

→ E04SD – EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT

Agriculture and Rural Development | Cambodia

Land-use and infrastructure planning for rural development

Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD)

Climate-resilient Rice Commercialization Sector Development Program (Rice-SDP)

Strengthening Coordination for Management of Disasters Project (SCMD)



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1. INTRODUCTION

Despite Cambodia's significant economic growth in recent years, the persistence of rural poverty and growing income disparity between rural and urban areas have become a cause of deep concern for the government and its development partners. Around 85% of Cambodians depend on agriculture and non-timber forest extraction for a major part of their livelihoods, although these activities account for only about one-third of the national GDP.

Cambodia is one of the lowest per capita agricultural producers in Southeast Asia. Key issues affecting agriculture and rural development in the country include low cropping intensity and low yields, poor siting of agricultural production areas, roads and bridges, and high vulnerability of agricultural and urban areas to flooding and other climatic factors.

The Asian Development Bank (ADB) country strategy aims at reducing poverty and promoting inclusive growth with an integrated approach to rural development. EO4SD (Earth Observation for Sustainable Development) "Agriculture and Rural Development Cluster" supports ADB and its efforts to improve the agricultural sector through three projects all focused on rural provinces surrounding the Tonle Sap lake:

- ADB Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD)

The Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD) has been funded by ADB and the International Fund for Agricultural Development (IFAD). It focuses on improving rural infrastructure, agricultural productivity and monitoring of crop production (expanding from rice crops/yields to other main crops, expansion of irrigation canals, and access to markets). The Ministry of Agriculture, Forestry and Fisheries (MAFF) and the National Committee for Subnational Democratic Development Secretariat (NCDDSS) are the implementing organisations. Phase I of the TSSD project will be completed by end of February 2018, and phase II will be implemented from 2018 to 2022 following approval from the ADB and the Government of Cambodia.

- ADB Climate-resilient Rice Commercialization Sector Development Program (Rice-SDP)

The Climate-resilient Rice Commercialization Sector Development Program (Rice-SDP) will address key high priority and strategic measures to improve national food security and expand rice export through (i) removing legal and regulatory constraints inhibiting rice commercialization; (ii) improving productivity of paddy crops and consistency in quality of milled rice; (iii) enhancing rice value chain support services; and (iv) addressing risks of climate change through mitigation and adaptation.

The potential of satellite EO technology for effectively managing and planning land-use and infrastructures for rural development in Cambodia is presented in this document. The purpose is to raise awareness and demonstrate to MDBs and their local stakeholders in Cambodia added value of EO information products and services for implementation of their ongoing development projects and programs.

ADB country partnership strategy 2014 – 2018 for Cambodia

The strategy will embed the three strategic agendas of Strategy 2020 into all ADB operations: (i) inclusive economic growth, (ii) environmentally sustainable growth, and (iii) regional cooperation and integration. Public-private partnerships will serve as key relationships, as will strategies to enhance partnerships with co-financiers and implement knowledge activities. It will focus on six sectors: agriculture, natural resources, and rural development; education; finance; public sector management; transport; and water and other urban infrastructure and services.

