMS. The idea of Copernicus is to make the proposed Service/data free and open to promote the development of economic activities behind it.

CS asked if AC knows about Copernicus Programme.

- AC answered that he has himself a good knowledge of Copernicus Programme and use regularly Sentinel data, but emphasized that Greenpeace is currently developing its GIS competence in Europe and thus, he would say that his close colleagues do not know very well about this Programme since they have not this GIS competence. However, he mentioned that the Greenpeace Russia office has the lead of this competence in the Organization.
- In terms of interactions, AC indicated that he has already used the datasets provided though the Programme and illustrated by listing projects²⁴ in which he used the Copernicus datasets e.g. monitoring of deforestation in specific African countries. They were also planning to use the Copernicus data to monitor Methane emissions for their works.

CS presented quickly the Copernicus Programme and indicated that the current project is trying to develop/interact with international organizations to shape up the future Service which should become operational by end of the year. The objective of this meeting is to present the future programme as envisaged and to see if Greenpeace would be interested and would like to provide feedback.

3. Presentation of REDDCopernicus Project and Technical Design

CS presented the project and explained that Europe already provides lot of support for REDD worldwide and that there is an increasing request to avoid importing goods coming from deforestation events, and at the same time, there are a lot a requirements from the tropical countries for their forest policies, and to monitor themselves their own forest. This is therefore natural that the Commission is considering a Copernicus Global Service for REDD+ and FM, and in this context the current project is a pre-cursor to such a programme and the whole idea is to develop Core services, free and open in terms of access. He explained that GAF is coordinating the project and that the project will make recommendations to Commission on the design of such a Service. He indicated that the project involves a Consortium of partners coming from different domain, - JRC, VTT, WU and GAF which is the leader of the project as already mentioned.

²⁴ <https://www.greenpeace.org/static/planet4-africa-stateless/2018/10/2be53e67-2be53e67-greenpeace-africa-sudcam-report-2018-fr.pdf>

https://cdn.greenpeace.fr/site/uploads/2020/09/Cartographie_autonomie_prot%C3%A9g%C3%A9e_Land-use.pdf?_ga=2.139009265.315575687.1600764033-1903021749.1535444981

<https://maps.greenpeace.org/project/>

CS added that the project is a H2020 project -research programme. The main objective is to define an end to end operational system for these FM activities. This is not just to focus on technical aspects, but also all what is around. This includes coordination with users, relevant stakeholders and many other aspects to design an operational Service.

CS said that the project entered in the third and final year. During the first year, there was mainly a focus on defining the user requirement /assessment and assessing overall capacities in the FM from EO domain, and the second year was to organize workshops in a number of tropical countries which would be the users of this type of system. These workshops provided feedback on future products and services.

CS continued the presentation with a recall of the challenges met in FM from EO and with the challenges in REDD reporting, which AC knows well also. He explained that there was a workshop with many stakeholders held in Ispra (Italy) in 2019 to talk about user requirements and identify priorities for these requirements. CS then listed and presented the products proposed in the portfolio for a future FM/REDD+ Copernicus Service and explained that this was presented last year to the Commission and also to the workshops (format webinars) held in tropical countries. The Consortium now wants to consolidate this initial design. He added that it is important that the Service foster Downstream activities from Core Service that will be provided freely.

4. Feedbacks on the presentation

AC asked if the platform is already open.

- CS answered that a demonstration platform had been designed exclusively for the workshops, but the official platform is currently being designed as the project aims to design all organizational elements including the platform.

AC mentioned a CESBIO project launched together with CNES, which aims to develop a NRT deforestation alerting system.

- CS indicated that the Consortium has heard about this project and indicated the advantages of the project compared to what is already existing. CS added that there is also another project launched by the WU dealing with NRT deforestation alerting system, which is already provided on GFW platform.

About the TCD product from the portfolio of the future Service, AC asked whether this data would be updated regularly or not.

- CS answered that indeed, it is foreseen that this product will be updated in a yearly basis at least. It is also envisaged that the Service could provide an historical for reference basis.

About the deforestation alerting system products, AC asked if the SAR sensor will be used in the production of the data.

- CS answered that even if the optical sensors are the preferred ones, it is indeed envisaged the use of SAR data for cloudy geographical areas.

AC indicated that in its work, he makes extensive use of other datasets that are well known and used as reference for forest monitoring, but he added that they are well aware that this data is not homogeneous in terms of accuracy and that its use is prescribed for certain geographic areas, and especially since they must have quality data given the legal scope of their actions. Therefore, he asked if the future products and especially TCD will allow to enhance the known confusion existing between plantation and forest cover for example.

