

Japan International Cooperation Agency

**Human Resource Development
in Space Sector in Rwanda**

Final Report

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Human Resource Development in Space Sector in Rwanda

Final Report

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List of Abbreviations

Abbreviation	Definition
AfSA	African Space Agency
AI	Artificial Intelligence
ASES	Senegalese Space Study Agency
ASI	Italian Space Agency
BBM	Bread Board Model
CAD	Computer Aided Design
CDO	Chief Digital Officer
CFD	Computational Fluid Dynamics
CNES	National Center for Space Study
EC	European Commission
ESA	European Space Agency
EM	Engineering Model
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FM	Flight Model
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GIZ	German Agency for International Cooperation
GSaaS	Ground Station as a Service
GSMaP	Global Satellite Mapping of Precipitation
GSSTI	Ghana Space Science and Technology Institute
HAPS	High Altitude Platform Station
HEC	Higher Education Council
IAF	International Astronautical Federation
ICHARM	International Centre for Water Hazard and Risk Management
ICT	Information and Communication Technology
JAXA	Japan Aerospace Exploration Agency
JICA	Japan International Cooperation Agency
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KNUST	Kwame Nkrumah University of Science and Technology
KSA	Kenya Space Agency
Kyutech	Kyushu Institute of Technology
LaSEINE	Laboratory of Spacecraft Environment Interaction Engineering
MDR	Mission Design Review
MESRI	Ministry of Higher Education Research and Innovation
METEO	Meteorology Agency

Abbreviation	Definition
MINAGRI	Ministry of Agriculture and Animal Resources
MINEMA	Ministry in Charge of Emergency Management
MININFRA	Ministry of infrastructure
MIT	Massachusetts Institute of Technology
MoU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
OSIL	Open Source Integrated Library
PCB	Printed Circuit Board
PDR	Preliminary Design Review
RAB	Rwanda Agriculture and Animal Resources Development Board
RESTEC	Remote Sensing Technology Center of Japan
RHA	Rwanda Housing Authority
RSA	Rwanda Space Agency
SAR	Synthetic Aperture Radar
SATREPS	Science and Technology Research Partnership for Sustainable Development
UAV	Unmanned Aerial Vehicle
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOOSA	United Nations Office for Outer Space Affairs
UNISEC	University Space Engineering Consortium
UR	University of Rwanda
WFP	World Food Programme
WS	Workshop

Chapter 1 Overview of the Project

1.1 Background and Objective

The Republic of Rwanda has made ICT a strategic development pillar and has built its position as an ICT country amongst the African countries. The Government of Japan has fostered cooperation in the ICT sector in Rwanda. The Government of Rwanda is promoting “The National Strategy for Transformation (NST1)” (2017–2024), as its medium-term development strategy. One of the pillars of the strategy, “Economic Transformation,” is the promotion of a knowledge-based economy, with the aim of realizing social economic growth through the use of ICT as well as scientific and technological development. In addition, “The ICT Sector Strategic Plan” (2018-2024) sets forth five priority areas, including advanced technology skills and capacity development, with the aim of becoming leaders in the ICT and science and technology fields in Africa, and it promotes human resource development in these fields.

In the space sector related to ICT and science and technology, Rwanda established the Rwanda Space Agency (RSA) directly under the Presidential Office in 2019, and the University of Rwanda (UR) had planned to establish Rwanda's first aerospace engineering department in 2024. As support for Rwanda's space sector, the Cabinet Office of Japan, JAXA, Japanese universities and research institutes, and JICA supported the development and launch of Rwanda's first small satellite (RWASAT-1). In addition, advisers have been dispatched to assist in the development of Rwanda's draft national space strategy. However, there is a lack of experience in the use of satellite data in Rwanda, and it is necessary to develop human resources for products, technologies, and know-how related to the use of geospatial information in climate change, environmental monitoring, agriculture, and disaster preparedness. Therefore, JICA formulated this project aiming that “Function to develop and produce human resources who contribute to the development of satellite and promotion of satellite data utilization over the medium to long term, and RSA's cooperation with relevant organizations (including ministries) are enhanced”.

1.2 Project Overview

With regard to the "Human Resource Development in the Space Sector in Rwanda" scheduled to be implemented from September 2023 to January 2026, this project will provide human resource development activities in the space sector, especially in the field of satellite technology and the utilization of satellite data. The project overview is summarized in the table below.

Table 1 Project overview

Title of the Project	Human Resource Development in Space Sector in Rwanda
Project Purpose	Function to develop and produce human resources who contribute to the development of satellite and promotion of satellite data utilization over the medium to long term, and RSA's cooperation with relevant organizations (including ministries) are enhanced.
Project Output	<p>Output 1: Development of Satellite and/or related infrastructure is promoted and satellite data utilization at the RSA and related institutions (end users of data) is enhanced.</p> <p>Output 2: Education and research capacity of the University of Rwanda in satellite development and the use of geospatial information is strengthened.</p> <p>Output 3: Cooperation between RSA and related institutions (international organizations, Japanese institutions, others) is enhanced.</p> <p>Output 4: The social economic impact of space technology in Rwanda is measured.</p>
Project Activities	<p>Activity 1-1: To assess and highlight the existing gaps of the status of development of satellite and/or related infrastructure and satellite data utilization in RSA, and the status of cooperation between RSA and relevant institutions (end users of data).</p> <p>Activity 1-2: To formulate capacity developing programs regarding development of satellite and satellite data utilization in RSA and relevant institutions (end users of data).</p> <p>Activity 1-3: To conduct training programs of development satellite and satellite data utilization for RSA and related institutions (end users of data).</p> <p>Activity 1-4: To conduct follow-up support to RSA and relevant institutions (end-users) for the promotion of satellite development and satellite data utilization.</p> <p>Activity 2-1: To analyze the UR's current status toward development of aerospace engineering program and of recommend necessary interventions.</p> <p>Activity 2-2: To prepare the planning for preparation of human resources and facilities in aerospace engineering in the organizations other than UR.</p> <p>Activity 2-3: To conduct training programs of the of aerospace engineering program development for UR and stakeholders.</p> <p>Activity 3-1: To advocate for cooperation between RSA and Japanese organizations, international organizations and others.</p> <p>Activity 3-2: To propose and strengthen the cooperation with Japanese institutions (space agencies, universities and others).</p> <p>Activity 3-3: To provide networking opportunities with Japanese institutions and companies at space-related events to be held in Africa and other area.</p> <p>Activity 4-1: To prepare quarterly and annual reports highlighting social economic impact assessment.</p> <p>Activity 4-2: To conduct workshops in social economic impact assessment.</p> <p>Activity 4-3: To conduct consultations on the utilization of reports on social and economic impact at quarterly meetings and update the reports.</p>

Implementing Agency	RSA in cooperation with UR and related agencies in Rwanda.
Period of the Project	September 2023 to January 2026 (28 months in total)

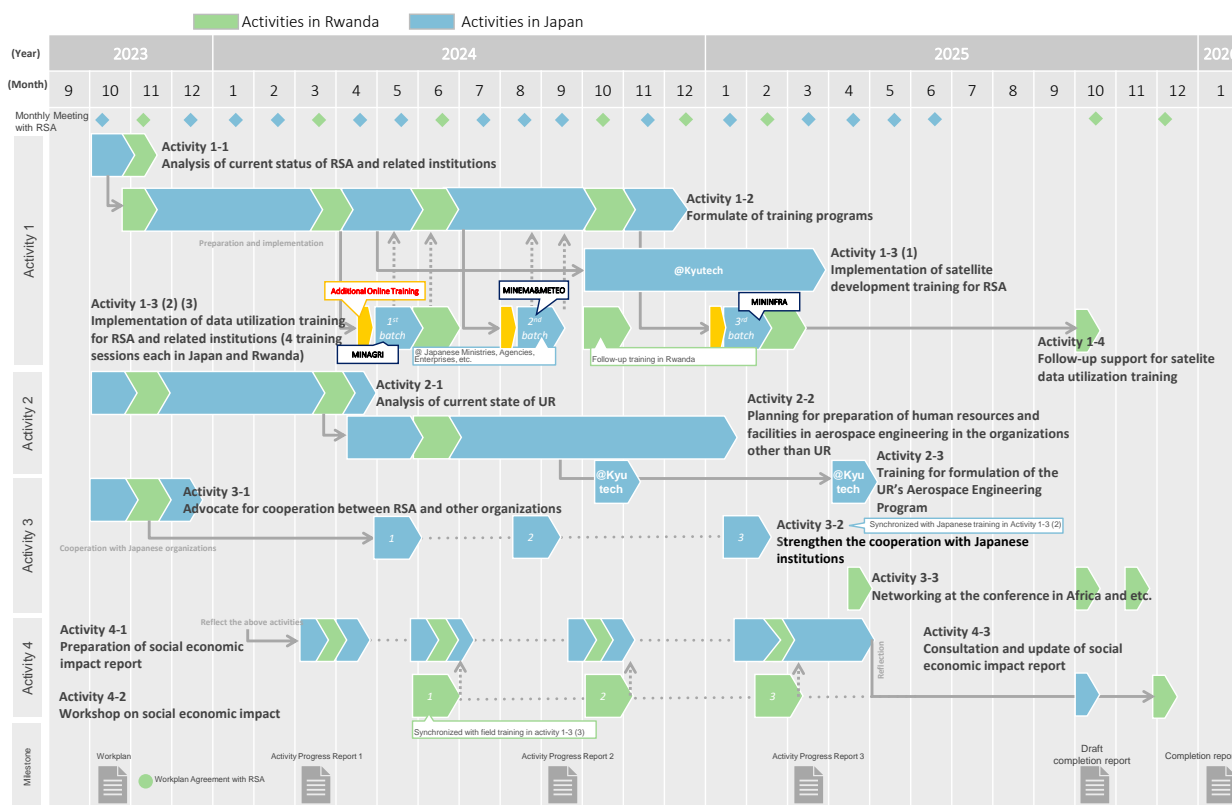
*Activities 1-4, 3-3, and 4-3 were added in July 2025.

Source: Minutes of Meeting between JICA and RSA (on June 22, 2023)

Chapter 2 Implementation Results of Project Activities

2.1 Implementation results of whole project

The project began in October 2023, and although the schedule has been partially changed due to consideration of coordination with external events, etc., as shown in the figure below, progress has been generally made as scheduled.



Source: JICA Project Team

Figure 1 Project workflow

2.2 Implementation results by output

The implementation results for each output are described below.

2.2.1 Activities relating to “Output 1: Development of Satellite and/or related infrastructure is promoted and satellite data utilization at the RSA and related institutions (end users of data) is enhanced”

■ Training on satellite data utilization:

Interviews were conducted with the RSA and the end user institutions, such as the Ministry of Agriculture and Animal Resources (MINAGRI), the Rwanda Meteorological Agency (METEO), the Ministry of Infrastructure (MININFRA), and the Ministry of Emergency Management (MINEMA), during the trip of JICA Project Team in November 2023 to confirm the current situation and update the training implementation policy (an overview is shown below).

Institution	Findings on Interview	Update on Training Implementation Policy
RSA	<ul style="list-style-type: none"> • Related ministries and agencies need to learn the basic level of satellite data utilization. • First priority is training engineers, then networking. • Need hands-on training based on specific use cases. 	<p>Update on Training Implementation Policy</p> <p>Pre-training preparation :</p> <ul style="list-style-type: none"> • Content of training in Japan focus on practical aspects, with basic content covered online beforehand. <ul style="list-style-type: none"> ➢ In online contents, provide basic –level training mainly for 4 relevant institutions. ➢ Participants for Online training includes not only the 2 (CDO, engineer) but also around 10 participants for each institutions. ➢ The training order is determined based on the specificity and progress of the use cases of satellite data by the institutions. <p>Approach of Training in Japan</p> <ul style="list-style-type: none"> • Design the training content based on the use cases of 4 relevant institutions and determine the visiting sites accordingly. <ul style="list-style-type: none"> ➢ Provide networking opportunities with individuals at various levels, including management level to and on-site level such as engineers.
MINAGRI	<ul style="list-style-type: none"> • Current status: Started working on crop type mapping in cooperation with RSA. • Need: We would like to gain knowledge on the use of satellite data to contribute to decision-making in the agricultural sector. 	
METEO	<ul style="list-style-type: none"> • Current status: Until now, data related to weather patterns such as rain, clouds, temperature and convection have been used. This is the first time we have worked with RSA. • Need: The use of satellite data is not often conducted so far and access to data is a major challenge. 	
MININFRA	<ul style="list-style-type: none"> • Current status: GIS is used by several people. Secondary data based on satellite data are often used. • Needs: We want to use satellite data to monitor infrastructure nationwide. Technically, access to satellite data and analysis technology are the issues. 	
MINEMA	<ul style="list-style-type: none"> • Current status: Working with RSA to map flood affected areas. • Need: Regarding disaster risk reduction, it is better to participate in the training jointly with METEO because of the cross-cutting theme. As satellite data is a new technology, access to tools and imagery as well as skills is a challenge. 	

Source: JICA Project Team

Figure 2 Overview of Interview to RSA and End User Institutions and Training Policy Update

The main points are as follows: (1) training on satellite data utilization should be practical and based on use cases, and (2) basic training should be acquired by taking additional online courses beforehand. Based on this study, the purpose and structure of the training were summarized as shown in the figure below. Of the objectives listed in the table below, this section, 2.2.1, describes activities related to training professionals who handle satellite data and section 2.2.3 “Activities relating to ‘Outcome 3: Cooperation between RSA and related institutions (international organizations, Japanese institutions, others) is enhanced’” describes activities related to establishment of collaborative framework between RSA and relevant institutions and collaboration between RSA and private sector companies.

As for METEO and MINEMA, since they are collaborating under the same target use case (disaster prevention), it was proposed and agreed that training should be conducted jointly. Therefore, the number of training sessions related to satellite data utilization was changed from one training session at each institution (four sessions in total) to three training sessions by integrating the training sessions of METEO and MINEMA (however, the total number of participants was not changed). This change was reflected in the Work Plan (Version 2) updated in December 2023.

Table 2 Purpose and structure of training on satellite data utilization

<p>Training professionals of handling satellite data (Output 1)</p>	<ul style="list-style-type: none"> • While satellite data is becoming more affordable, open, and sophisticated in computational capabilities, there is a shortage of engineers skilled in utilizing technologies like AI for satellite data analysis. • Moreover, addressing social challenges through satellite data requires considering integrated approaches with positioning (GNSS), location, weather, and movement data. • Professionals with expertise in analyzing satellite data and collaborating with external research institutions, such as universities, are essential to promote the utilization of satellite data.
<p>Establishment of collaborative framework between RSA and relevant institutions (Output 2)</p>	<ul style="list-style-type: none"> • To promote the effective utilization of satellite data, it is essential for RSA and relevant ministries to have a common understanding of social challenges (such as disasters, agriculture production, and infrastructure maintenance) and establish a collaborative framework based on on the concrete use case in each sector. • By addressing these social challenges as the starting point, roles can be defined, including providing satellite data and analysis results from RSA to relevant ministries and considering proposals for satellite data utilization methods and regulatory adjustments from the ministries.
<p>Collaboration between RSA and private sector companies (Output 3)</p>	<ul style="list-style-type: none"> • Space and satellite data-related private sector companies are key players driving the growth of the space industry. They, especially startups, require support in funding, core technology development, talent matching, and international expansion/connection formation. • Through learning collaboration cases and support systems in Japanese institutions, RSA and related institutions explores how to collaborate effectively with private enterprises.