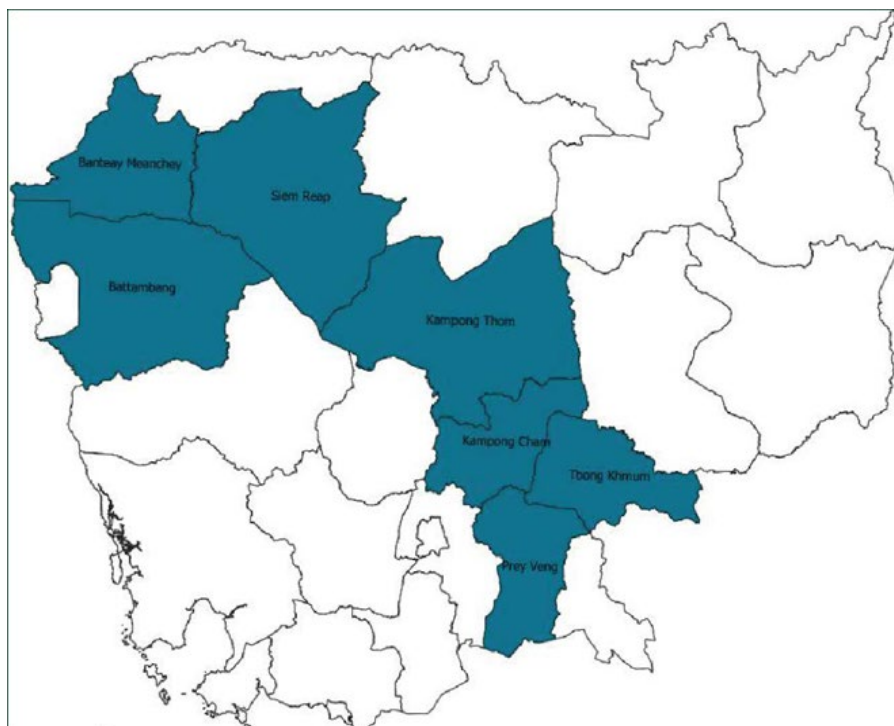


Figure 1 Figure 1 TSSD and Rice-SDP project areas. TSSD is implemented in all 7 provinces (dark blue), Rice-SDP only in Battambang, Kampong Thom and Prey Veng.

Credit: E04SD Agriculture Cluster

2. OBJECTIVES

E04SD (Earth Observation for Sustainable Development) “Agriculture and Rural Development Cluster” is a European Space Agency (ESA) initiative which aims at increasing the use of Earth Observation information products and services for international development projects. Collaboration with the Asian Development Bank (ADB) is one of its main targets. Its ultimate objective is to assist the ADB on several key investment areas:

Enhancing agricultural productivity which involves measures to make farm practices more efficient, based on the improved use of natural resources (e.g. soils and water) and preventing the exploitation of ecologically sensitive areas. Irrigation system enhancement is also a key element of investment portfolio, as it is crucial to improving the efficiency of water management and to maintain its operational sustainability.

Agricultural diversification, since future productivity growth in agriculture requires a shift toward higher-value outputs. Currently, Cambodia's agriculture sector is dominated by low yielding rice varieties with a maximum of two, but often only one, crop cycles a year. Solutions include the system of rice intensification, “drought escape”, precision or drip irrigation, small scale intercropping, zero or minimum tillage, and bare and degraded lands planting.

Sustainable natural resources management which includes mapping ecosystem functions and conducting assessments of ecosystem services as inputs into land-use planning processes, and improving monitoring systems, among others.

E04SD - Agriculture and Rural Development Cluster project aims at demonstrating the benefits of EO-based geo-information products and services to support agricultural monitoring and management tasks including:

- Monitoring agricultural production
- Monitoring and evaluation of land degradation
- Impact assessment of agricultural commodity production
- Mapping ecosystem services provided by agriculture
- Planning and monitoring of rural infrastructure investments
- Food security and agriculture risk management
- Support environmental and social safeguards frameworks
- Irrigation systems development and management

3. IMPLEMENTATION PLAN

E04SD defined and will develop a cluster of land information services that will be delivered to the ADB and their stakeholders in the form of mapping and monitoring tools and training activities in order to enhance the success of the respective projects in Cambodia. The E04SD “Agricultural and Rural Development Cluster” has identified two use cases:

(1) Land suitability for land use, intervention planning and agricultural expansion with reduced environmental impact. E04SD will provide with land information services in the form of mapping and monitoring tools. This includes:

- Historical change information on whether general cropping patterns have changed,
- Mapping the current status and productivity of the main crops: rice, sugar cane, cassava, sesame and, rubber plantations,
- Need for an operational system covering the entire country, monitoring of more crops than rice only.

(2) Agricultural disaster risk management support, which includes:

- Historical mapping of flood and drought risk to assist with infrastructure development of roads and irrigation networks,
- Monitoring (near-real time) status of crops and impact of floods and droughts.

The target partners are:

- **ADB** as the lead for the Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD)
- the **Ministry of Agriculture, Forestry and Fisheries** (MAFF) and the **National Committee for Subnational Democratic Development Secretariat** (NCDSD) as the implementing organisations for the TSSD project,
- **The Ministry of Water Resources and Meteorology** (MOWRAM) as one of the implementing organisations for the Rice-SDP project.

Earth Observation data, information products and services, available at the appropriate scales and timeframes, will be made accessible to the users through the E04SD data and information delivery platform (E04SD.lizard.net). The Lizard platform is used as a hub for data sharing and visualisation. Communication with Lizard will be available both via the web-interface (where the services and data products will be shown for different regions and scales) and through direct communication with an Application Programming Interface for continuous communication between the technical partners and the ESA consortium.

