9th REGIONAL MEETING OF PACIFIC HEADS OF AGRICULTURE AND FORESTRY SERVICES (PHOAFS)

(15 – 17 May 2024) – virtual

Paper reference	**Session 3: Agenda Item 4**
Title	**Digital Earth Pacific: provision of satellite**
Action	For Information
Author(s)	Andiswa Mlisa, Sachindra Singh, Nicholas Metherall,

Summary

Pacific Digital Earth Pacific will provide a digital public infrastructure that will ensure every nation in the Pacific has access to decades of satellite data, earth observation tools, and technologies that routinely monitor and track challenges such as coastal inundation, land use changes, deforestation, and water resources through robust decision-ready products.

The Pacific Community (SPC) initiated Phase I of Digital Earth Pacific (DEP) in March 2021 to engage stakeholders, conduct a needs assessment, develop use cases and a prototype infrastructure, and use this experience to develop a business case for making free, open and operational satellite data available for the region.

Achievements on the implementation of Phase 1 include:

- Four (4) in-country consultation workshops held Fiji, the Republic of Marshal Islands, Tonga, and Vanuatu
- User needs assessment report
- Developed Business Case: 2022 – 2030
- Established digital infrastructure.
- Developed and launched three (3) beta regional products
    - Coastline change (22 years)
    - Water Resources (11 years)
    - Mangrove change (7 years)

  And national land use land cover maps for Tonga and Fiji, and illegal gravel extraction for Fiji.
- Establish governance (Steering Committee)
- Capacity building and country engagement
- Communications and outreach
- Resource mobilisation

In addition to the three (3) regional products already developed, DEP holds the potential to support agriculture and forestry services. In agriculture, DEP can provide valuable insights into crop monitoring, soil moisture levels, and vegetation vigor, enabling farmers to make informed decisions regarding irrigation, fertilization, and pest management. By monitoring crop growth patterns and detecting anomalies early on, satellite imagery helps optimize yields and resource usage while mitigating risks, therefore informing countries' food security measures. Moreover, in forestry, satellite imagery aids in forest management by assessing tree density and species distribution and detecting deforestation or forest degradation. This data supports sustainable forest management practices, such as reforestation planning and monitoring illegal logging activities. Overall, satellite imagery enhances precision and efficiency in agricultural and forestry services, contributing to both environmental conservation and agricultural productivity.

Recommendation:

The PHOAFS are invited to :

1. Note the progress made in the development of Digital Earth Pacific and encourage members to increase the use of Earth observation technologies provided by this regional digital public infrastructure.
2. Support SPC in engaging with countries to
   a. Identify opportunities to demonstrate DEP's current capabilities and products and understand relevance to members.
   b. Identify additional use cases and quick wins.
   c. Identify opportunities for workshops focused on capacity development.
   d. Embed DEP in national science-policy interfaces to drive action and decision-making from DEP products and services

Purpose of this paper

1. The paper aims to provide a progress update on the development of Digital Earth Pacific in response to needs outlined by the Pacific countries and to demonstrate further Earth observation applications for agriculture and forestry services.

Background

2. Globally, the effects of climate change are already being observed through increases in drought, forest fires, sea level rise, flooding and hunger. Given the vulnerability of Pacific Island Countries and Territories (PICTs) in this respect, the Pacific region faces unique challenges in managing natural resources and biodiversity, securing economies and livelihoods and ensuring sustainable food systems.

3. Advancements in technology are allowing geospatial and Earth and marine observation data to scale at an unprecedented rate. New satellites are entering orbit monthly, providing a wealth of information that can help address many of the challenges across the Pacific. However, there continues to be a gap in providing access to these data in the right form and quality with the capacity needed to effectively inform policy, decision-making and action according to the needs and priorities of the region.

4. The Pacific Heads of Agriculture and Forestry Services (PHOAFS), during their 7th regional meeting in August 2021, noted the intention to leverage the benefits of Earth Observation

(EO) for members through the development of Digital Earth Pacific (DEP). Members recognised the strong demand for improved data collection and analysis, robust data management systems, and the use of innovation for more informed decision-making.

Introduction

5. The Pacific Community (SPC) initiated Phase I of Digital Earth Pacific (DEP), in March 2021, to engage stakeholders, conduct a needs assessment, develop use cases and a prototype infrastructure, and use this experience to develop a business case for making free, open and operational satellite data available for the region.

6. Digital Earth Pacific will provide a digital public infrastructure that will ensure every nation in the Pacific has access to tools and technologies to routinely monitor and track challenges such as coastal inundation, deforestation, and illegal fishing through robust decision-ready products. The system condenses decades of freely available datasets to provide a near real-time understanding on issues such as the changing coastline, the impact climate-change is having on lagoon health, where hot spots for wave energy are located, and to combine weather outlooks and agricultural production for farmers across countries.

7. Following country consultation workshop held in 2021, in four countries, Tonga, Vanuatu, Republic of Marshal Islands and Fiji, to understand country needs, a needs assessment report was compiled which informed the product development and capacity building for Digital Earth Pacific.