Source: JICA Project Team

The satellite data used in the hands-on training of this training session was as follows. Based on data that can be obtained from Sentinel without charge, RESTEC selected Sentinel-2 optical imagery for vegetation monitoring in the agriculture sector and Sentinel-1 SAR imagery for flood inundation area extraction in the disaster management sector. For the infrastructure sector, RESTEC also obtained commercially-available Pleiades data tailored to the size of the target (illegal construction). The following data was procured and processed by RESTEC for training purposes and does not include data that was examined and prepared by individual trainees during training or data provided by RSA.

Table 3 Satellite data used in hands-on training

Field of training	Satellite	Satellite engine	Number of scenes
Agriculture	Sentinel-2	ESA, EC	7
Disaster management	Sentinel-1	ESA, EC	10
Infrastructure	Pleiades	Airbus DS	2
Infrastructure	Sentinel-2	ESA, EC	2

Source: JICA Project Team

i) Satellite data utilization training for agriculture:

As satellite data utilization training for the agricultural sector, an online course was conducted for MINAGRI and RSA in April 2024, followed by training in Japan in May 2024 and follow-up training in June 2024. The outline of the training is shown below.

Components	Participants	Duration	Outline
i) Online Training	About 6 persons from MINAGRI	April 22-25, 2024 (4 days)	<ul style="list-style-type: none"> Content of training in Japan focus on practical aspects, with basic content covered online beforehand. <ul style="list-style-type: none"> In online contents, provide basic level training for MINAGRI and RSA. Design the training content based on the use cases of agricultural applications.
ii) 2-week Training in Japan	<ul style="list-style-type: none"> 2 persons from MINAGRI (CDO and Engineer) 1 person from RSA 	May 11-26, 2024 (2 weeks in Japan)	<ul style="list-style-type: none"> Design the training content based on the use cases of MINAGRI and determine the visiting sites accordingly. <ul style="list-style-type: none"> Conduct advanced training sessions to promote use case for MINAGRI and RSA by RESTEC. Networking sessions with relevant government institutions and Japanese space-related companies in agricultural sector.
iii) Follow-up Training in Rwanda	<ul style="list-style-type: none"> About 6 persons from MINAGRI 1 person from RSA 	Jun 11-19, 2024 (6 days in Rwanda)	<ul style="list-style-type: none"> In order to share learning in Japan with other persons in MINAGRI and RSA, follow-up training focusing on satellite data utilization for agricultural use cases was provided During follow-up training, workshop on social economic impact was held.

Source: JICA Project Team

Figure 3 Overview of training on satellite data utilization for agriculture

<Online course for agriculture (April 22 to 25, 2024)>

As shown in the figure below, the online course was conducted mainly for MINAGRI from April 22, 2024 to 25th. From MINAGRI, 6 persons participated.

Objective	To acquire the basic knowledge of remote sensing so that we can focus on the specific knowledge and technology in the agricultural application at the training in Japan
Program	<p>The proposed dates and time are 8:30–10:30 in Kigali / 15:30 – 17:30 in Tokyo time on April 22 – 25, and the proposed content is as below. .</p> <ul style="list-style-type: none"> Day 1: Mon, Apr 22: Overview of satellite remote sensing including Orbit, Commercialization, VEGA*, introduction to the training in Japan Day 2: Tue, Apr 23: Principle of optical remote sensing, visualization and interpretation of Sentinel-2 and Landsat data using VEGA Day 3: Wed, Apr 24: Principle of SAR remote sensing, visualization and interpretation of Sentinel-1 data using VEGA Day 4: Thu, Apr 25: Analysis example, use cases, agricultural applications, overall discussion.

*VEGA is the Visualizing Earth tool by Google Earth Engine Apps which RESTEC developed for the basic training. It allows you visualize free and open satellite data online.

<https://geerestec.users.earthengine.app/view/vega-restec-en>

Source: JICA Project Team

Figure 4 Overview of online course of satellite data utilization for agriculture

<Training in Japan for the agricultural sector (May 13 to 24, 2024)>

From May 13, 2024 to 24, two trainees from MINAGRI and one from RSA participated in the training in Japan with the following objectives.

- To acquire knowledge and skills in the agricultural field through lectures, consultations, and practical training on the use of satellite data in the field.
- To learn about cooperation systems and methods among Japanese administrative agencies in the utilization of satellite data, and to consider establishing cooperation systems in one's own country.
- To learn about cooperation systems and methods among Japanese industry, government and academia in the utilization of satellite data, and to consider the establishment of cooperation systems in one's own country.

The overall schedule of the training is shown in the table below.

Table 4 Overall schedule of training in Japan for satellite data utilization for agriculture

Date	Programs, Visits, and Responsible Agencies
Monday, May 13	<ul style="list-style-type: none"> • JICA Briefing • Introduction to remote sensing: (1) Review of online training, data retrieval and visualization (RESTEC)
Tuesday, May 14	<ul style="list-style-type: none"> • Lecture on the Ministry of Agriculture, Forestry and Fisheries's Utilization of Satellite Data (Ministry of Agriculture, Forestry and Fisheries) • Introduction to Remote Sensing: (2) Use in Agriculture (RESTEC)
Wednesday, May 15	<ul style="list-style-type: none"> • Lecture on agricultural services using satellite data (Sagri) • Lecture on Satellite Data Pipeline Service (Yamaguchi University) • Visit to SusHi Tech Tokyo 2024
Thursday, May 16	<ul style="list-style-type: none"> • JAXA Earth Observation Center Visit (RESTEC) • Inspection of Antenna and Receiving Facilities and Introduction of Research on SAR Data (Tokyo Denki University)
Friday, May 17	<ul style="list-style-type: none"> • Satellite cropping Estimation: (1) A Case Study of Rice Cultivation in Japan (RESTEC) • Satellite acreage estimation: (2) Various analytical approaches (RESTEC) • Meet Up with Space players (Deloitte)
Monday, May 20	<ul style="list-style-type: none"> • Satellite cropping Estimation: (2) Analytical Approach (RESTEC) • Clean Room Tour and AxelGlobe Overview (Axelspace)
Tuesday, May 21	<ul style="list-style-type: none"> • Satellite acreage estimates: (3) Rwanda trials on crops (RESTEC)
Wednesday, May 22	<ul style="list-style-type: none"> • Lectures and Visits on Satellite Data Utilization at NARO (NARO) • JAXA Tsukuba Space Center Visits and Exchanges Opinions (Dear JAXA)
Thursday, May 23	<ul style="list-style-type: none"> • Satellite yield estimation: (1) Case study of rice cultivation in Japan, an analytical approach (RESTEC) • Satellite yield estimation: (2) Trial on Crops in Rwanda (RESTEC)
Friday, May 24	<ul style="list-style-type: none"> • Preparation of data for presentation of results • Results presentation and closing ceremony • Visit to JICA Headquarter

Source: JICA Project Team

As shown in the table below, 3 persons including the Chief Digital Officer (CDO) of MINAGRI participated in this training.

Table 5 Trainees of the training in Japan for satellite data utilization for agriculture

	Name	Institution and title
1	Ms. NEZERWA Martine	Chief Digital Officer, Digitalization Office, Ministry of Agriculture and Animal Resources
2	Mr. TUYIZERE Jean Baptiste	Senior Software Developer, Digitalization Office, Ministry of Agriculture and Animal Resources
3	Mr. ISHIMWE MBARAGA Samuel	Geospatial Analyst, Earth Observation Dept., Rwanda Space Agency

Source: JICA Project Team

This training was carried out according to the above schedule. Below is a photo of the training.



Lecture by Sagri, May 15, 2024



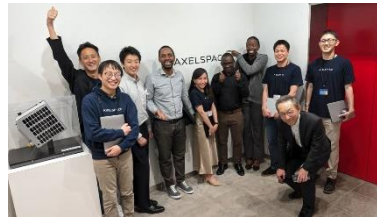
Visit to SusHi Tech Tokyo 2024
(May 15, 2024)



Visit to the Earth Observation Center
(May 16, 2024)



Meeting with space-related
companies (May 17, 2024)



Lecture by Axelspace
(May 20, 2024)



Hands-on training by RESTEC
(May 21, 2024)



Lecture by NARO
(May 22, 2024)



Exchange of opinions and
inspection with JAXA (May 22,
2024)



Courtesy Visit to JICA Headquarters
(May 24, 2024)

<Follow-up training for agriculture (June 11 to 19, 2024)>

As shown in the figure below, follow-up training in Rwanda was conducted for MINAGRI and RSA from June 11, 2024 to 19. It was conducted mainly for participants of the online course. Six participants from MINAGRI and one from RSA participated. On the last day of the follow-up training, a workshop on socio-economic effects of satellite data utilization was held. The workshop is reported in “Activities relating to Output 4 “The social economic impact of space technology in Rwanda is measured””.

Objective	<ul style="list-style-type: none"> To share the specific knowledge and technology in the agricultural application at the training in Japan to other staff and engineers. We expect the Japan training participants to play active role to share their experience (as lecturer) 			
Participants	<ul style="list-style-type: none"> Online training participants from MINAGRI and RSA, and other relating staff and engineers 			
Venue	KLab: https://klab.rw/			
Program (tentative)	Date	Time	Contents	Instructor
	Tue, Jun 11	10:00-12:00	Lecture: Recap of Basic RS and Agricultural RS	Kamei, RESTEC
		12:00-13:00	Lunch break	
		13:00-15:00	Report: Cropland classification / Yield estimation	MINAGRI/RSA
	Wed, Jun 12	10:00-15:00	Exercise: Cropland classification / Yield estimation (including 1 hour break for lunch)	Kamei, RESTEC
	Thu, Jun 13	10:00-15:00	Lecture & Exercise: Agricultural RS with Python (including 1 hour break for lunch)	Yamamoto, Deloitte
	Fri, Jun 14	AM	Move to the crop fields around Kagitumba	
		PM	Field survey	
	Sat, Jun 15		Move back from Kagitumba to Kigali	
	Sun, Jun 16		Day off	
	Mon, Jun 17		Day off (National Holiday)	
Tue, Jun 18	10:00-15:00	Verification using the field data and statistic data (including 1 hour break for lunch)		
Wed, Jun 19	10:00-17:00	One day workshop on social economic impact		

Source: JICA Project Team

Figure 5 Overview of follow-up training for satellite data utilization for agriculture

This training was carried out according to the above schedule. Below is a photo of the training.



Follow-up training
(June 18, 2024)



Social Economic Impact Workshop
(June 19, 2024)



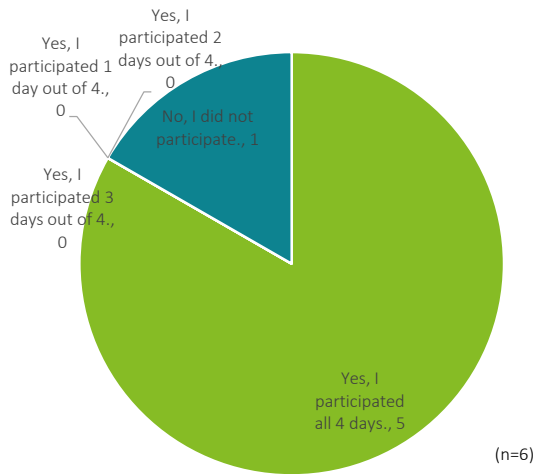
Social Economic Impact Workshop
(June 19, 2024)

At the end of the training, a questionnaire on the training was conducted. The results are summarized as follows.

Table 6 Outline of questionnaire after the follow-up training (satellite data utilization for agriculture)

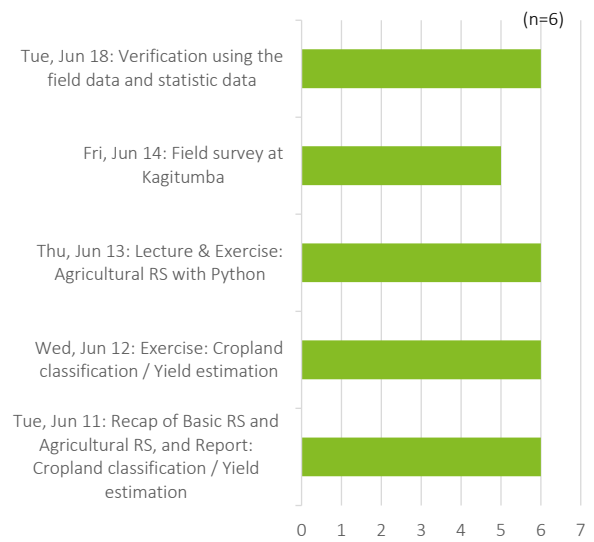
Purpose	To get feedback on follow-up training for satellite data utilization from June 11 to 18 in order to plan further capacity building in space sector
Target Respondents	7 participants of follow-up training (1 from MINAGRI , 5 from RAB under MINAGRI and 1 from RSA)
Collected answer	6 answers collected

Source: JICA Project Team



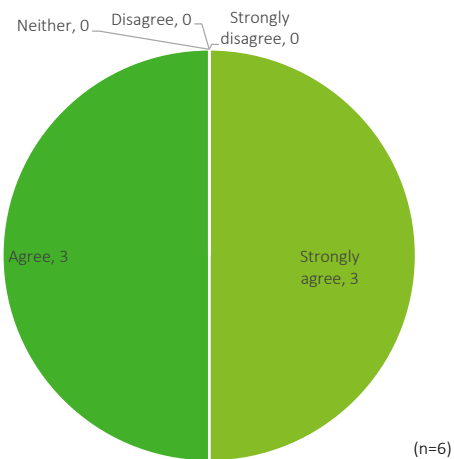
Source: JICA Project Team

Figure 6 Post follow-up training questionnaire (agriculture): Participation in online courses



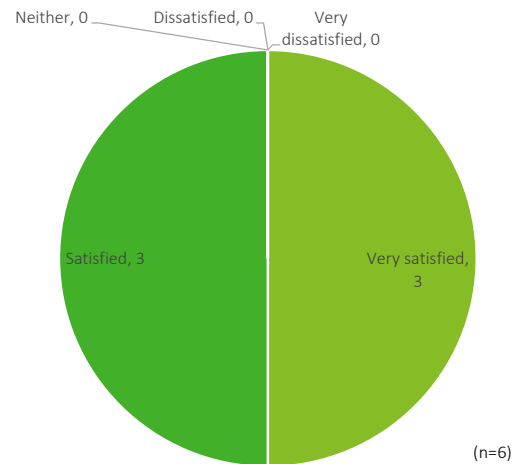
Source: JICA Project Team

Figure 7 Post follow-up training questionnaire (agriculture): Participation in follow-up training



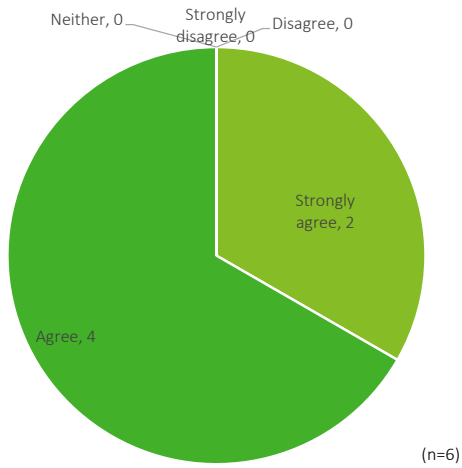
Source: JICA Project Team

Figure 8 Post follow-up training questionnaire (agriculture): Did you clearly understand the objectives of the follow-up training before participating in the training?