Table 1 List of multi-scale (regional and national level) indicators

Service level	Data	Spatial coverage	Temporal coverage	Spatial resolution	Description
Cambodia	Crop type and intensity	7 provinces	2014 - 2018	250m Prey Veng: 10-30m	Monitoring crop diversification: number of crop cycles (harvests) per year. This includes mapping the current status and productivity of the main crops: rice, sugar cane, cassava, sesame, and rubber plantations (pending ground reference data on provincial and local level)
	Flood risk (water extent)	7 provinces	1985 - 2018	250m Prey Veng: 10-30m	The extent and frequency of inundated and flooded areas
	Agricultural water productivity	7 provinces	2014 - 2018	250m	Agricultural productivity and water use efficiency on provincial and local level
	Drought	7 provinces	2014 - 2018	250m	Evapotranspiration deficit as a measure of drought
	Soil Moisture Monitoring	Cambodia	1990 - 2015	25km	Surface soil moisture: wetness of the soil
	Soil Water Index	Cambodia	2007 - 2015	10km	Surface soil moisture: wetness of the soil

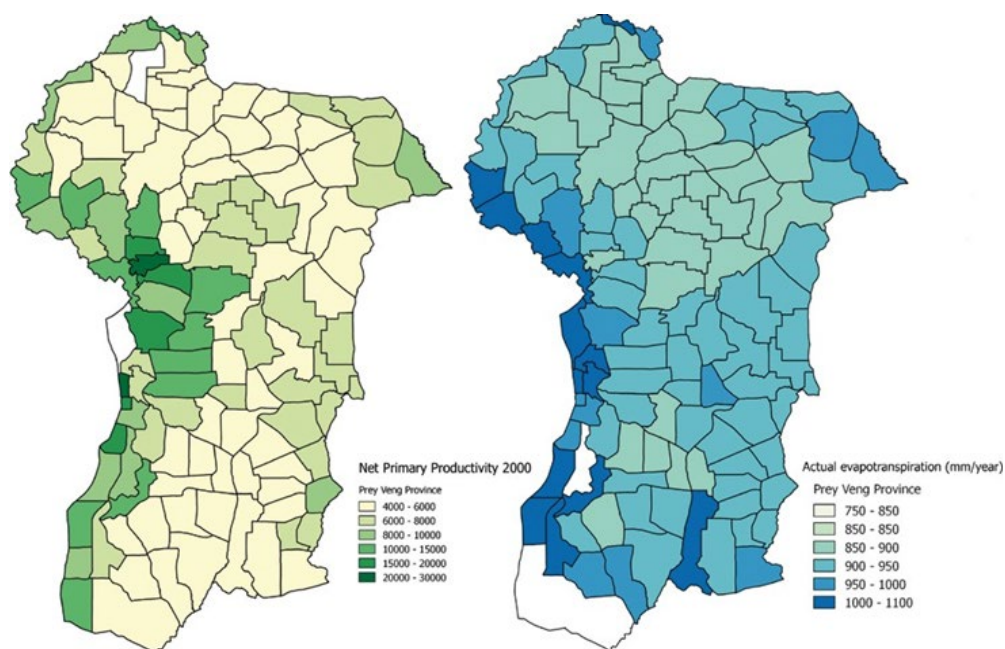


Figure 2 Crop primary productivity (left), and water consumption (right) in Prey Veng province, 2000.

Credit: E04SD Agriculture Cluster (eLEAF for ESA/ADB, 2017).