Implementation Roadmap

8. A phased approach for establishing and growing the Digital Earth Pacific program through the 2030 timeframe has been proposed. The roadmap is presented according to three phases:
   - **Phase 1 (2022-2024): Setting the Foundation**
     Set the strategic foundations, iterating on the technical infrastructure and related use cases, engage stakeholders and develop a fully operational program.
   - **Phase II (2025-2027): Increase Capacity, Uptake and Engagement**
     Fully operationalize DEP. Existing capabilities will be leveraged and built upon to create new innovative, decision-ready products and applications with a focus on engagement and capacity development to ensure uptake, usage, and impact.
   - **Phase III (2028-2030): Establish a Data Ecosystem**
     DEP will have a network of data, users, applications, and knowledge in a place where data is flowing bi-directionally across organizations and platforms, creating a data ecosystem approach. Governments, the private sector, and civil society are not only using data, products, and services provided by DEP but also creating their own innovations powered by DEP.

Phase 1 Progress Update

9. Initiated in March 2021, the implementation of Phase 1 has seen incredible progress, with achievements including:
   - **User needs assessment:** Understanding data needs from countries was paramount to informing the development of DEP. In this regard, four (4) in-country consultation workshops were held virtually and physically in Fiji, the Republic of Marshal Islands,

Tonga, and Vanuatu. The analysis of the use needs resulted in an aggregated list of ranked tiers I and II priorities that would inform the work plan for product development for DEP.

- **Developed Business Case:** considering the undertaken Pacific needs assessment and the estimated return on investment from Digital Earth Australia
- **Established digital infrastructure and launched three (3) beta regional products**: This included the collation of over 750,000 satellite images over the 22 PICTS, computing infrastructure, and analytical tools for the development of the regional products.

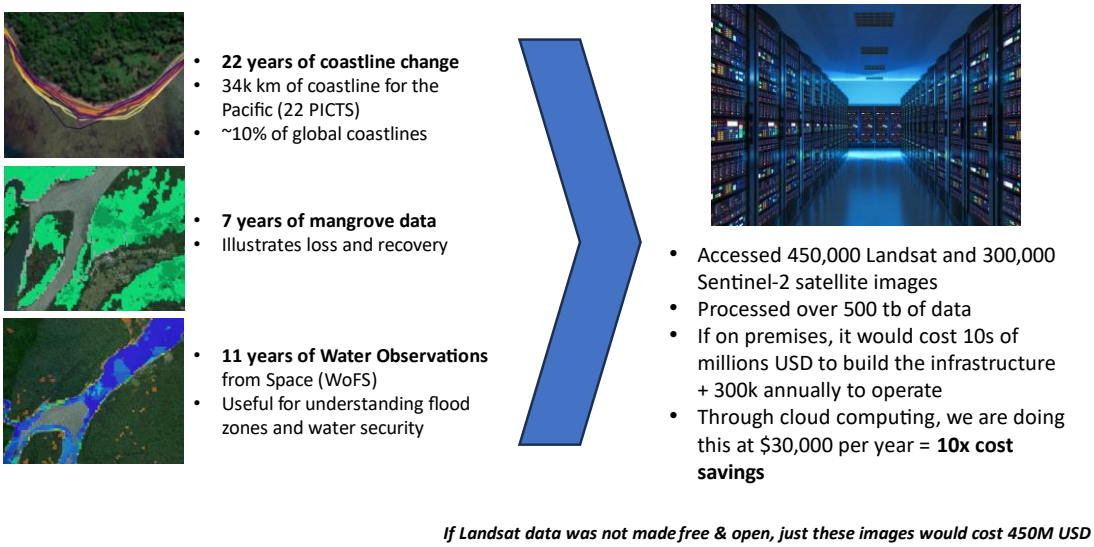


Figure 1 Digital Earth Pacific Infrastructure and three (3) regional products

10. The regional products are further complemented by bespoke co-created national products focused, two examples (Figure 2 and Figure 3) shown below on land use land cover national products.

