Satellite Environmental Information and Development Aid: An Analysis of Longer-Term Prospects

Executive Summary

Commissioned by the European Space Agency

Caribou Space | esa

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Introduction

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This report is an analysis of the longer-term prospects for expanding the use of satellite-based environmental information in Development Aid operations and activities.

The report has been commissioned by the European Space Agency (ESA), which is an intergovernmental organisation of 22-member states with a mission to 'shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world' (see **www.esa.int**).

The intended audience is; the European National Development Aid Agencies, International Financial Institutions (IFIs) and National Space Agencies.

The report consists of the following:

- An Executive Summary of the key points,
- Background information to set the context, summarise the current status of ESA's and other space agencies initiatives in promoting the use of satellite environmental information for Sustainable Development,
- An actual example of a similar high-technology sector being fully integrated into Development Aid operations & financing; a case study on mobile telecommunications,
- A brief summary of the current changes taking place in both Sustainable Development and satellite environmental information,
- A description of the benefits of satellite environmental information for Development Aid,
- The longer-term strategic vision, including the barriers to be addressed in achieving this vision and a description of the primary activities to be carried out,
- Initial options on how these activities might be financed and an identification of some issues related to their implementation.

In addition, the report contains supplementary information in several Annexes in support of the main arguments, as follows:

- An Annex of the export market opportunity in developing countries for the European EO information services sector,
- An Annex of the benefits of satellite environmental information specifically for Environmental Safeguard Systems (ESS),
- An Annex of other ESA initiatives in relation to the Sustainable Development Goals (SDGs) and the implementation of some Global Environmental Conventions.

Whilst there are benefits arising from other aspects of space capabilities to the field of Development Aid (e.g. satellite communications (SatComms), global navigation satellite system (GNSS), space weather/ meteorology), this report does not analyse these aspects. It focuses entirely on the capabilities offered by satellites in delivering a wide range of information for the monitoring of the Earth's environment in the context of Sustainable Development.

Executive Summary

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This report is an analysis of the longer-term prospects for expanding the use of satellite-based environmental information in Development Aid operations and activities, commissioned by the European Space Agency (ESA). The main findings are:

— *Satellite Environmental Information in the Context of Sustainable Development*

- Satellite environmental information is global, comprehensive, accurate, repeatable and timely,
- Satellites can produce a wide range of key environmental information that is of significant value to Sustainable Development,
- Substantial initiatives are in progress to demonstrate the value of satellite environmental information for Sustainable Development within Europe (ESA, UK Space Agency, Netherlands Space Office, DG-DEVCO) and outside Europe (NASA, JAXA, CEOS, GEO).
- Work to date has focused on engaging the International Financial Institutions (e.g. World Bank, ADB, IFAD) and user organisations in developing countries. Dialogue with the European National Development Aid Agencies is beginning at European level,
- It is widely recognised that there is significant potential for the large-scale use of satellite capabilities in the field of Development Aid.

— *An Example of Integrating High Technology into Development Aid: Mobile Telecommunications*

- The mobile industry successfully integrated mobile technology within Development Aid,
- The GSMA's Mobile for Development department was influential in this evolution and was provided with over £50 million of funding from 10 National Development Aid Agencies and Private Foundations,
- This took ~10 years to achieve the change in behaviour required in both the aid and mobile sectors,
- GSMA had to convince these donors of the 'case for mobile in development' by communicating impact and cost-effectiveness of mobile technology in development,
- GSMA is the mobile industry trade association and not an obvious host for a development initiative. However, the technical understanding, relationships to industry and governments, and ability to collaborate across industry all located in one organisation were recognised as unique and valuable capabilities by donors themselves.

— *Sustainable Development in Evolution*

- The UN 2030 Agenda and the Sustainable Development Goals (SDGs) provide a globally agreed set of development priorities and targets to 2030,
- Accurate, global and timely data is critical to tracking progress towards the achievement of the SDG targets and indicators,
- Development Aid is provided for the economic development and welfare of developing countries and the majority is classed as Official Development Assistance (ODA),
- There is increasing emphasis on addressing environmental issues in developing countries in the National Development Aid Agencies and International Finance Institutions.

— *Step-change in Satellite Environmental Information*

- Europe's Copernicus programme is a game-changer in providing unprecedented volumes of free satellite environmental data,

- ESA and the European Commission have invested over €250 million over the past decade for the research & development of a wide variety of satellite environmental information products and services, with the European EO information services sector now having world-leading capabilities,
- These combined capabilities (Copernicus space system, the European EO information services sector) are currently in place and are ready to be leveraged further for the environmental issues facing international Development Aid,
- Space 4.0 is a new era happening now in which there is the increased number of diverse space actors around the world, including the emergence of private companies, participation with academia, industry and citizens, digitalisation and global interaction. It represents new opportunities for the use of space technologies.