- CS answered that this TCD product is about Tree and not about Forest, and that the definition here is very important, and it depends on what type of plantation we are talking about. CS indicated that this was already a real subject in Copernicus HRL Lot2 to define what is considered as trees and what can be included in forests. CS added that the added value of the product is that it will be a validated data with accuracy figures, and that the technical specifications will be fully transparent contrary to some other external datasets.

AC added about these data from Maryland that it has already happened that these data were used for Greenpeace projects, but it turned out that the specifications of the products were at first not so clear and it was a real issue.

- CS agreed that clear definitions are really important and indicated that this is already foreseen to be taken into account in the future Service.
- AC added that for Greenpeace, it is really important to get global figures about many different thematic, including forests, especially for communication purposes. Those from FAO and University of Maryland are really important in this aspect. However, when dealing with specific cases, they need accurate data because of the legal risk encountered. In that aspect, the alerting system are really interesting for Greenpeace.

AC mentioned another need from Greenpeace side which is related to the European policy about the willingness to avoid importing goods from deforestation, and the needs to have tools for traceability purposes.

- CS said that this is a real topic and a key aspect of the future Service, because transparency and open sourced data are key components of the envisaged REDD+/FM Service.

AC indicated that another aspect which is interesting for Greenpeace is about fire monitoring in forests. He asked if the future Service might help with this.

- CS answered that there is already a global fire monitoring system led by NASA, and also an European system.

Finally, AC said that it is a good news to know that the Service will be long-term released.

JH asked about the potential to provide feedbacks on the proposed Service Component and its definitions. She assumed that he seems rather favorable in view of the exchanges.

- AC confirmed that Greenpeace can give feedbacks in order to share its technical needs but those feedbacks cannot be used as a support for any commercial product or political goal. AC added that it is always good for Greenpeace to know what is ongoing in the sector.

JH asked if it would be envisaged by Greenpeace to disseminate the Core Service Components to its contacts and through its work.

- AC answered that indeed, if the future Service is relevant for their purposes, he will, as he does for other relevant materials available on the web, share it to the Global Mapping Hub of Greenpeace.

JH asked if Greenpeace would be in a position to provide a financial support to enhance the Service Component.

- AC answered that he is not the best person to answer that question, but he assumes that it would not be possible and will check with the person in charge of these questions. He added that Greenpeace is independent, free from any economic or political power as the organization is totally financed by private individuals and any link with an external initiative is delicate because of political/economical/ethical aspects.

5. End of meeting

AC agreed to review the minutes of the meeting and agreed to have this reviewed document published in one of the project's deliverables.

END OF MEETING

End of Annexe 7.

Annexe 8: Meeting with WWF – Minutes of meeting

Date: 27.01.2021 (virtual meeting)

Participants

- **WWF:** Naikoa Aguilar-Amuchastegui (NAA) naikoa.aguilar-amuchastegui@wwfus.org
- **CLS:** Christophe Sannier (CS), Carlos Dewasseige (CD), Justine Hugé (JH), Hervis Ghomsi (HG)

1. Introductions

From WWF side: NAA is Senior Director in Carbon Forest domain in WWF (USA) and has been working for 10 years on REDD+, in WWF network. NAA is involved in the discussions about the Forest Monitoring. Its role is to transfer the scientific knowledge to the decision-makers.

2. Objectives of the meeting

CS indicated that the current project which is an EU funded programme (Horizon2020 with a cycle of 7 years), aims to design a pan tropical REDD+ Service which can be used for NFMS. The idea of Copernicus is to make the proposed Service/data free and open to promote the development of economic activities behind it. As the project involves stakeholder engagement, the objective of the current meeting is to get WWF feedback and his perception on the proposed Copernicus REDD+ Service.

3. Presentation of REDD Copernicus Project and Technical Design

CS asked NAA if he already knows the Copernicus Programme. NAA answered yes, however, beyond the use Sentinel data, he has no real interaction with the Programme. He would have to check with his European colleagues in WWF if they have interactions with the Programme, in particular the German colleagues.