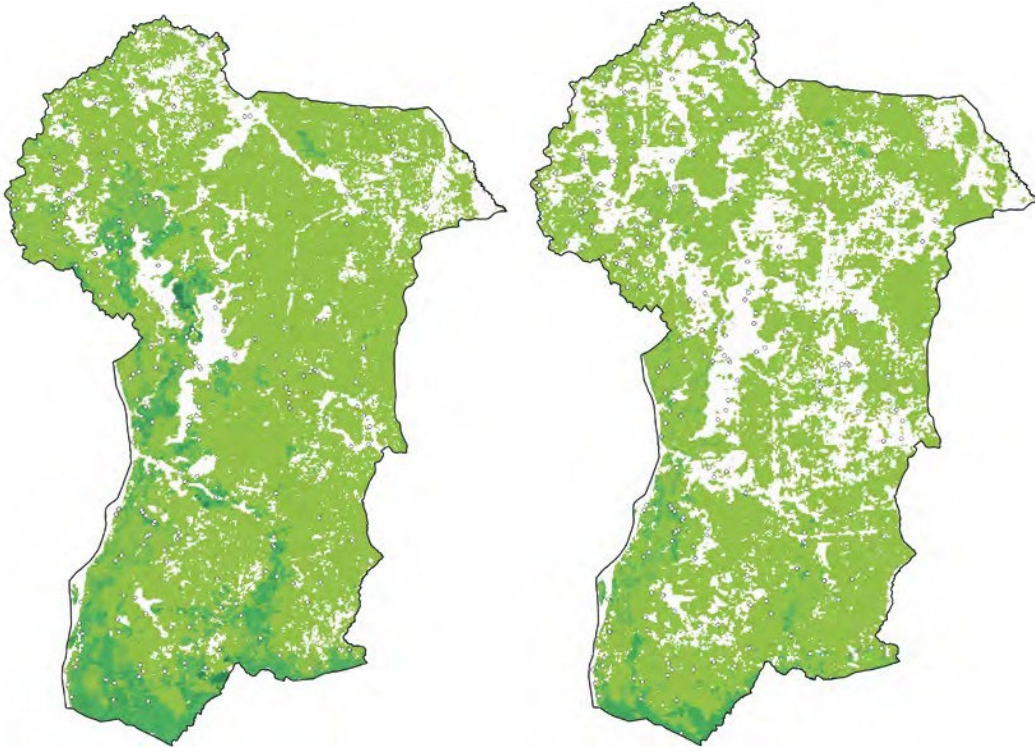


Figure 3 Number of rice harvests in Prey Veng province, in 2015 (left) and 2000 (right).

Credit: E04SD Credit: E04SD Agriculture Cluster (Satelligence for ESA/ADB, 2017).

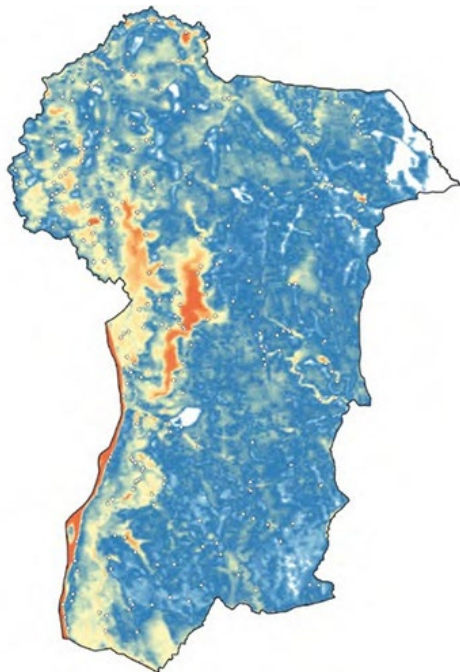


Figure 4 Inundated area and flood frequency (%), in Prey Veng province, 2010-2015.

Credit: E04SD Agriculture Cluster (Satelligence for ESA/ADB, 2017).