— *Benefits of Satellite Environmental Information for the Development Aid Sector*

- The primary benefits that satellite environmental information brings to the Development Aid sector can be categorised in four areas of activities:
  - Increased efficiency of existing operations and activities, leading to increased impact,
  - Improved policy definition and planning of future activities,
  - New and extended capabilities,
  - Improved transparency, responsibility and accountability.
- Most existing examples of benefits are associated with the first category (1), but there are a growing number in the other three categories (2,3,4),
- As a starting point, a 1-2% investment in procurement and use of satellite environmental information in development will lead to increased efficiencies for Development Aid operations and activities (some quantitative results are emerging for on-going projects), with probably more benefit achieved if fully incorporated into policy-making and planning,
- The benefits of satellite environmental information are real, manifest, growing in number, but the value-proposition (benefits vs. cost) of the use needs to be further consolidated, convincingly argued and presented. There is an opportunity to do this via the OECD Space Forum.

— *Evidence of Uptake of Satellite Environmental Information in Development Aid*

- European National Development Aid Agencies and IFIs are increasing their interest and usage of satellite environmental information through the use of their own resources,
- The World Bank is the IFI that has the highest value of projects with specific financial amounts for satellite imagery and services,
- The majority of IFI projects including satellite imagery and services are located in Asia and Africa,
- If satellite environmental information were systematically used in all IFI development projects at the level of 1-2% of the project financial resources, this may represent a significant economic volume of ~€200–300 million per year for this source of information.

— *Strategic Vision and Activities*

- The strategic vision is to 'transfer and mainstream satellite environmental information into Development Aid operations, activities & financing',
- The barriers to achieving this vision include lack of awareness, acceptance and adoption in the Development Aid community (IFIs, National Development Aid Agencies, Private Foundations and Client States),
- Overcoming these barriers will require a sustained programme of effort and resources; therefore, a dedicated programme of work be initiated by ESA is proposed, referred to as 'Space for International Development Aid' (Space4IDA),
- This programme is designed from the outset to achieve sustainable transfer and systematic use of satellite environmental information, and should be implemented in partnership with the Development Aid stakeholders,
- The three suggested primary activities are:
  - Activity 1: Risk-Reduction Developments
  - Activity 2: Capacity Building for IFIs, National Development Aid Agencies, Private Foundations and Client States
  - Activity 3: Skills/Knowledge Transfer to Developing Countries

— *Options for Programme Financing*

- The overall envelope for the integration and of satellite environmental information into Development Aid is proposed on the order of €120–200 million and for a timescale of 2020–25, with the bulk of the financing (€100-150 million) coming from Development Aid financing, and a small R&D component from ESA Member States (€20–50 million),
- Two options are foreseen for handling the Development Aid financing as follows;
  - Option 1 is for ESA to receive the Development Aid directly and implement Space4IDA activities as a single ESA programme with the Development Aid community,
  - Option 2 is for one or more IFIs to set up a Trust Fund for receipt of Development Aid and implement Space4IDA activities in a joint programme of work between ESA and Development Aid community,
- Both options have advantages and disadvantages for consideration.

— *Implementation Topics*

- Space for International Development Aid (Space4IDA) will ensure long term sustainability and reduce dependence on Development Aid in the future by focusing heavily on capacity building and skills/ knowledge transfer activities,
- Compliance to ODA requirements will be managed by either the IFIs or ESA depending on the selected programmatic structure,
- The Space4IDA programme will require a robust monitoring and evaluation (results reporting) framework to measure and communicate progress against its primary and secondary aims,
- The Space4IDA programme will generate a reference portfolio of results, lessons and best practice that can be shared across the Development Aid Community. Communications activities will ensure that these organisations learn from the programme, and each other, to replicate best practice.

— *Conclusions*

The Development Aid community, by nature of the development activities carried out (many of which are large-scale infrastructure projects), have an evident and manifest need for coherent, consistent, accurate and varied environmental information (both current & historical).

There is a growing public & political pressure to demonstrate that the development investments being made for economic growth are also environmentally sustainable (i.e. 'Green Growth'). Achieving the target of Green Growth requires a detailed understanding of the state of the Earth's environment; what is happening now, where has it come from, and what is going to be the likely evolution in the future.

It is in this context, that satellite environmental information plays a key role. The international Development Aid sector represents an opportunity to realise the full value (scientific, societal, economic) of the world-leading space missions and satellite environmental information expertise already available in Europe.

These factors—in combination with the step-change in satellite environmental information, the huge developments in computing and data science, and proven benefits for Development Aid—highlight that now is the time for the space industry to accelerate the achievement of the 2030 Agenda on Sustainable Development.

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