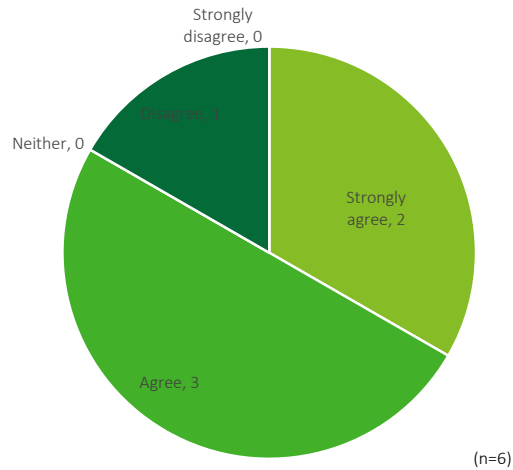
Source: JICA Project Team

Figure 9 Post follow-up training questionnaire (agriculture): Satisfaction with the follow-up training program as a whole



Source: JICA Project Team

Figure 10 Post follow-up training questionnaire (agriculture): Can the knowledge and experience acquired in the follow-up training be used in operation?

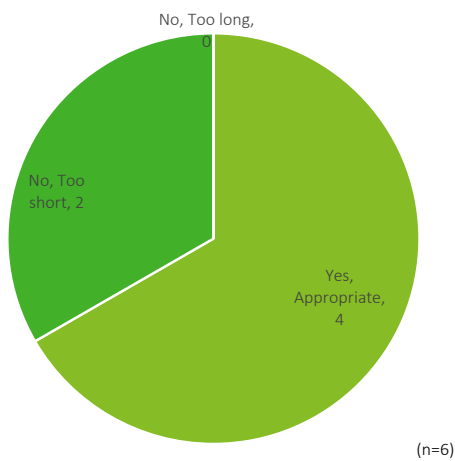


Source: JICA Project Team

Figure 11 Post follow-up training questionnaire (agriculture): Was the curriculum structure of the follow-up training appropriate?

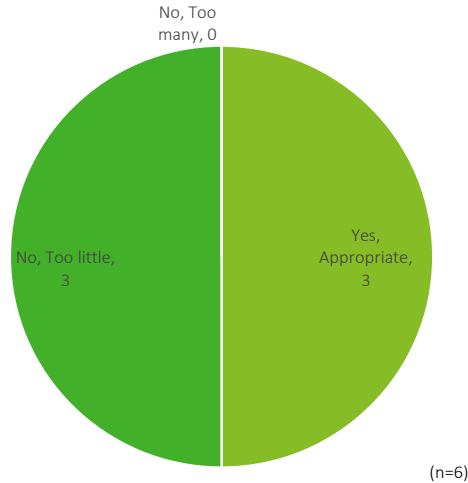
Comments related to "Can the knowledge and experience acquired through the follow-up training be used in business?":

- I am delighted, however, it would be much better to have an individual case study that each and every one have to work on and present.



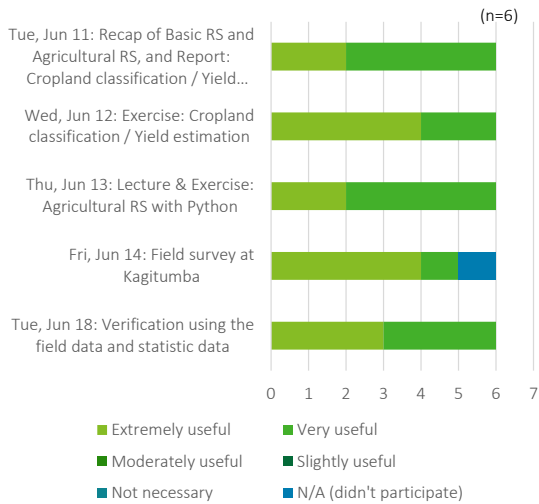
Source: JICA Project Team

Figure 12 Post follow-up training questionnaire (agriculture): Was the length of the follow-up training adequate?



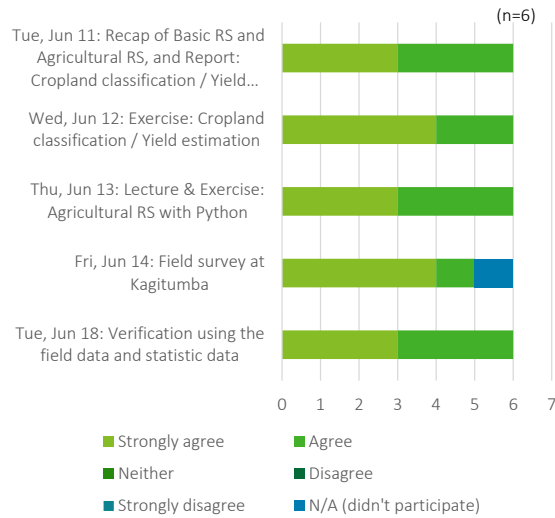
Source: JICA Project Team

Figure 13 Post follow-up training questionnaire (agriculture): Was the number of participants in the follow-up training adequate?



Source: JICA Project Team

Figure 14 Post follow-up training questionnaire (agriculture): Were the subjects and content (lectures, workshops, teaching materials, etc.) useful?



Source: JICA Project Team

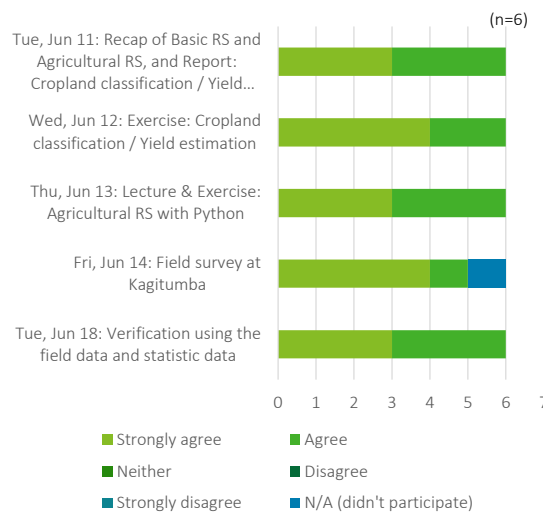
Figure 15 Post follow-up training questionnaire (agriculture): Was the lecturer's presentation and explanation easy to understand?

Comments related to "Subjects and content that were not covered in this training but should be included":

- Using ArcGIS in cropland classification
- The use of Arc GIS software
- Using parcel data to mask out unimportant areas

Comments on the above reasons:

- Because ArcGIS is the one we used in our daily activities
- Rwandan parcel data could not be used because it is not publicly available. However, for the Japan example use cases, it could have been possible for the sake of demonstrating how it's done.



Source: JICA Project Team

Figure 16 Post follow-up training questionnaire (agriculture): Were the materials of high quality and useful?

Comments related to "Were the materials high quality and useful?": <ul style="list-style-type: none"> • Training materials were prepared well as much as possible
Other Program Comments: <ul style="list-style-type: none"> • Python training should be given more time. • More practices in Python are welcome • Thanks for your time and share the moment together we will be waiting for other session • We need more time specifically on Python • The program was very informative for an introduction to remote sensing

<Achievements and challenges of training for agriculture>

Trainees acquired fundamental knowledge of satellite observation, methods for searching and acquiring Sentinel-2 satellite data, techniques for creating land cover classification maps using the Sentinel-2 data, and methods for verifying accuracy through field surveys. This enabled MINAGRI to engage in discussions with RSA regarding cooperation with a thorough understanding of the technical aspects involved. On the other hand, Rwanda primarily practices small-scale mixed farming. The spatial resolution of the free Sentinel-2 satellite data limits classification and acquiring higher-resolution data incurs significant costs. To integrate satellite data into MINAGRI's operations, further discussions are needed to select the appropriate data and technology. Accuracy must then be improved through demonstration activities.

ii) Satellite data utilization training for disaster management:

As satellite data utilization training for disaster management, an online course and training in Japan were conducted in August 2024 for MINEMA, METEO, and RSA. The follow-up training was held in October 2024. The outline of the training is shown below.

Components	Participants	Duration	Outline
i) Online Training	<ul style="list-style-type: none"> • About 10 persons from MINEMA & METEO respectively • RSA 	August 5-8, 2024 (4 days)	<ul style="list-style-type: none"> • Content of training in Japan focus on practical aspects, with basic content covered online beforehand. <ul style="list-style-type: none"> ➢ In online contents, provide basic level training for MINEMA, METEO and RSA. ➢ Design the training content based on the use cases of disaster management by utilizing SAR data.
ii) 2-week Training in Japan	<ul style="list-style-type: none"> • 2 persons from MINEMA • 2 persons from METEO • 2 persons from RSA 	August 19-30, 2024 (2 weeks in Japan)	<ul style="list-style-type: none"> • Design the training content based on the use cases of MINEMA/METEO and determine the visiting sites. <ul style="list-style-type: none"> ➢ Conduct advanced training sessions to promote use case for MINEMA, METEO and RSA by RESTEC. ➢ Networking sessions with relevant government institutions and Japanese space-tech companies for disaster management.
iii) Follow-up Training in Rwanda	<ul style="list-style-type: none"> • About 10 persons from MINEMA & METEO respectively • RSA 	October 14-21, 2024 (6 days)	<ul style="list-style-type: none"> • In order to share learning in Japan with other persons in MINEMA, METEO and RSA, follow-up training was provided. • During follow-up training, workshop on social economic impact was held.

Source: JICA Project Team

Figure 17 Overview of training on satellite data utilization for disaster management

<Online course for disaster prevention (August 5 to 8, 2024)>

As shown in the figure below, online courses were held from August 5, 2024 to 8, mainly for MINEMA and METEO. About 10 persons each participated from MINEMA and METEO.

Table 7 Overview of online course of satellite data utilization for disaster management

Date	Time in Kigali	Topic	Lecturer
Mon, Aug 5	9:00 - 9:15	Introduction to the training in Japan	Ryo Michishita
	9:15 - 10:15	Overview of Satellite RS	Toshi Kamei
	10:15 - 10:30	Discussion	Toshi Kamei
Tue, Aug 6	9:00 - 9:45	Principle of SAR remote sensing	Toshi Kamei
	9:45 - 10:30	Hands-on: Visualization and interpretation of SAR data using VEGA	Toshi Kamei
Wed, Aug 7	9:00 - 9:45	Principle of optical remote sensing	Ryo Michishita
	9:45 - 10:30	Hands-on: Visualization and interpretation of optical data using VEGA	Ryo Michishita
Thu, Aug 8	9:00 - 9:20	Space technology utilization case	Yasuo Matsuura
	9:20 - 10:00	Example of satellite data analysis and applications	Toshi Kamei
	10:00 - 10:30	Overall discussion	Toshi Kamei

Source: JICA Project Team

< Training for disaster prevention in Japan (August 13 to 24, 2024) >

From August 13, 2024 to 24, two trainees from MINEMA, two from METEO, and two from RSA participated in the training in Japan with the following objectives.

- To acquire knowledge and skills in the field of disaster management through lectures, discussions, and practical training on the utilization of satellite data in the field of disaster management.
- To learn about cooperation systems and methods among Japanese administrative agencies in the utilization of satellite data, and to consider establishing cooperation systems in one's own country.
- To learn about cooperation systems and methods among Japanese industry, government and academia in the utilization of satellite data, and to consider the establishment of cooperation systems in one's own country.

The overall schedule of the training is shown in the table below.

Table 8 Overall schedule of training in Japan for satellite data utilization for disaster management

Date	Programs, Visits, and Responsible Agencies
Monday, Aug 13	<ul style="list-style-type: none"> JICA Briefing Introduction and Recap for online course (RESTEC)
Tuesday, Aug 14	<ul style="list-style-type: none"> Flood control measures, river administration, and satellite data utilization in Japan (MLIT: The Ministry of Land, Infrastructure, Transport and Tourism) Disaster Prevention Efforts Utilizing TOPPAN Digital Sensors (TOPPAN Digital) Meteorological Forecasts and communication of disaster information in Japan (Japan Weather Association)
Wednesday, Aug 15	<ul style="list-style-type: none"> Visit to the JAXA Earth Observation Center (RESTEC) Inspection of antenna and reception facilities and introduction of research on SAR data (Tokyo Denki Univ)
Thursday, Aug 16	<ul style="list-style-type: none"> Introduction of disaster prevention system using satellite data by Spectee (Spectee) Lecture on satellite data pipeline services (online) (Yamaguchi Univ) Introduction and exchange meeting of the Satellite Earth Observation Consortium (CONSEO)
Friday, Aug 17	<ul style="list-style-type: none"> Lecture: Principle of SAR Data (RESTEC) Lecture: Introduction of disaster management using satellite data by UN (UNOOSA)
Monday, Aug 20	<ul style="list-style-type: none"> Visit to JAXA's Tsukuba Space Center and exchange views (JAXA) Lecture: Precipitation information from space (RESTEC) Lectures on GHG observations, data use, and research results from GOSAT (National Institute for Environmental Studies)
Tuesday, Aug 21	<ul style="list-style-type: none"> Lectures on ICHARM and flood forecasting and warning systems (Public Works Research Institute) Lectures on disaster prevention research using satellite data and facility tours (National Research Institute for Earth Science and Disaster Prevention)
Wednesday, Aug 22	<ul style="list-style-type: none"> Case study by a private company/Optical small satellite constellation and utilization (Axelspace) Exercise: Flood area detection using SAR data (RESTEC)
Thursday, Aug 23	<ul style="list-style-type: none"> Case Study by a Private Company/SAR Small Satellite Constellation and Utilization Platform (Synspective) Exercise: Flood area detection using SAR data (RESTEC)
Friday, Aug 24	<ul style="list-style-type: none"> Preparation of data for presentation of results Results presentation and closing ceremony Visit to JICA Headquarter

Source: JICA Project Team

The table below shows the participation of 6 persons including Chief Digital Officer (CDO) of MINEMA.

Table 9 Trainees of the training in Japan for satellite data utilization for agriculture

	Name	Institution and title
1	Mr. MIZERO Roger	Chief Digital Officer (CDO), Digitalization, Ministry in charge of Emergency Management (MINEMA)
2	Mr. TWAGIRAMUNGU Deus Dedit	GIS and Mapping Specialist, GIS of Policy Planning and Risk Reduction, Ministry in charge of Emergency Management (MINEMA)
3	Ms. MUKAMANA Blandine	Observation Processing Officer, Data Observation Quality Control and Processing, Rwanda Meteorology Agency
4	Mr. IYAMUREMYE Aime Emmanuel	Meteorological Applications Officer, Weather/Climate Services and Application Division, Rwanda Meteorology Agency
5	Ms. MUTAVU Grace Ndabaga	Strategic Partnership Analyst, Strategy Office, Rwanda Space Agency
6	Ms. TESIRE Ange Marie	Geospatial Analyst, Earth Observation, Rwanda Space Agency

Source: JICA Project Team

This training was carried out according to the above schedule. Below is a photo of the training.