As NAA already knows Copernicus Programme, CS presented directly the project and explained that Europe already provides lot of support for REDD worldwide and that there is an increasing request from European MS to know if the imported goods comes from deforestation events in tropical countries. This is therefore natural that the Commission is considering a Copernicus Global Service for REDD+ and FM, and the current project is a pre-cursor to such a programme. He explained that GAF is coordinating the project and that the project will make recommendations to Commission on the technical design of such a Service. He indicated that the project involves a Consortium of partners coming from different domain, - JRC, VTT, WU and GAF which is the leader of the project as already mentioned.

Then, CS explained that the Consortium is trying to define an operational system taking into account all aspects - end-to-end, from technical to organizational aspects, and to propose a portfolio of different type of products to be developed for the tropic following the needs identified in the FM domain.

- NAA asked about the policy to access these data, CS answered that it will be free and open.
- NAA asked if it is foreseen that the products will make use of the advantage of combining optical and SAR sensors. He uses S1 images combined with optical products for his work (e.g. oil palm plantation monitoring), and explained that methods already exists and should be used for the production. NAA also explained that one of the main challenges in the use of SAR data is that there is a common difficulty to access to pre-processed images and then to make mosaics of S1 to work together with S2 or other optical data (e.g. from SPOT). This could be addressed with training courses. CS answered that indeed, the use of SAR is planned (e.g. NRT alerting).

CS then mentioned that the project is now in the third year and that the objective is to coordinate the capacities dealing with forestry and to consult with stakeholders involved in this domain. In the second year of the project, virtual workshops were conducted in tropical countries to showcase the initial design of the Service which has been developed during the first year of the project. Currently, the feedbacks are being consolidated to finalize the specifications of the products and the framework for implementation of the Service, in parallel to identification research needs. CS said that currently when dealing with FM from EO data, there is a gap between what is done in practice and what research can

already do i.e. science proves the concept but then the process of streamlining the methods is left up in the air.

CS also mentioned the possibility to use DIAS platforms for the production of the Service. NAA said that he did not know about these platforms and CS explained quickly what they are and took the example of a project using these platforms to produce a worldwide dataset of water-bodies at resolution 100m. Finally, it is agreed that there are still R&D needs on the topics of biomass measurement and removals estimation.

4. Feedbacks on the presentation

CS asked if WWF would be in a position to provide feedbacks on the proposed Service Component and its definition, and how it could be done -he gave the example of a scientific council.

- NAA answered that indeed it would be interesting for WWF, especially from the user's point of view because their teams are interested in using the data and doing the analysis, then add conservation and social aspects on it. A second type of use is the applied research such as NAA is doing himself to solve specific questions e.g. oil palm plantation which is of the first driver of deforestation. NAA said that WWF would be interested to provide feedbacks and scientific advices.

CS asked about the potential for contributing/disseminating Core Service Components through WWF.

- NAA answered that it could be envisaged.

CS asked about the possibility/willingness to fund the Service or a part of it from WWF. He added that the commission has funding available, but there are already budgetary trade-offs so if there are any products/services/geographical areas that would be interesting for countries/users but cannot be realized due to lack of funding, the idea would be to see if other organizations would be likely to finance part of the programme in order to be able to have a sufficiently large coverage.

- NAA answered positively that indeed, the alternatives to participate to the processes could be explored and that it can be possible to see if there are funding opportunities. NAA added that it is possible to already contact the global scientific team from WWF once the Consortium share the projects objectives and examples of what could be provided under this Service. NAA added that recently they received funding from the global WWF. If they can get a small part of that, it might be possible to support REDD with funding.

CS took the example of the TCD product -produced from S2- which can be seen as a Core product, and how it could be used as Downstream product and asked if this type of process would be considered of use for WWF.

- NAA said it is very interesting for WWF as they are used to produce/support countries for the production of forest cover using countries definition. CS added that indeed, one of the aims of the project is to encourage the use of Core product to foster production of Downstream services by the countries. NAA added that currently one point that is not solved is the height measurement of trees, and that it could be solved thanks to SAR analysis.

NAA asked whether it would be possible to participate through the provision of capacity building.

- CS answered that WWF can either participate in training, or financing or directly in the Core Service. NAA added that WWF is used to provide such capacity building to countries so they can use the data themselves.

CS finally asked if NAA had other comments. NAA asked when it could be possible to use these promising data. He also mentioned that it should be important to make it clear what kind of feedback/collaboration including participation in funding the Consortium would like to get with WWF. With the BOHN challenge business, a lot of companies are coming to work with WWF and it could offer a lot of opportunities.

5. End of meeting

NAA agreed to review the minutes of the meeting and agreed to have this document published in one of the project's deliverables.

END OF MEETING

End of Annexe 8.