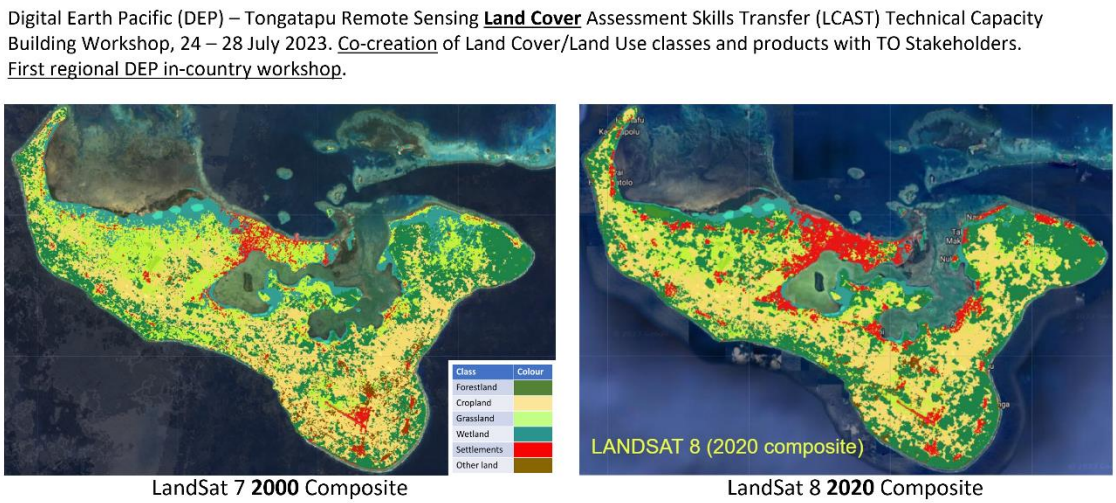
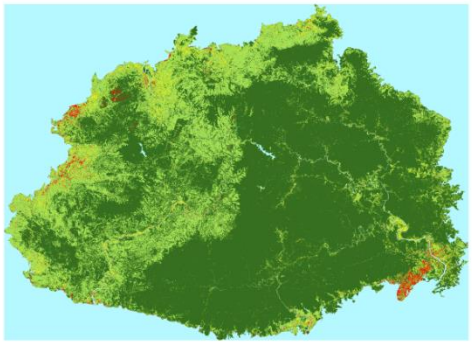


Figure 2 Tonga Land cover assessment skills transfer workshop



Held in March 2024. The core objective of the workshop was enabling the cabinet-mandated **National Land Cover Change Mapping Working Group (NLCMWG)** and utilising the official collated data points to build a machine learning model within Digital Earth Pacific to update and generate land cover maps and undertake change detection from 2017-2023.

17 participants (65% female) across 9 ministries, academia, GIZ and U.S. Forestry Service. Follow-up workshop in June.

Figure 3 Fiji land cover land use co-creation workshop

11. In addition to the three (3) regional products already developed, DEP holds the potential to further support agriculture and forestry services. In agriculture, DEP can provide valuable insights into crop health, soil moisture levels, and vegetation vigour, enabling farmers to make informed decisions regarding irrigation, fertilization, and pest management. By monitoring crop growth patterns and detecting anomalies early on, satellite imagery helps optimize yields and resource usage while mitigating risks, therefore informing countries' food security measures. DEP also supports Government Ministries of Agriculture monitor utilisation of land for agriculture, informing ownership and leases of land as well as agricultural census activities.

12. Moreover, in forestry, satellite imagery aids in forest management by assessing tree density and species distribution and detecting deforestation or forest degradation. This data supports national forest inventories, area-based sampling, plantation forestry, and sustainable forest management practices, such as reforestation planning and monitoring illegal logging activities.

13. Overall, satellite imagery enhances precision and efficiency in agricultural and forestry services, contributing to environmental conservation and agricultural productivity.

    - **Establish governance:** The DEP Steering Committee comprises of Pacific countries (Cook Islands, Fiji, Papa New Guinea, Marshall Islands, Solomon Islands, Tonga, Tuvalu, and Vanuatu), CROP agencies (Secretariat of the Pacific Regional Environment Programme (SPREP) and University of the South Pacific (USP)), Australia and international organisations (Committee on Earth Observation Satellites (CEOS), Group on Earth Observation (GEO), National Oceanic and Atmospheric Administration (NOAA), World Food Programme (WFP)).
    - **Capacity building and country engagement:** several capacity development and country engagement workshop have been held and further are planned for 2024.
    - **Communications and outreach:** outreach to members, communities and international partner organisations are held to raise awareness and promote DEP.

- **Resource mobilisation:** SPC has received financial support from several funding partners including Australia (DFAT) and United States (NOAA), Germany (GIZ), PIFS, New Zealand (MFAT), United Kingdom (FCDO), and McGovern Foundation.

Call to Action

14. To ensure DEP provides routine information in support of decision-making, members and partners are encouraged to work with SPC to:
    - Identify opportunities for broader showcasing of DEP.
    - Demonstrate current capabilities and products and understand relevance for your country.
    - Improve existing products through co-design.
    - Identify additional use cases and quick wins.
    - Identify opportunities for workshops focused on capacity development.
    - Develop partnerships that support the long-term sustainability of DEP.
    - Embed DEP in your science-policy interface to drive action and decision-making from DEP products and services.
    - Advocate for improved satellite data coverage over the Pacific region.

Recommendation:

15. The PHOAFS are invited to:
    1. **Note** the progress made in the development of Digital Earth Pacific and encourage members to increase the use of Earth observation technologies provided by this regional digital public infrastructure.
    2. **Support** SPC in engaging with countries to
        a. Identify opportunities to demonstrate DEP's current capabilities and products and understand relevance to members.
        b. Identify additional use cases and quick wins.
        c. Identify opportunities for workshops focused on capacity development.
        d. Embed DEP in national science-policy interfaces to drive action and decision-making from DEP products and services.