Lectures by the Ministry of Land, Infrastructure, Transport and Tourism (August 20, 2024)



Lectures by TOPPAN Digital (August 20, 2024)



Lectures by the Japan Weather Association (August 20, 2024)



Lecture by Spectee (August 21, 2024)



Networking with CONSEO (August 22, 2024)



Exchange of views with JAXA (August 26, 2024)



Visit to JAXA (August 26, 2024)



Lectures by Public Works Research Institute ICHARM (August 27, 2024)



Lectures and inspections by the National Research Institute for Disaster Prevention (August 27, 2024)

<Follow-up training for disaster prevention (scheduled from October 14 to 21, 2024)>

As shown in the figure below, follow-up training in Rwanda was conducted for MINEMA, METEO and RSA from October 14 to 21, 2024. It was held mainly for the online course participants so 10 MINEMA participants, 9 METEO participants, and 7 RSA participants participated. On the last day of the follow-up training, a workshop on social economic impacts of satellite data utilization was held. The workshop is reported in “Activities relating to Output 4 “The social economic impact of space technology in Rwanda is measured””.

Objective	<ul style="list-style-type: none"> To share the specific knowledge and technology in the disaster management application at the training in Japan to other staff and engineers. We expect the Japan training participants to play active role to share their experience (as lecturer) 			
Participants	<ul style="list-style-type: none"> Online training participants from MINEMA, METEO and RSA, and other relating staff and engineers 			
Venue	<ul style="list-style-type: none"> Conference room at Highlands Suites Hotel in Kigali 			
Program (tentative)	Date	Time	Contents	Instructor
	Mon, Oct 14	10:00- 17:00	Introduction to SAR Data Analysis– Recap of the training in Japan	Remi (RESTEC) & MINEMA/METEO
	Tue, Oct 15	10:00- 17:00	High resolution optical data and case study using Airbus Pléiades Neo	Remi (RESTEC) & MINEMA/METEO
	Wed, Oct 16	10:00- 17:00	Analysis and Data visualization for Disaster Response using Arc GIS Pro	Remi & ESRI
	Thu, Oct 17	10:00- 17:00	Introduction to using Python for satellite data analysis	Yamamoto (Deloitte)
	Fri, Oct 18	10:00- 17:00	Flood damage prediction by optical satellite and digital elevation model (DEM) using Python / Presentations by the trainees and Wrap-Up	Yamamoto & Remi
	Sat, Oct 19		Day off	
	Sun, Oct 20		Day off	
	Mon, Oct 21	10:00- 17:00	One day workshop on social economic impact	Yamamoto & RSA/ MINEMA/METEO
Tue, Oct 22	10:00- 11:30	For reference: Quarterly Coordination Meeting (* RSA & focal persons of each institute)	-	

Source: JICA Project Team

Figure 18 Overview of follow-up training for satellite data utilization for disaster management

This training was carried out according to the above schedule. Below is a photo of the training.



Follow-up training (October 14, 2024)



Follow-up training (lectured by ESRI Rwanda) (October 15, 2024)



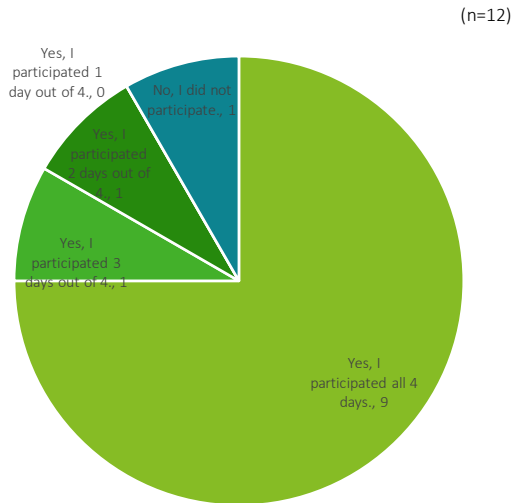
Social Economic Impact Workshop (October 21, 2024)

At the end of the training, a questionnaire on the training was conducted. The results are summarized as follows.

Table 10 Outline of questionnaire after the follow-up training (satellite data utilization for disaster management)

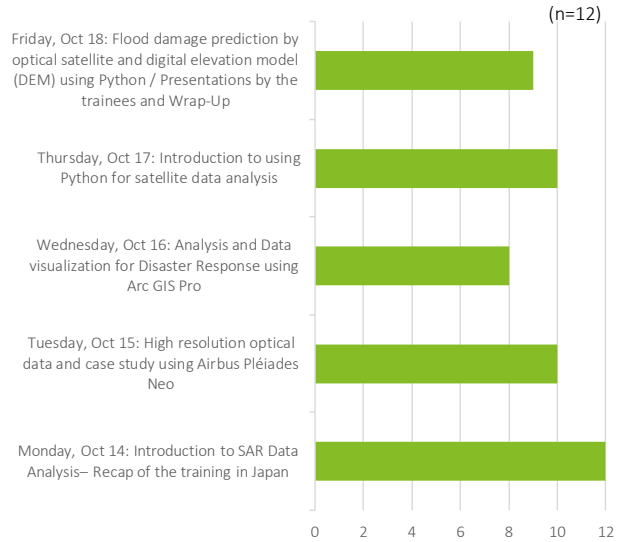
Purpose	To get feedback on follow-up training for satellite data utilization from October 14 to 18 in order to plan further capacity building in space sector
Target Respondents	26 participants of follow-up training (10 from MINEMA, 9 from METEO, and 7 from RSA)
Collected answer	12 answers collected (5 from MINEMA, 5 from METEO, and 2 from RSA)

Source: JICA Project Team



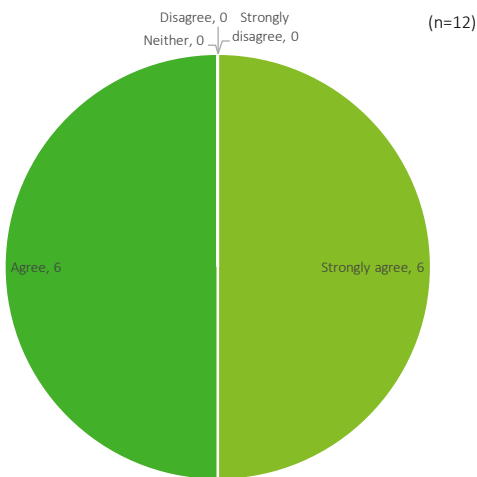
Source: JICA Project Team

Figure 19 Post follow-up training questionnaire (disaster management): Participation in online courses



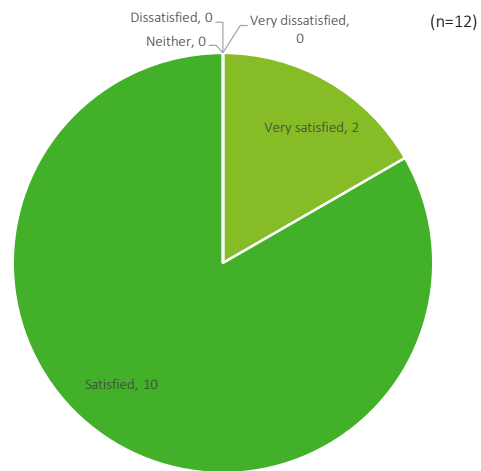
Source: JICA Project Team

Figure 20 Post follow-up training questionnaire (disaster management): Participation in follow-up training



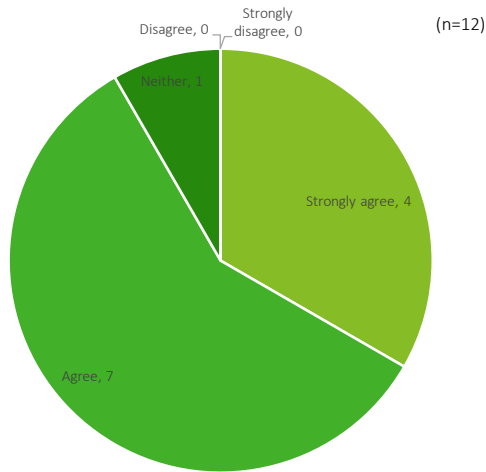
Source: JICA Project Team

Figure 21 Post follow-up training questionnaire (disaster management): Did you clearly understand the objectives of the follow-up training before participating in the training?



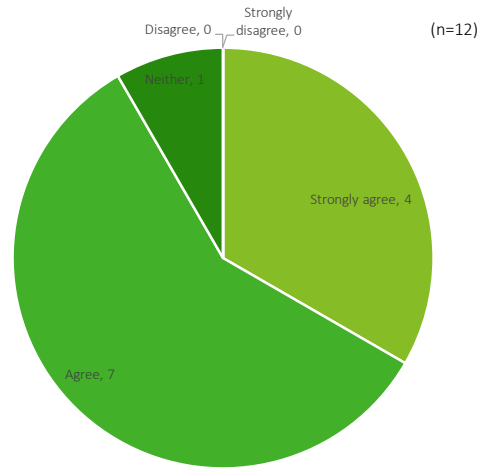
Source: JICA Project Team

Figure 22 Post follow-up training questionnaire (disaster management): Satisfaction with the follow-up training program as a whole



Source: JICA Project Team

Figure 23 Post follow-up training questionnaire (disaster management): Can the knowledge and experience acquired in the follow-up training be used in operation?

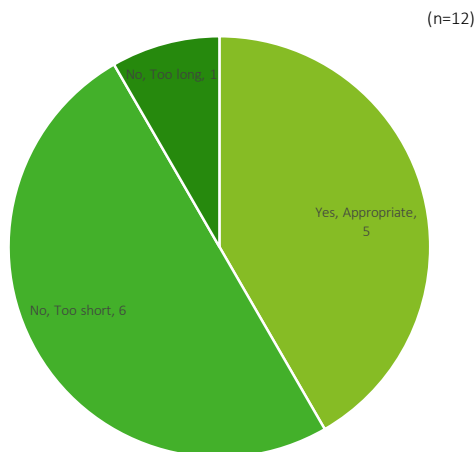


Source: JICA Project Team

Figure 24 Post follow-up training questionnaire (disaster management): Was the curriculum structure of the follow-up training appropriate?

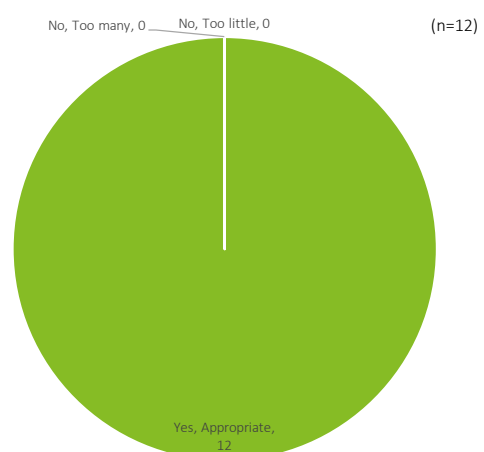
Comments related to "Can the knowledge and experience acquired through the follow-up training be used in business?":

- Next time you should assess the skills of trainees in order to group them accordingly. Otherwise, much time will be spent in explanation of basics and risk to not cover topics as planned.
- Little time for hands on exercises.
- This was a great challenge for me as a non-technical person. I learned a lot and enjoyed learning new things. Thank you.
- More workshops needed for mastering the data analysis and make prediction



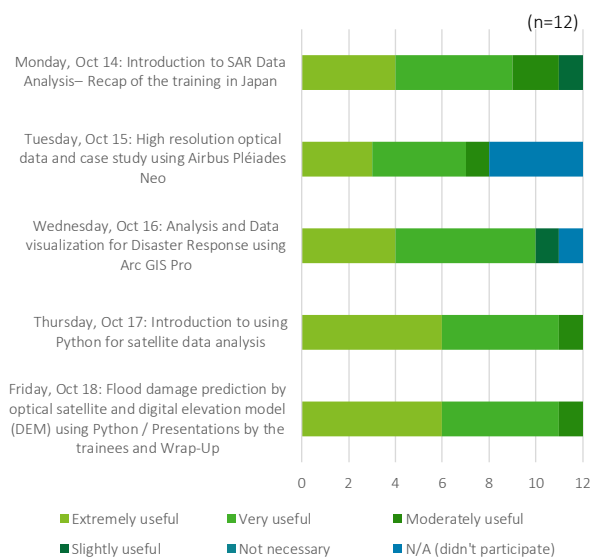
Source: JICA Project Team

Figure 25 Post follow-up training questionnaire (disaster management): Was the length of the follow-up training adequate?



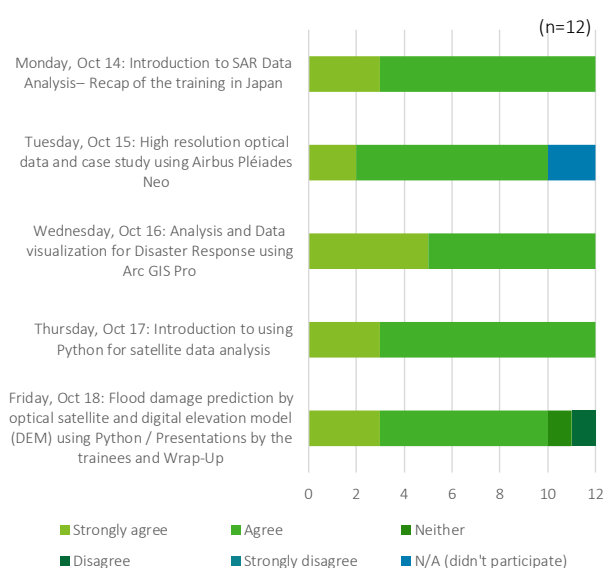
Source: JICA Project Team

Figure 26 Post follow-up training questionnaire (disaster management): Was the number of participants in the follow-up training adequate?



Source: JICA Project Team

Figure 27 Post follow-up training questionnaire (disaster management): Were the subjects and content (lectures, workshops, teaching materials, etc.) useful?



Source: JICA Project Team

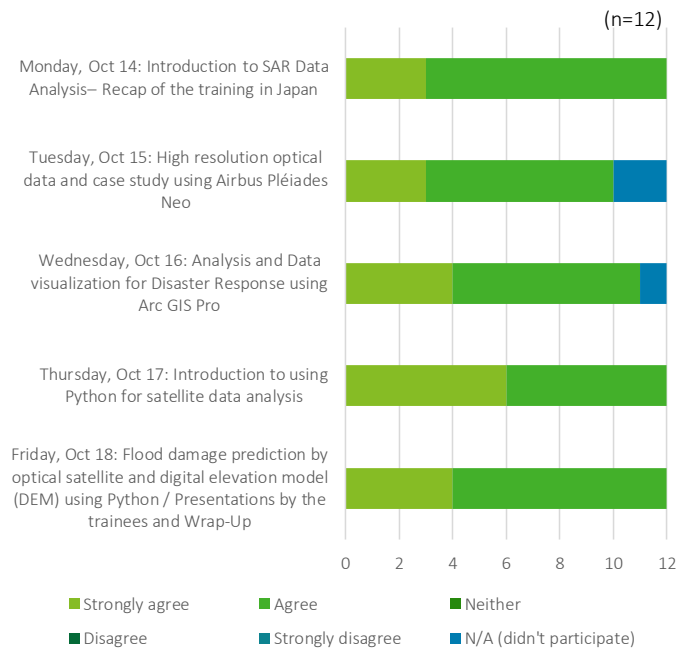
Figure 28 Post follow-up training questionnaire (disaster management): Was the lecturer's presentation and explanation easy to understand?