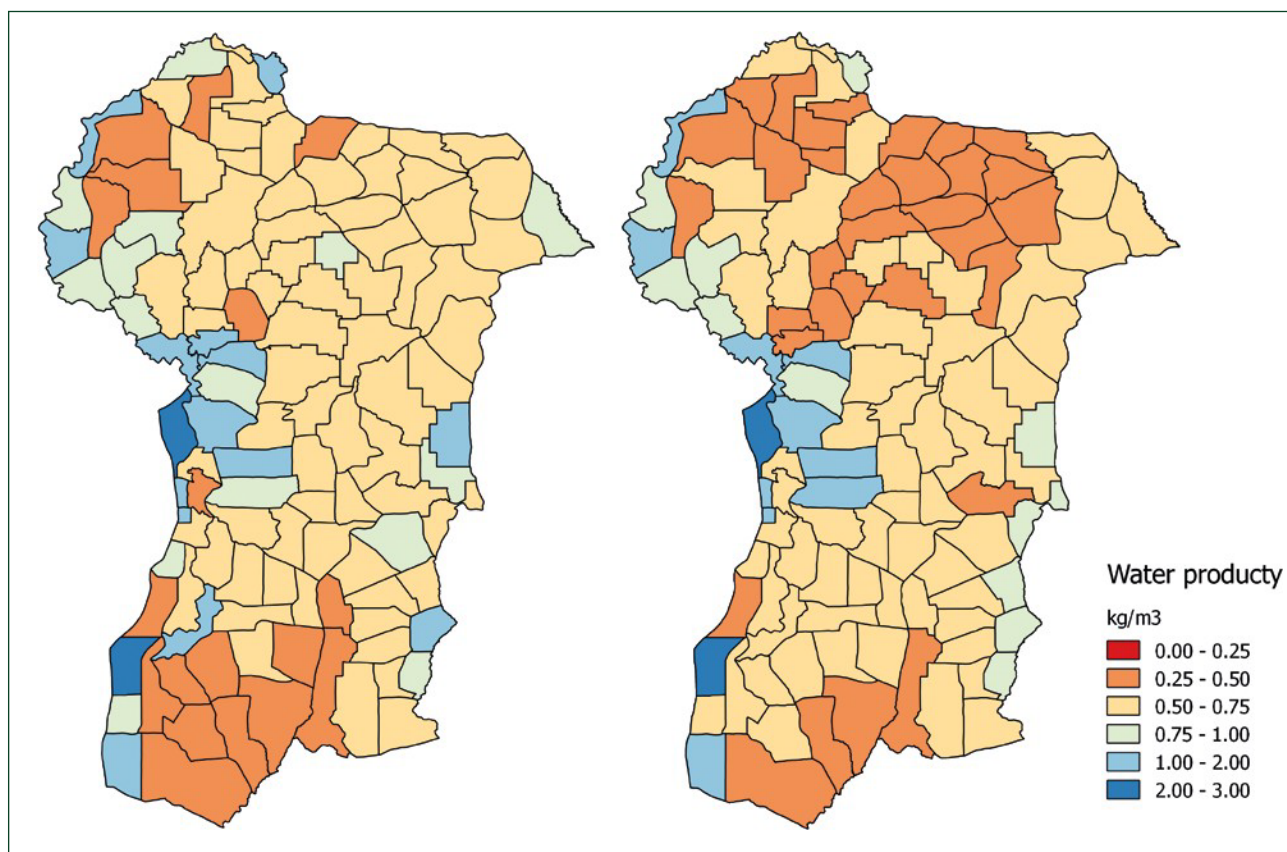


Figure 5 Biomass water productivity (kg/m³) in 2000 (left) and 2014 (right).

Credit: E04SD Agriculture Cluster (eLeaf for ESA/ADB, 2017).

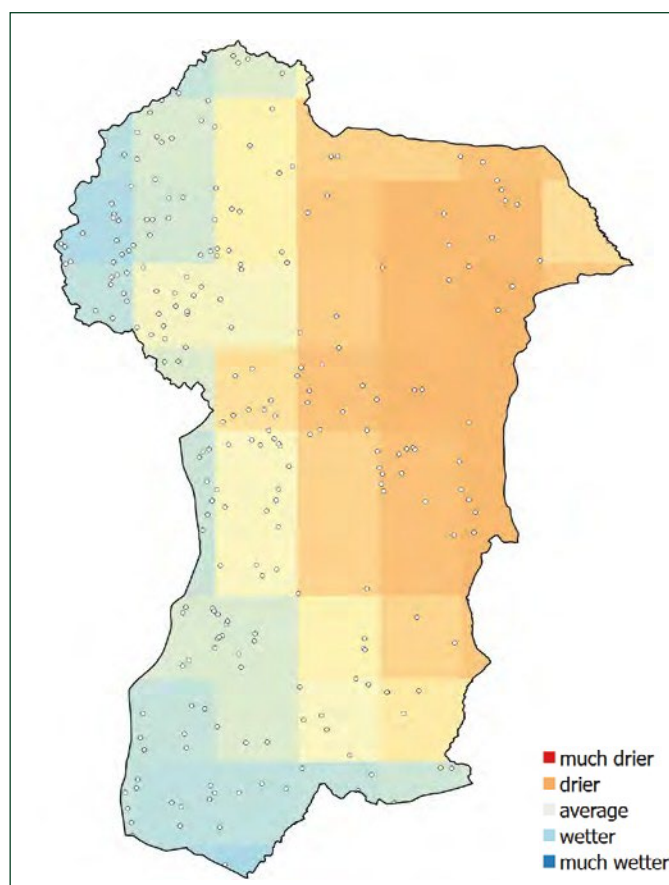


Figure 6 Soil Water Index, in Prey Veng province, December 2015. The map shows the relative wetness of certain areas.