Comments related to "Subjects and content that were not covered in this training but should be included"

- The training was useful but was not in good format to be understood by participants easily
- Practical use cases in the context of Rwanda
- Real life application examples
- The contribution or usage of ground sensor to monitor disaster by integrating the technical staff from the institution owner those sensors
- N/A
- Machine learning and model prediction

Comments on the above reasons:

- Training should be well understood by participant when they are in understood format
- Short time and lack of data
- It will be better to include the real application in Rwanda and in the region
- Lectures were well prepared
- N/A
- Providing other workshop and cover all necessary knowledge and skills



Source: JICA Project Team

Figure 29 Post follow-up training questionnaire (disaster management): Were the materials of high quality and useful?

Comments related to "Were the materials high quality and useful?":

- Ok
- No comments
- May be the arc GIS pro license will be short for some who will need to continue improving their knowledge
- The learning materials should be shared with every participant.
- Can lecturers be more energetic in the future, if possible?

Other Program Comments:

- Teaching program should be organized in situation that may favor the participants to concentrate
- I suggest training again staff in disaster risk management
- The training was beneficial
- Next time organize the training outside the City of Kigali to enable trainees focused. Otherwise, they are still linked to their workplaces. Next time try to group trainees according to skills or topics by specialization. Ex: Script courses to IT Team, Analysis using GIS Pro to GIS Professional, Basic skills to non-GIS professional
- Needs continual training for next years
- To enhance training effectiveness, you should prioritize planning sessions outside of Kigali City
- "I would like to express my heartfelt appreciation to the workshop organizing committee for their outstanding efforts in creating an enriching experience for all participants. Your dedication and attention to detail made the event not only informative but also inspiring. I sincerely hope that you will continue to share your valuable knowledge and insights in future workshops, as they play a crucial role in fostering growth and collaboration within our field community. Thank you once again for your hard work and commitment!"
- I can't emphasize enough that it is very important for lecturers to be more energetic and include more audience participation as well as group work. Thank you, super appreciate this training and in general, it really was superb!

- I strongly commend this kind of training and capacity building programmes, MINEMA and Stakeholders staff benefit and will continue to benefit from them. The skills gained will change the way we manage disasters using data particularly spatial/satellite data
- We thank you for your effort and commitment to give us this training. And would like other opportunities and sessions like this. Thank once again for usual cooperation.

<Achievements and challenges of training for disaster management>

The trainees acquired fundamental knowledge on satellite observation, the international disaster management framework (International Disaster Charter), methods for searching and acquiring Sentinel-1 satellite data, techniques for extracting flooded areas, and methods for utilizing JAXA's Global Satellite Mapping of Precipitation (GSMaP). Following the training, MINEMA joined the International Disaster Charter, and METEO now utilizes GSMaP in its routine weather forecasting operations. Regarding the International Disaster Charter, a key challenge going forward is establishing the capability (including securing and training personnel) to process and analyze the large volumes of data provided by space agencies when the Charter is activated. Furthermore, METEO has expressed interest in JAXA's Today's Earth, which can estimate soil moisture and river flow in real time, and has indicated a desire to learn more about it in conjunction with GSMaP.

iii) **Satellite data utilization training for infrastructures:**

As satellite data utilization training for infrastructures, an online course and training in Japan were conducted in January and February 2025 for MININFRA and RSA. The follow-up training was held in February 2025. The outline of the training is shown below.

Components	Participants	Duration	Outline
i) Online Training	About 10 persons from MININFRA	January 14-17, 2025 (4 days)	<ul style="list-style-type: none"> • Content of training in Japan focus on practical aspects, with basic content covered online beforehand. <ul style="list-style-type: none"> ➢ In online contents, provide basic level training for MININFRA and RSA. ➢ Design the training content based on the use cases of urban and infrastructure sector.
ii) 2-weeks Training in Japan	<ul style="list-style-type: none"> • 2 persons from MININFRA • 1 person from RSA 	January 27– February 7, 2025 (2 weeks in Japan)	<ul style="list-style-type: none"> • Design the training content based on the use cases of MININFRA and determine the visiting sites accordingly. <ul style="list-style-type: none"> ➢ Conduct advanced training sessions to promote use case for MININFRA and RSA. ➢ Networking sessions with relevant government institutions and Japanese space-tech companies in urban and infrastructure sector.
iii) Follow-up Training in Rwanda	About 10 persons from MININFRA	February 19-28, 2025 (8 days in Rwanda)	<ul style="list-style-type: none"> • In order to share learning in Japan with other persons in MININFRA, follow-up training was provided. • During follow-up training, workshop on social economic impact was held.

Source: JICA Project Team

Figure 30 Overview of training on satellite data utilization for infrastructures

<Online course for infrastructures (January 14 to 18, 2025)>

As shown in the figure below, online courses were held from January 14 to 18, 2025, mainly for MININFRA. About 10 persons participated from MININFRA.

Table 11 Overview of online course of satellite data utilization for infrastructures

Date	Time in Kigali	Topic	Lecturer
Tue, 14 Jan	9:00 - 9:15	Introduction to the training in Japan	Ryo Michishita
	9:15 - 10:15	Overview of Satellite RS	Ryo Michishita
	10:15 - 10:30	Discussion	Ryo Michishita
Wed, 15 Jan	9:00 - 9:45	Principle of optical remote sensing	Ryo Michishita
	9:45 - 10:30	Hands-on: Visualization and interpretation of optical data using VEGA	Ryo Michishita
Thu, 16 Jan	9:00 - 9:45	Principle of SAR remote sensing	Toshi Kamei
	9:45 - 10:30	Hands-on: Visualization and interpretation of SAR data using VEGA	Toshi Kamei
Fri, 17 Jan	9:00 - 9:20	Space technology utilization case	Yasuo Matsuura
	9:20 - 10:00	Example of satellite data analysis and applications	Toshi Kamei
	10:00 - 10:30	Overall discussion	Toshi Kamei

Source: JICA Project Team

<Training for infrastructures in Japan (January 17 to February 7, 2025)>

From January 17 to February 7, 2025, two trainees from MININFRA and one from RSA participated in the training in Japan with the following objectives.

- To acquire knowledge and skills in the field of infrastructure management through lectures, discussions, and practical training on the utilization of satellite data in the field of disaster management.
- To learn about cooperation systems and methods among Japanese administrative agencies in the utilization of satellite data, and to consider establishing cooperation systems in one's own country.
- To learn about cooperation systems and methods among Japanese industry, government and academia in the utilization of satellite data, and to consider the establishment of cooperation systems in one's own country.

The overall schedule of the training is shown in the table below.

Table 12 Overall schedule of training in Japan for satellite data utilization for infrastructures

Date	Programs, Visits, and Responsible Agencies
Monday, Jan 27	<ul style="list-style-type: none"> JICA Briefing Introduction and Recap for online course (RESTEC)
Tuesday, Jan 28	<ul style="list-style-type: none"> Visualization of optical satellite data (incl. commercial data) (RESTEC) AW3D for Urban Monitoring (RESTEC)
Wednesday, Jan 29	<ul style="list-style-type: none"> Visualization of optical satellite data (incl. commercial data) (RESTEC) Land cover classification: case in Japan (RESTEC)
Thursday, Jan 30	<ul style="list-style-type: none"> Visit to the JAXA Earth Observation Center (RESTEC) Inspection of antenna and reception facilities and introduction of research on SAR data (Tokyo Denki University)
Friday, Jan 31	<ul style="list-style-type: none"> SAR Small Satellite Constellation and Utilization Platform (Synspective) Lecture on Satellite Data Pipeline Service (Yamaguchi University) Monitoring of urban development using satellite data (Space Shift)
Monday, Feb 3	<ul style="list-style-type: none"> Initiatives for Urban Spatial Information Digital Infrastructure (PLATEAU, etc.) (The Ministry of Land, Infrastructure, Transport and Tourism (MLIT)) Introduction of research on spatial information by Professor Shibasaki of Reitaku University (CTO of Location Mind) Introduction of SKY Perfect JSAT Business Land cover classification: case in Rwanda (RESTEC)
Tuesday, Feb 4	<ul style="list-style-type: none"> Urban Planning and Infrastructure Management by Ridge-1 ArcEdge Space Introduction of Research on Spatial Information by the Center for Spatial Information Science, The University of Tokyo Land cover classification: case in Rwanda (RESTEC)
Wednesday, Feb 5	<ul style="list-style-type: none"> Land cover classification: case in Rwanda (RESTEC) Shimizu Corporation's Space Activities (Shimizu Corporation)
Thursday, Feb 6	<ul style="list-style-type: none"> Land cover classification: discussion for accuracy improvement (RESTEC) Preparation of data for presentation of results
Friday, Feb 7	<ul style="list-style-type: none"> Results presentation Visit to JICA Headquarter

Source: JICA Project Team

The table below shows the participation of 3 persons from MININFRA and RSA.

Table 13 Trainees of the training in Japan for satellite data utilization for infrastructures

ID	Name	Organization	Title
1	Mr. Lewis NSENGEYUKURI	Urbanization, Human Settlement & Housing Development Directorate General (UHSHD), Ministry of Infrastructure (MININFRA)	Urban and Rural Physical Planning Engineer
2	Mr. Longin DUSENGEYEZU	Chief digital office, Ministry of Infrastructure (MININFRA)	Developer
3	Mr. Stapin MUBERANGABO	Earth Observation Department, Rwanda Space Agency (RSA)	Geospatial Analyst

Source: JICA Project Team

This training was carried out according to the above schedule. Below is a photo of the training.



Visit to JAXA's earth observation center (January 30, 2025)



Lectures by Synspecive (January 31, 2025)



Lectures by SpaceShift (January 31, 2025)



Lectures by the Ministry of Land, Infrastructure, Transport and Tourism (February 3, 2025)



Lectures by Prof. Shibasaki from LocationMind/Reitaku Univ. (February 3, 2025)



Lectures by SkyPerfect-JSAT (February 3, 2025)



Lectures by Ridge-i (February 4, 2025)



Lectures by ArkEdge Space (February 3, 2025)



Lectures by and visit to Shimizu Corp. (February 3, 2025)

<Follow-up training for infrastructure (scheduled from February 19 to 27, 2025)>

As shown in the figure below, follow-up training in Rwanda was conducted for MININFRA and RSA from February 19 to 27, 2025. It was held mainly for the online course participants so 12 MININFRA, MININFRA' sub organizations and RSA. On the last day of the follow-up training, a workshop on social economic impacts of satellite data utilization was held. The workshop is reported in "Activities relating to Output 4 "The social economic impact of space technology in Rwanda is measured"

Objective	<ul style="list-style-type: none"> To share the specific knowledge and technology in the disaster management application at the training in Japan to other staff and engineers. We expect the Japan training participants to play active role to share their experience (as lecturer) 			
Participants	<ul style="list-style-type: none"> Online training participants from MININFRA and RSA, and other relating staff and engineers 			
Venue	<ul style="list-style-type: none"> Highland Suites Hotel Kigali 			
Program (tentative)	Date	Time	Contents	Instructor
	Wed, Feb 19	10:00- 17:00	Review of the training result in Japan	Kamei (RESTEC)
	Thu, Feb 20	10:00- 17:00	Access and Visualize satellite data	Kamei (RESTEC)
	Fri, Feb 21	10:00- 17:00	Land cover classification / Field survey	Kamei (RESTEC)
	Sat, Feb 22		Day off	
	Sun, Feb 23		Day off	
	Mon, Feb 24	10:00- 17:00	Land cover classification	Kamei (RESTEC)
	Tue, Feb 25	10:00- 17:00	Satellite data utilization for urbanization change detection by Python	Yamamoto (Deloitte)
	Wed, Feb 26	10:00- 17:00	Satellite data utilization for urbanization change detection by Python / Presentations by the trainees and Wrap-Up	Yamamoto (Deloitte)
	Thu, Feb 27	10:00- 17:00	One day workshop on social economic impact	Yamamoto (Deloitte)
Fri, Feb 28	9:00-10:30	For reference: Quarterly Coordination Meeting (* RSA & focal persons of each institute)	-	

Source: JICA Project Team

Figure 31 Overview of follow-up training for satellite data utilization for infrastructures

This training was carried out according to the above schedule. Below is a photo of the training.



Follow-up training
(February 19, 2025)



Follow-up training (field studies)
(February 21, 2025)



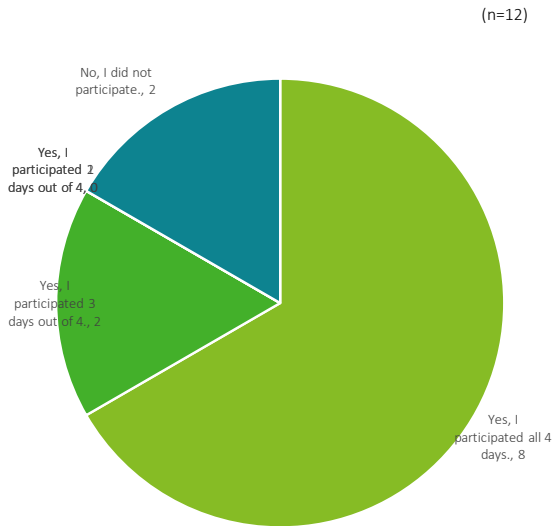
Social Economic Impact Workshop
(February 27, 2025)

At the end of the training, a questionnaire on the training was conducted. The results are summarized as follows.

Table 14 Outline of questionnaire after the follow-up training (satellite data utilization for infrastructures)

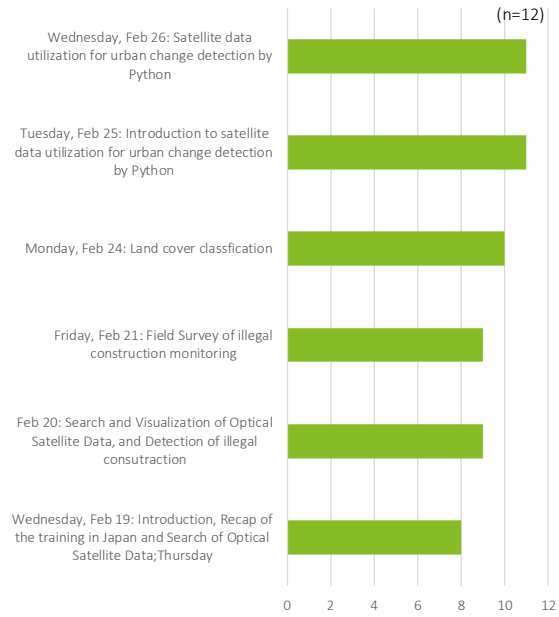
Purpose	To get feedback on follow-up training for satellite data utilization from February 19 to 26 in order to plan further capacity building in space sector
Target Respondents	13 participants of follow-up training (2 from MININFRA, 4 from WASAC, 2 from RHA, 2 from RTDA, 1 from REG and 4 from RSA)
Collected answer	12 answers collected (2 from MININFRA, 3 from WASAC, 2 from RHA, 2 from RTDA, 1 from REG and 2 from RSA)

Source: JICA Project Team



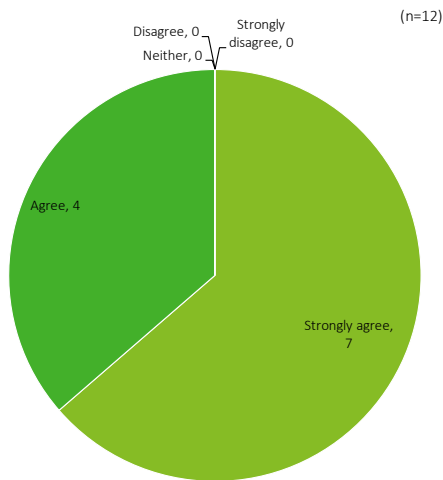
Source: JICA Project Team

Figure 32 Post follow-up training questionnaire (infrastructures): Participation in online courses



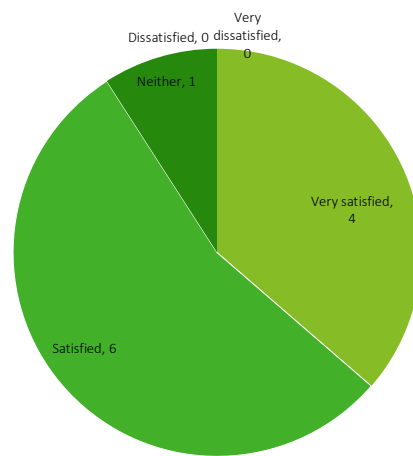
Source: JICA Project Team

Figure 33 Post follow-up training questionnaire (infrastructures): Participation in follow-up training



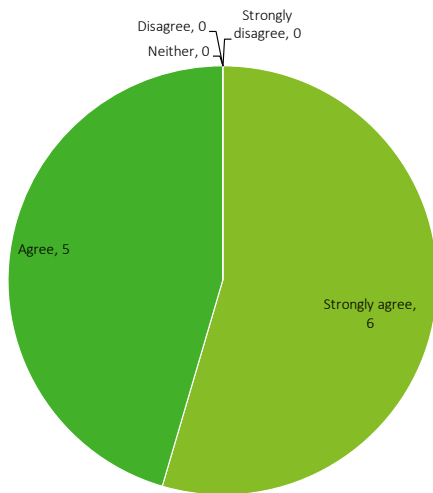
Source: JICA Project Team

Figure 34 Post follow-up training questionnaire (infrastructures): Did you clearly understand the objectives of the follow-up training before participating in the training?



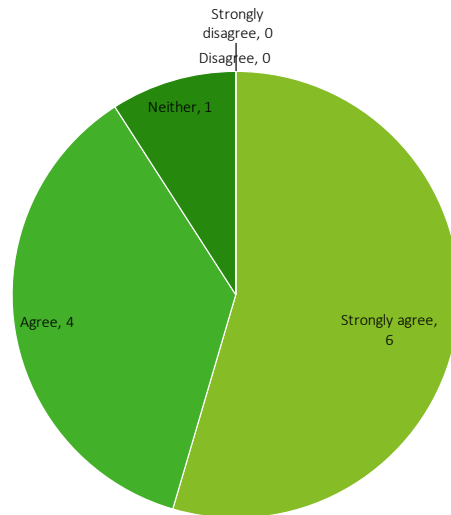
Source: JICA Project Team

Figure 35 Post follow-up training questionnaire (infrastructures): Satisfaction with the follow-up training program as a whole



Source: JICA Project Team

Figure 36 Post follow-up training questionnaire (infrastructures): Can the knowledge and experience acquired in the follow-up training be used in operation?

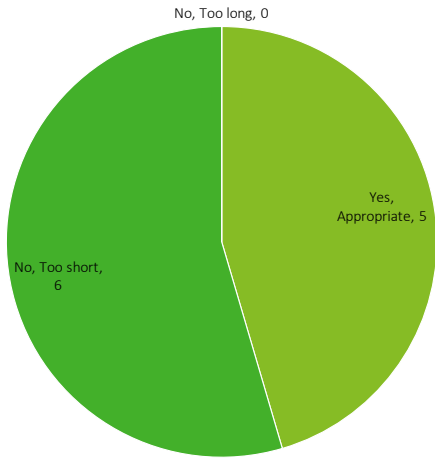


Source: JICA Project Team

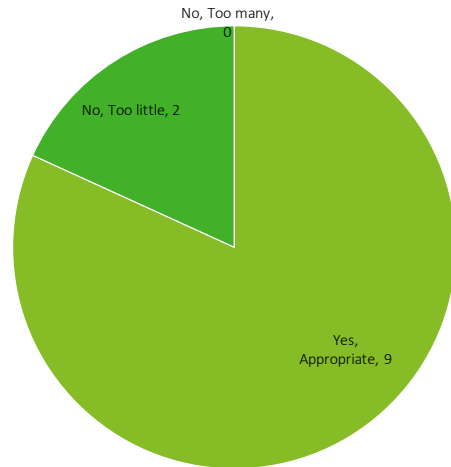
Figure 37 Post follow-up training questionnaire (infrastructures): Was the curriculum structure of the follow-up training appropriate?

Comments related to "Can the knowledge and experience acquired through the follow-up training be used in business?":

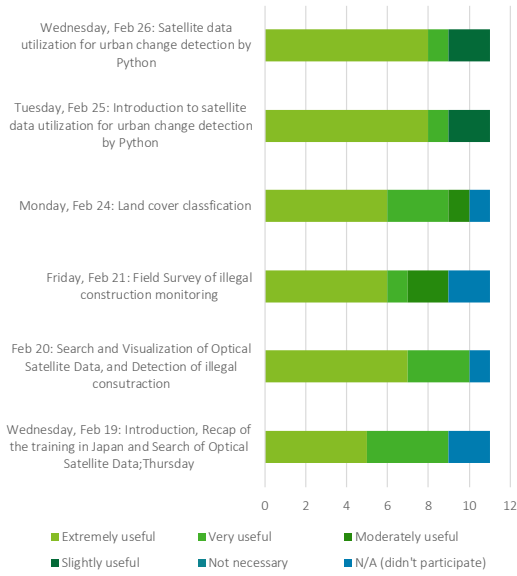
- Technical skills we learned will be very important
- Time for hands on skills was not sufficient, mostly on "python".
- Your training program was beneficial because it related to my daily work. This will enable me to perform tasks more quickly and with better quality.
- As a recommendation in the next training, it will be better to prepare the certificate for the participants.
- Actually, trainees are from different background. Among them, there are beginners but who are willing to learn and contribute much to their works. We recommend that, for such kind of training which include learning software and coding, we need enough time for explanation and practicing from scratch to get used to the software.
- If you provide specific details about the experience, it will make the feedback more constructive and potentially help improve the service or product.
- I would suggest the extension of the training, and increase in practical sessions.
- Very nice



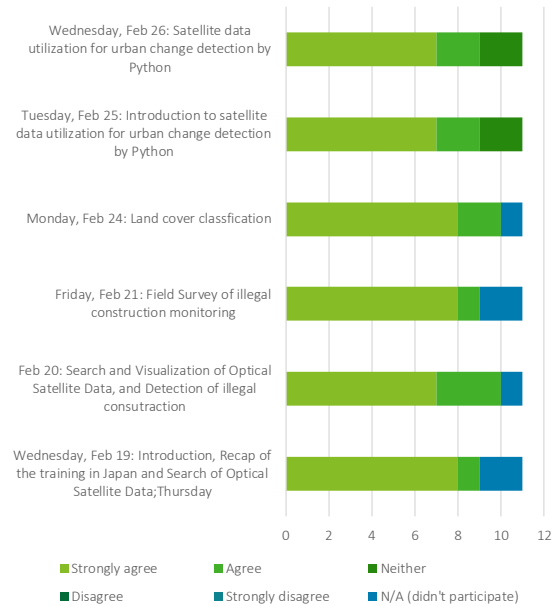
Source: JICA Project Team
Figure 38 Post follow-up training questionnaire (infrastructures): Was the length of the follow-up training adequate?



Source: JICA Project Team
Figure 39 Post follow-up training questionnaire (infrastructures): Was the number of participants in the follow-up training adequate?



Source: JICA Project Team
Figure 40 Post follow-up training questionnaire (infrastructures): Were the subjects and content (lectures, workshops, teaching materials, etc.) useful?



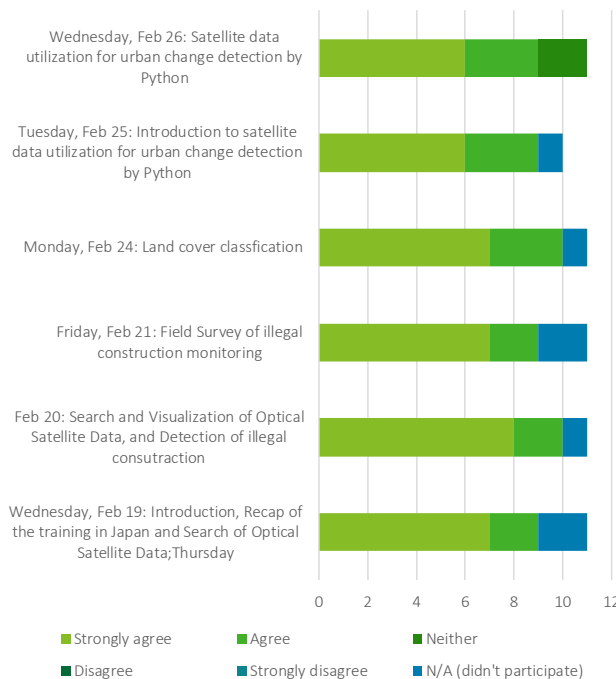
Source: JICA Project Team
Figure 41 Post follow-up training questionnaire (infrastructures): Was the lecturer's presentation and explanation easy to understand?

Comments related to "Subjects and content that were not covered in this training but should be included"

- SAR data processing
- the first fourth were all captured but for using python, I would suggest starting from scratch where everyone can understand the codes
- Basic introduction to programming using "python".
- Road condition changed detection (e.g. from paved to paved), expanded, ...
- are powerful tools for spatial analysis, helping professionals across fields like agriculture, environmental science, and urban planning make informed decisions. By combining the ability of remote sensing to capture data from the Earth with QGIS's robust analytical capabilities, users can gain valuable insights into geographical phenomena and trends.
- None
- None of them are finished

Comments on the above reasons:

- Optical datasets not always available
- It is the last two sessions which was not performed well based on the how the knowledge was captured.
- Many of participants are not specialized in IT related programming.
- Because the material focused much on building, yet we come from different institutions with different missions
- are powerful tools for spatial analysis, helping professionals across fields like agriculture, environmental science, and urban planning make informed decisions. By combining the ability of remote sensing to capture data from the Earth with QGIS's robust analytical capabilities, users can gain valuable insights into geographical phenomena and trends.
- I was leaned more lesson



Source: JICA Project Team

Figure 42 Post follow-up training questionnaire (infrastructures): Were the materials of high quality and useful?

<p>Comments related to "Were the materials high quality and useful?":</p> <ul style="list-style-type: none"> • Basics of programming are needed. • Providing more intuitive visualization tools, such as clear legends, color-coded maps, and detailed classification reports, would help users better interpret the results." • By giving clear, specific feedback, you can help improve the land use/land cover classification process and highlight areas where improvements are necessary, whether in methodology, data quality, software tools, or post-processing techniques. • None • Strongly disagree
<p>Other Program Comments:</p> <ul style="list-style-type: none"> • None • The program is very useful and need to be scaled up to include more participants. To be more productive it is better to conduct next trainings out of Kigali in order to allow participants get concentrated to the training and avoid interference with routine office tasks. • Prepare a long-time learning session outside Kigali • The program is excellent, and the content is highly informative. However, for future sessions, it would be beneficial to choose a venue that allows participants to focus better. Since the training takes place in Kigali, where participants are close to their workplaces, their supervisors often assign tasks during the session, which affects their concentration. • More training • It was helpful • Very nice

<Achievements and challenges of training for infrastructure>

In the infrastructure sector, training focused on identifying illegal construction, one of the priority issues for MININFRA. Trainees acquired fundamental knowledge of satellite observation and methods for acquiring and searching Sentinel-2 satellite data. They also learned techniques for detecting illegal construction using commercial high-resolution satellites and verified the usefulness of such satellites through field surveys. However, challenges were also identified for integrating satellite technology into MININFRA's operations, including data procurement costs, integration with existing systems, and the vast size of the target area. Regarding the challenge of the size of the target area, trainees learned that AI technology can be used to automatically extract new construction. For the cost challenge, if high-resolution satellite imagery is regularly updated on the GEO HUB which is being developed by RSA, this issue can be resolved.

■ Training on satellite development:

At the start of this project, no satellite had been developed and operated in Rwanda since RWASAT-1, Rwanda's first satellite released from the International Space Station in November 2019 (operation ended in 2022). On the other hand, TRL Space Rwanda, a satellite developer, had been working with RSA to develop satellites as a private initiative since 2024. RSA is also building ground stations to receive S- and X-band signals and has plans for a Ground Station as a Service (GSaaS) that will be available to various satellite operators. As described above, satellite development in Rwanda is still at the initial stage of capacity building, and RSA training on satellite development was re-entrusted to Kyushu Institute of Technology as an activity related to Output 1 "Development of satellite and/or related infrastructure is promoted and satellite data utilization at the RSA and related institutions (end users of data) is enhanced," which is one of the activities of this project.

In March 2024, Mr. Tetsuhito Fuse, Adjunct Associate Professor at the Laboratory for Demonstration of Innovative Space Applications (LaSEINE) at Kyushu Institute of Technology (Kyutech), accompanied the project team to Rwanda and discussed with RSA about training on satellite development. The overview of the training and the requirements for trainees are as follows.

[Training Overview]

- The purpose of this training is to educate and train young engineers who acquire basic knowledge of satellite development such as design, integration and testing.
- It takes at least two years from mission conception to launch/operation to master the entire process of satellite development. However, since the use of the existing EM (engineering model) of past Kyutech BIRDS satellites makes it possible to reduce the training period adjusted to 3 ~ 6 months, the existing EM of Kyutech BIRDS satellites will be used and the training period will be 6 months.
- The 6-months training includes the design and assembly of the mission board and its testing as an original component. Other subsystems is used from previous BIRDS satellite EMs, basic lectures, and exam training.

[Requirements for Trainees]

- Basic engineering knowledge of a bachelor's degree is required.
- Mechanical or electrical engineering background preferred.
- Some basic software experience preferred (Example: MATLAB, LabView, CAD, Thermal Desktop, Computer Language (C, Python), etc.).
- The most important element is leadership to pass on experience to colleagues and influence other technicians after training.