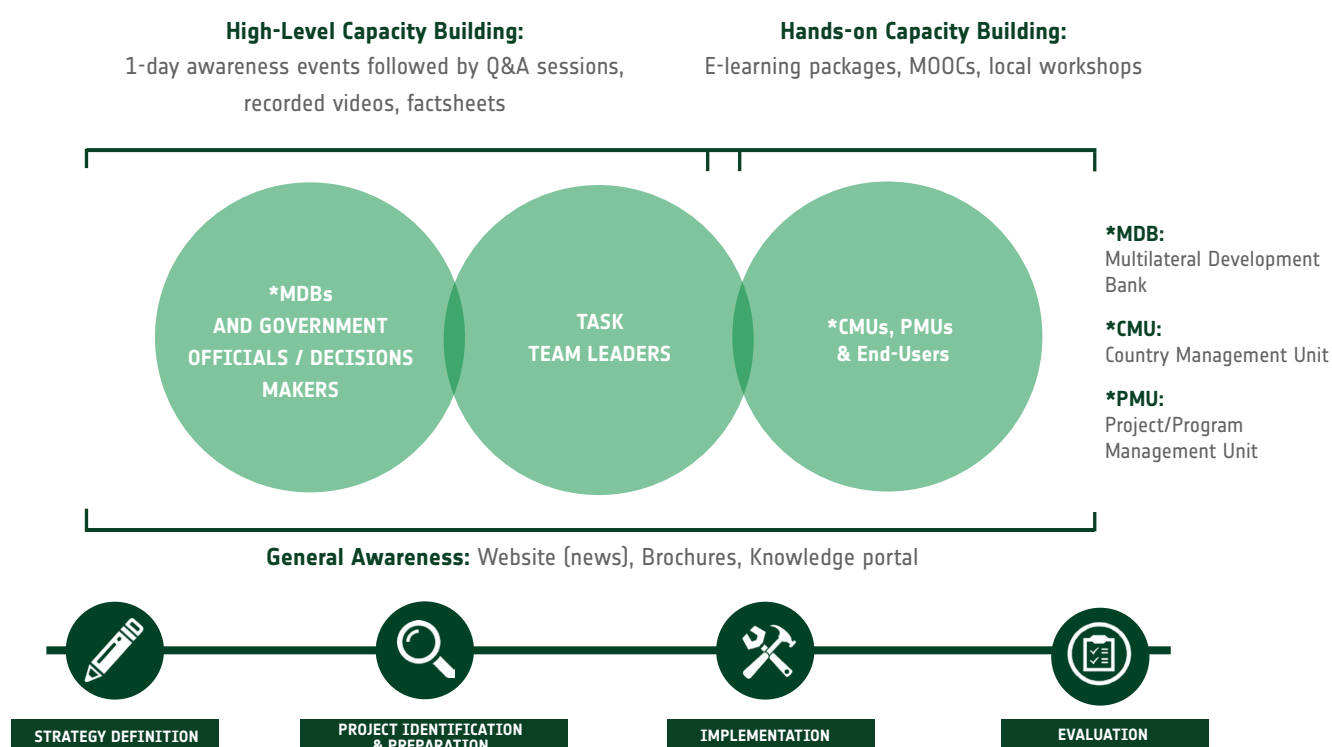
Credit: E04SD Agriculture Cluster (GeoVille for ESA/ADB, 2017).

4. CAPACITY BUILDING

The amount of free and open-access satellite data has increased dramatically with the commissioning of the Sentinel satellites. However national GIS and remote sensing centres or user organisations often lack the capacity to develop and use the data for monitoring and reporting activities. Developing a portfolio of tailored information services and ad hoc capacity building activities helps them to sustainably build up their decision-making capabilities as well as skills in EO data exploitation.

The training under the EO4SD umbrella is aimed at demonstrating the opportunities and benefits of using EO-based information services so that they become an integral part of the planning, operational, monitoring and evaluation phases of projects. This plan is implemented with the technical support of the ITC Faculty of Geo-Information Science and Earth Observation of the University of Twente, a global leader in training and capacity building in the field of geo-information science, Earth Observation and GIS. It was aimed at developing the skills set of remote sensing professionals and user organisations alike and included practical exercises concerning data application and use, lectures, and independent EO research by the participants. It will also specifically leverage free, open access Earth Observation data and programs.

This dedicated training component (see Figure 7) involved the organisation of awareness raising sessions with ADB Headquarters in Manila as well as national training workshops in Cambodia to be delivered in 2018 and 2019 timeframe gathering users from targeted ADB projects.



Partners of the Agriculture Cluster



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