Table 15 Training Overview of satellite development in Japan

Training Name	Training for satellite development and testing
Purpose	Young engineers acquire basic knowledge of satellite development
Time	October 4, 2024 – March 28, 2025
Location	Kitakyushu-city, Fukuoka
Training participant	RSA: 2 (including one from private sector with RSA endorsement)
Training organization	Kyushu Institute of Technology, JICA Project Team

Source: JICA Project Team

Training schedule:

From October 4, 2024 to March 28, 2025, satellite development training was conducted for two RSA personnel, mainly at Kyushu Institute of Technology. Details are shown in the table below.

Table 16 Overall Training Schedule of satellite development in Japan

Week			Completed Program
1	2024/10/7 -	2024/10/11	- Orientation, facility tour, Kick-off (Oct 7) - Internatinal Forum on Low Carbon Cities (Oct 8-9)
2	2024/10/14 -	2024/10/18	- Introduction to the BIRDS-RP satellite project - Discussion about mission ideas - Attended class of Satellite power systems I
3	2024/10/21 -	2024/10/25	- Subsystem team formed - Mission objectives and concept
4	2024/10/28 -	2024/11/1	- Discussion on mission specifications and success criteria - Attended special lecture on Machine Learning for CubeSat Magnetic Field Measurements - Attended Space systems engineering class
5	2024/11/4 -	2024/11/8	- Discussion on mission requirements - Review of mission concept and modes - Discussion on satellite main bus budgets
6	2024/11/11 -	2024/11/15	- Discussion on the satellite internal configuration - Attended Space System engineering class(11/14, 11/15) - Attended Satellite Power system class (11/15)
7	2024/11/18 -	2024/11/22	- Discussion on requirements and verification document - Preparing of list of mission components - Attended Satellite Power system class (11/22)
8	2024/11/25 -	2024/11/29	- Attended Space System engineering class(11/28, 11/29) - Attended Satellite Power system class (11/29) - Procurement of BBM components
9	2024/12/1 -	2024/12/6	- Discussion on missions power consumptions (12/4) - Discussion on mission operational modes and interfaces (12/4)
10	2024/12/9 -	2024/12/13	- Discussion on mission data budget and configuration updates. (12/11) - Attended Introduction to Satelite Engineering class (12/12) - Attended Satellite Power Systems class (12/13)
11	2024/12/16 -	2024/12/20	- Attended Introduction to Satelite Engineering class (12/19) - Discussion on mission on BBM development plan (12/20) - Attended Satellite Power Systems class (12/20)
12	2024/12/23 -	2024/12/27	- Mission Definition Review Discussion (12/25) - Attended Introduction to Satelite Engineering class (12/26)
13	2025/1/6 -	2025/1/10	- Attended Introduction to Satellite Engineering Class (1/9) - BBM development activities (1/6 ~ 1/10) - Mission defintion revision comments and modifications (1/9 ~ 1/10)
14	2025/1/13 -	2025/1/17	- Discussions on BBM tests plan and objectives (1/13 ~ 1/17) - Attended Space Systems Engineering class (1/16) - Attended Satellite Power System Class (1/17)
15	2025/1/20 -	2025/1/24	- BBM development activities (1/20 ~ 1/24) - Attended Introduction to Satellite Engineering Class (1/23) - Attended Satellite Power System Class (1/24)
16	2025/1/27 -	2025/1/31	- BBM functionality tests (1/27 ~ 1/31) - Attended Space Systems Engineering Class (1/26, 1/30) - Attended Introduction to Satellite Engineering Class (1/30)
17	2025/2/3 -	2025/2/7	- BBM functionality tests (2/3 ~ 2/7) - Attended Introduction to Satellite Engineering Class (2/6) - Attended Satellite Power System Class (2/7)
18	2025/2/10 -	2025/2/14	- Discussions on commands and integration tests (2/10 ~ 2/14) - Attended Introduction to Satellite Engineering Class (2/13) - Attended Space Systems Engineering Class (2/13)

(Table Continued)

Week			Completed Program
19	2025/2/17 -	2025/2/21	- BBM functionality tests (2/17 ~ 2/21) - BBM software development (2/17 ~ 2/21) - BBM preparation for integration tests (2/17 ~ 2/21)
20	2025/2/24 -	2025/2/28	- BBM integration tests with satellite main bus (2/24 ~ 2/28) - EM board schematics preparation (2/24 ~ 2/28)
21	2025/3/3 -	2025/3/7	- BBM integration tests with satellite main bus (3/3 ~ 3/7) - EM board layout design (3/3 ~ 3/7) - EM Board BOM preparation (3/5 ~ 3/7)
22	2025/3/10 -	2025/3/14	- BBM power consumption tests (3/10 ~ 3/14) - Ordering EM Board and Components (Luis, 3/12)
23	2025/3/17 -	2025/3/21	- BBM integration with main bus (3/17 ~ 3/21) - BBM integration with eOBC mission tests (3/18 ~ 3/21) - Preliminary Design Review material preparations (3/17 ~ 3/20)
24	2025/3/24 -	2025/3/28	- BBM integration tests (3/24 ~ 3/25) - Communication system EMC test (3/25 ~ 3/27) - Preliminary Design Review Meeting (3/27) - JICA Training Report Meeting (3/28)

Source: JICA Project Team

Training Participants:

Following two persons participated from RSA. One of the participants, Mr. Arnaud, was from a private company recommended by RSA as a person who will contribute to Rwanda's satellite development in the future. Mr. Arnaud is partially dispatched from Meshpower Ltd, a solar power generation system developer, as a software developer and is involved in the joint project between TRL Space Rwanda, a satellite developer, and RSA. He is expected to contribute to satellite development in Rwanda and RSA in the future.

Table 17 Trainees for Satellite Development Test Training

ID	Name	Organization	Title
1	Mr. NDUWAYEZU Gabriel	Rwanda Space Agency	Senior Engineer, Space operation
2	Mr. KAYONGA Arnaud	Meshpower Ltd	Software developer, IT Department

Source: JICA Project Team

Training Delivery:

The training including the contents below was carried out without delay according to the above schedule.

- Mission Requirements Definition, Mission Design Review (MDR)
- Procurement and assembly of the Bread Board Model (BBM), testing of each component, integration into the main bus, and Preliminary Design Review (PDR)
- Procurement and assembly of Engineering Model (EM) components

The photo of kick-off and final report are below.

Kickoff (October 7, 2024)



Group photo of BIRD project members



Tour of the project room

Final report meeting and closing ceremony (March 28, 2025)



Final report meeting



closing ceremony

Outcomes of Training:

- Two trainees had backgrounds related to satellite development such as software development and electrical engineering, but this was their first experience in actual satellite development. In this training session, a mission was designed according to the needs of Rwanda, and an Engineering Model (EM) was designed, procured, and developed according to the mission without any problems. By utilizing their respective expertise, the trainees were able to engage in the design and development of camera missions and machine learning missions and acquired satellite development capabilities.
- In addition to acquiring knowledge, the two trainees also experienced working on satellite development as a team, which is considered to be an achievement of this training. This satellite development project included components not only from Rwanda but also from Paraguay and Moldova, and the two were able to gain experience developing in cooperation with members of each component.

Evaluation and improvement of the curriculum after the training:

- Evaluation of the curriculum: In this training session, a mission was designed according to the needs of Rwanda, and an Engineering Model (EM) was designed, procured, and developed according to the mission without any problems. The trainees were actively involved in the presentation at the Mission Design Review (MDR) which was conducted at the end of December as well as the documentation of the Project Design Review (PDR). We believe that the purpose of this training, educating young engineers with basic knowledge of satellite development, was achieved by providing training content that was in line with the purpose of this training.
- Improvements: Satellite development cannot be completed in six months; the normal Kyushu Institute of Technology program requires at least two years. This time, the process from

mission design to the design, procurement, and development of an EM was completed, but the processes of testing the EM as well as developing and testing the flight model (FM) were not conducted. Therefore, in order to acquire practical skills in satellite development, the training would be even better if trainees could experience all processes. In this regard, it is necessary to coordinate with or separate from other schemes of JICA (such as studying in master's programs).

Trainee Evaluation:

[Highlights of the training: System Engineering Approach]

- Define the system from high-level requirements to detailed design (Mission Requirements Allocation Sheet)
- Build and test the system to ensure it meets requirements (set mission objectives and success criteria)

[Learning through training]

- Role of technology in Rwanda's development goal and its path
- International satellite development cooperation
- Cultural Exchange between Japan and Rwanda

[Classes learned in particular]

- Space Systems Engineering
- Introduction to Satellite Engineering
- Advanced Satellite Power Systems

[Next Steps of satellite development trainees worked]

- Mission payload software finalization and integration testing
- Launch of OSIL (Open Source Integrated Library) Systems Documentation Blog and Digital Library

[Request from trainees]

- They would like to continue satellite development until the completion of FM development and testing (expected online. It would be even better if they could come to Japan as needed.).

Note: This point was confirmed with RSA at a regular meeting with RSA and at a wrap-up meeting in December 2025, and it was confirmed that RSA would work to ensure that trainees would continue to participate in satellite development, including securing budgets for travel.

■Follow-up Support for Satellite Data Utilization:

As follow-up support in the infrastructure sector, the training session outlined in the following table was conducted for RSA, MININFRA, and MININFRA's subordinate agency, RHA. While the previous session conducted in February 2025 verified the applicability of high-resolution satellite imagery for MININFRA's illegal construction monitoring, this session focused on AI, specifically addressing the challenge of covering a wide area with a small number of personnel—one of the key issues in introducing satellite technology.

Table 18 Outline of the training course for infrastructure sector

Course	Illegal Construction Monitoring by Satellites and AI
Objective	To understand the fundamental concepts and methods for automatically detecting new buildings using commercial high-resolution satellite imagery and AI technology.
Date	October 15 to 22, 2025 (3 days online and 2 days in-person sessions)
Venue	Highland Suites Hotel Kigali
Participants	RSA 1, MININFRA 6, Rwanda Housing Authority (RHA) 3

Source: JICA Project Team

Pleiades NEO satellite data with 50 cm resolution was obtained for the practical training, with Google Colab as the tool. However, only one participant had attended the previous training session (February 2025), and most of the participants of this time's session lacked sufficient knowledge to handle the data and tool. Therefore, after discussing with the participants on the first day of the in-person training, the second day's content was partially revised to cover methods for obtaining free satellite data (from Europe's Sentinel-2 satellite) and analyzing the data using QGIS (see the table below). Regarding the AI-based automatic detection method, the instructor explained the overview to all participants and provided individual instruction to the one engineer who had attended the previous training session.

Table 19 Training Program for the Infrastructure Sector

Date	Time	Format	Contents
Tue, Oct 14	9:00–10:30	Online	<ul style="list-style-type: none"> • Introduction • Review of the past training • Overview of satellite remote sensing
Wed, Oct 15	9:00–10:30	Online	<ul style="list-style-type: none"> • Introduction of high-resolution satellite data • Overview of AI technology • Application of AI technology in satellite remote sensing
Thu, Oct 16	9:00–10:30	Online	<ul style="list-style-type: none"> • Satellite x AI for illegal construction monitoring • Introduction of AI tools • Preparation for Google Colab
Tue, Oct 21	9:00–16:00	In-person	<ul style="list-style-type: none"> • Review and discussion of online training • Confirmation of QGIS and Google Colab setup • Exercise: Basic usage of satellite images on Google Colab • Discussion: Challenges in current monitoring operations
Wed, Oct 22	9:00–16:00	In-person	<ul style="list-style-type: none"> • Part-1: Detection of constructions in Kigali with AI • Part-2: How to access Sentinel-2 data • Part-3: Detecting changes in time series data with QGIS

Source: JICA Project Team

This training was carried out according to the above schedule. Below is a photo of the in-person session on October 20 and 21, 2025.

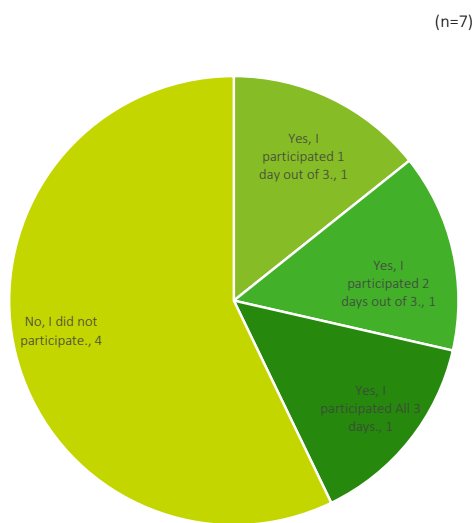


At the end of the training, a questionnaire on the training was conducted. The results are summarized as follows.

Table 20 Outline of questionnaire after the post follow-up training (satellite data utilization)

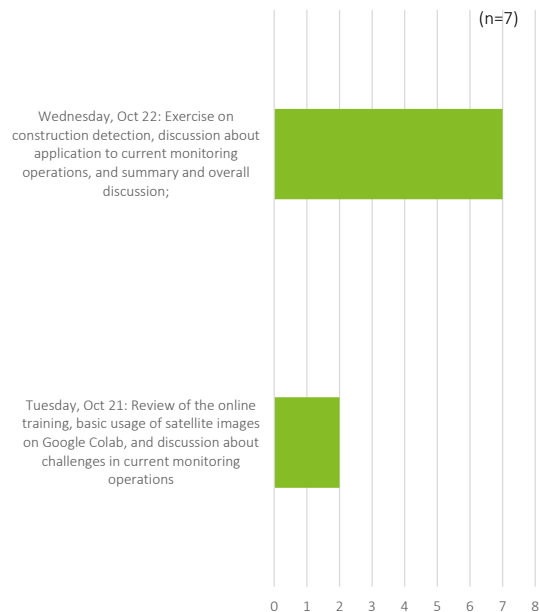
Purpose	To get feedback on follow-up training for satellite data utilization from October 15 to 26 in order to plan further capacity building in space sector
Target Respondents	10 participants of follow-up training (7 from MININFRA (including 6 internes from the University of Rwanda), 3 from RHA and 1 from RSA)
Collected Answer	7 answers collected (6 from MININFRA and 1 from RHA)

Source: JICA Project Team



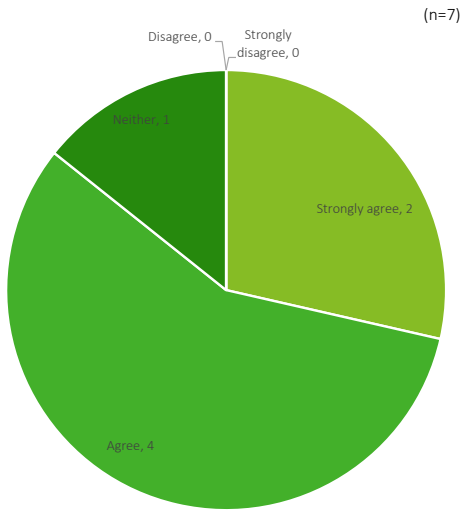
Source: JICA Project Team

Figure 43 Post follow-up training questionnaire: Participation in online courses

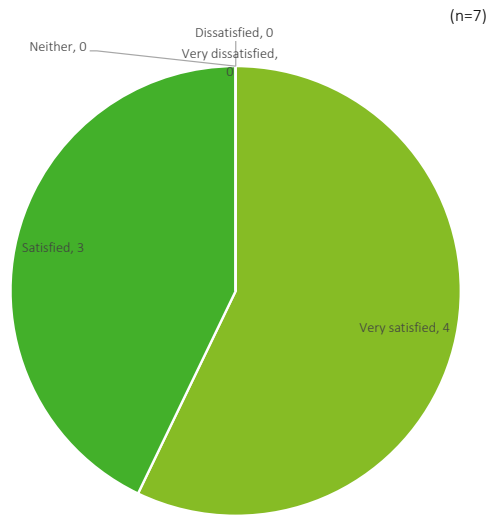


Source: JICA Project Team

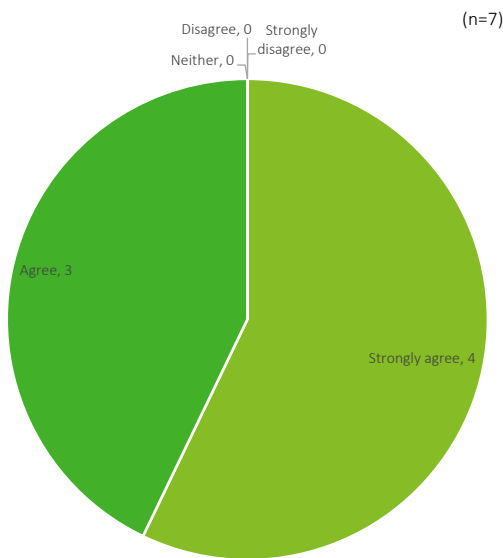
Figure 44 Post follow-up training questionnaire: Participation in follow-up training



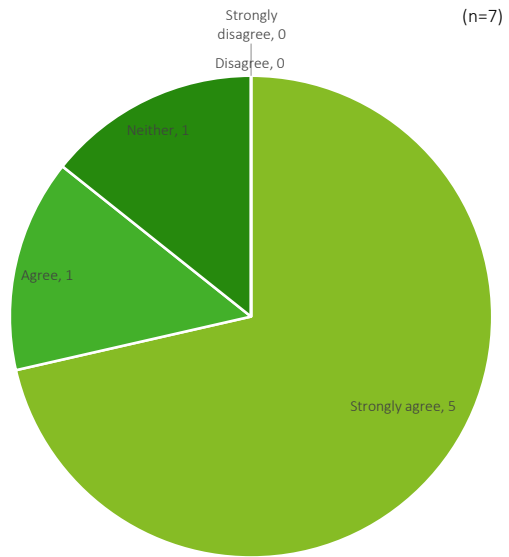
Source: JICA Project Team
Figure 45 Post follow-up training questionnaire: Did you clearly understand the objectives of the follow-up training before participating in the training?



Source: JICA Project Team
Figure 46 Post follow-up training questionnaire: Satisfaction with the follow-up training program as a whole



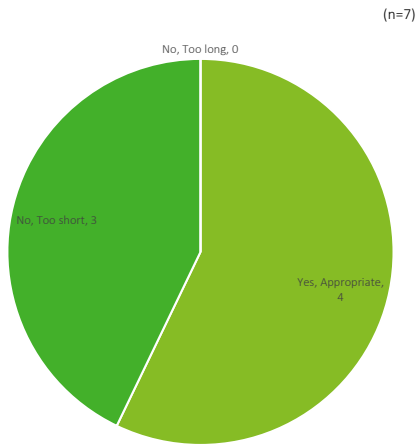
Source: JICA Project Team
Figure 47 Post follow-up training questionnaire: Can the knowledge and experience acquired in the follow-up training be used in operation?



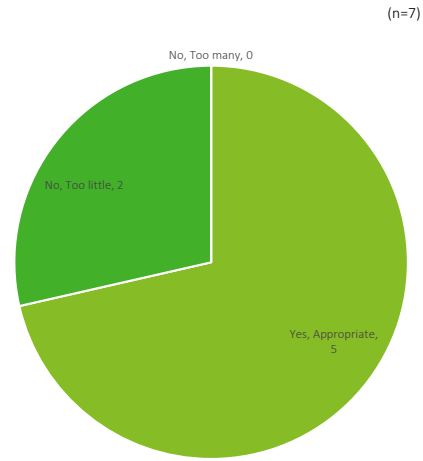
Source: JICA Project Team
Figure 48 Post follow-up training questionnaire: Was the curriculum structure of the follow-up training appropriate?

Comments related to "Can the knowledge and experience acquired through the follow-up training be used in business?":

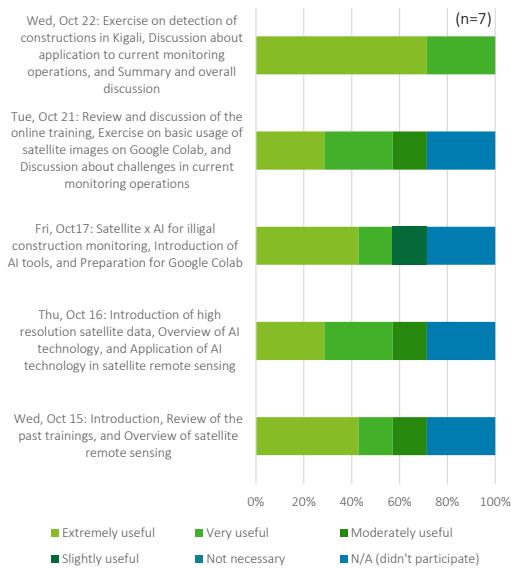
- This training was really needed
- The trainings duration was very short to enrich trainees. Purpose 2 could not be cover for a very limited time.
- Time was short to capture the contents.



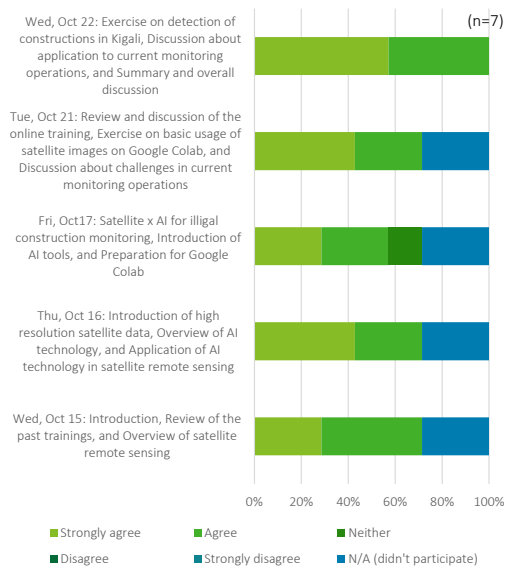
Source: JICA Project Team
Figure 49 Post follow-up training questionnaire: Was the length of the follow-up training adequate?



Source: JICA Project Team
Figure 50 Post follow-up training questionnaire: Was the number of participants in the follow-up training adequate?



Source: JICA Project Team
Figure 51 Post follow-up training questionnaire: Were the subjects and content (lectures, workshops, teaching materials, etc.) useful?



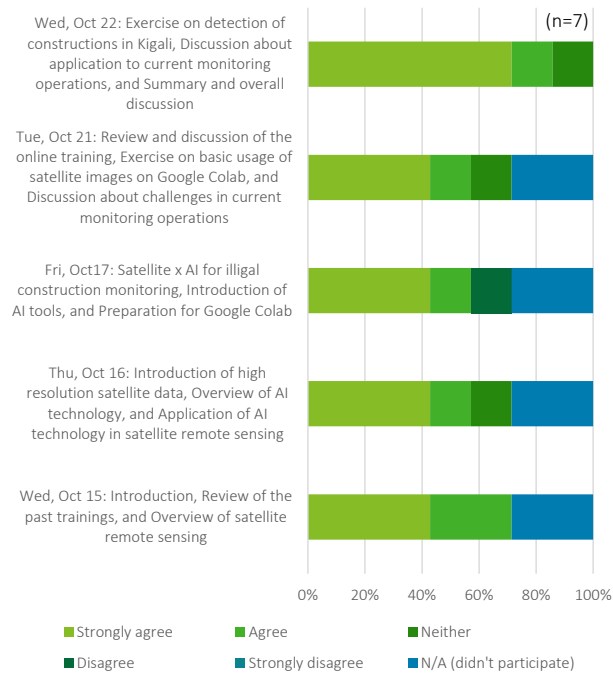
Source: JICA Project Team
Figure 52 Post follow-up training questionnaire: Was the lecturer's presentation and explanation easy to understand?

Comments related to "Subjects and content that were not covered in this training but should be included"

- Maybe include the subject of making layouts of the worked-on projects.
- I think they covered what they have planned for training
- "They were Covered, but We Covered them using Rater Data from the Imagery Satellite And also there was both Raster and Vector data instead the One "
- Start-up of AI operations for beginners

Comments on the above reasons:

- It will be helpful in making good reports and presentations with the help of well-structured layout.
- The contents and structure did not consider the exercises on any programming language for AI



Source: JICA Project Team

Figure 53 Post follow-up training questionnaire: Were the materials of high quality and useful?

Comments related to "Were the materials high quality and useful?":

- I have been satisfied, and I am going to practice it, especially the content for the last day's session
- There should be user guide or manuals which follow step-by-step for trainees' self-exercises
- More training is needed.

Other Program Comments:

- The program was good and very helpful I gained a lot of skills and knowledge on remote sensing and how to use QGIS software. Thank you
- "The training was incredible, I appreciate your time, support and courage! I will kindly request for another session to learn more! Thank you!"
- We need more training on that so that many can know this, because it is very helpful
- "Firstly I appreciate you for the preparation of this training, I have satisfied especially in my department of transport like to detect the destruction of roads in any area by using the data from the satellite and others. It was so wonderful to attend this Training"
- The program to schedule reasonable duration for trainings (like two weeks-face to face), targeting increased number of trainees, and consider other sectors like transport, energy, mining or water

Current Status of Satellite Development and Utilization in Africa:

With the establishment of the African Space Agency (AfSA) in 2025, moves to cooperate in the space field within Africa and to cooperate among multiple African countries and organizations outside Africa (ESA, etc.) using frameworks such as the AfSA have been activated. RSA is also aiming to establish cooperation in a wide area of Africa and Rwanda's position in Africa in future satellite data utilization, satellite development, and human resource development (for example, establishing and promoting the use of ground stations to establish superiority as receiving bases), and is placing importance on strengthening networks in Africa. In this context, from October to November 2025, JICA Project Team conducted a survey on the current situation of African countries (Kenya, Ghana, Senegal, as well as Rwanda) engaged in satellite development and utilization. The survey results are as follows:

Table 21 Current status of satellite development and utilization in African countries

Main	Sub	Rwanda	Kenya	Ghana	Senegal
Governmental Entity		<ul style="list-style-type: none"> Rwanda Space Agency (RSA): A space agency directly under the President. 	<ul style="list-style-type: none"> Kenya Space Agency (KSA): A space agency under the Ministry of Defense of Kenya. 	<ul style="list-style-type: none"> Ghana Space Science and Satellite Technology Institute (GSSSTI): A research institute for space science and technology, overseen by the Ghana Atomic Energy Commission under the Ministry of Environment, Science, Technology and Innovation. <i>Note: The Ghana Space Policy, launched in 2024, clearly states the establishment of the Ghana Space Agency. A founding law is expected to be submitted in the future.</i> 	<ul style="list-style-type: none"> Senegal Space Study Agency (ASES): A space agency directly under the President. Ministry of Higher Education, Research and Innovation (MESRI), Senegal: Promotes the SenSAT national space development program.
Space Policy (Year Formulated)		<ul style="list-style-type: none"> LAW OF ESTABLISHING RWANDA SPACE AGENCY (2021) National Space Policy (2025) 	<ul style="list-style-type: none"> Kenya Space Policy (2015) Kenya Space Agency Order (2017) KSA Strategic Plan (2023) Kenya Space Bill (2024) 	<ul style="list-style-type: none"> Ghana Space Policy (2022) 	
Satellite Data Utilization	Current Status and Applications	<p>Various ministries and the Rwanda Space Agency (RSA) are implementing the following initiatives:</p> <ul style="list-style-type: none"> Urban & Infrastructure: A project to detect illegal constructions in Kigali City using satellite data and drones. Disaster Management: In collaboration with the World Food Programme (WFP), a flood risk model has been developed. RSA also works with ESRI Rwanda to utilize ArcGIS. Meteorology: Satellite data from EUMETSAT and JAXA's GSMaP are used for weather forecasting. Agriculture: Crop mapping was conducted with support from GIZ (already completed). Efforts are ongoing in farmland boundary detection and soil degradation assessment. 	<p>The main utilization areas are:</p> <ul style="list-style-type: none"> Agriculture: Information provision, mapping Disaster response: Especially for floods, droughts, and landslides Climate change response: Monitoring deforestation, evaluating carbon footprint, etc. The President is promoting climate change measures, and there is a growing demand for quantitative evaluation of forest increase and carbon sequestration. Wildlife Conservation & Ecosystem Monitoring: Currently, manual monitoring of wildlife populations using sensors is underway. There are plans to improve efficiency by introducing satellite data and new technologies. 	<ul style="list-style-type: none"> Agriculture: Mapping of cultivated land, soil analysis, yield prediction for crop planning Mining: Monitoring illegal mining activities Water resources: Monitoring water quality (pollution) and water bodies Climate change & meteorology: Long-term observation of rainfall changes, assessment of meteorological disaster risks Coastal areas: Monitoring Sea level rise and coastal erosion. 	<p>[ASES]</p> <ul style="list-style-type: none"> Utilizes Earth Observation (EO) for sustainability in areas such as agriculture, infrastructure, energy, mining, water management, and urban planning. <p>[MESRI]</p> <ul style="list-style-type: none"> Agriculture: Mapping small-scale farmland and yield estimation are key challenges. Environment: Monitoring coastal erosion, deforestation, illegal mining, and forest fires. Disaster management: Measures against floods and river overflows; a major issue is the lack of water level monitoring for the Senegal River in the northern region.
	Challenges	<ul style="list-style-type: none"> Lack of ground data to supplement and integrate with satellite data Insufficient understanding of data from various satellites Shortage of data analysis engineers Insufficient frequency and resolution of satellite data 	<ul style="list-style-type: none"> High cost of access to high-resolution satellite data is a major constraint Challenges in data processing skills (especially AI utilization), application development, and infrastructure 	<ul style="list-style-type: none"> Difficulty in acquiring and maintaining high-resolution and high-frequency data Lack of know-how and personnel for SAR (Synthetic Aperture Radar) data analysis Underdeveloped infrastructure for data processing and for storing and sharing large volumes of data 	<p>[ASES]</p> <ul style="list-style-type: none"> Lack of staff capacity: skills in the space sector and project coordination Lack of industry players who can utilize satellite data Insufficient budget <p>[MESRI]</p> <ul style="list-style-type: none"> Shortage of personnel in each institution capable of satellite data analysis and practical operations High cost of acquiring high-resolution data Importance of domestic data: aiming to build an indigenous satellite constellation from the perspective of national sovereignty Introduction of technology and equipment: future challenges include establishment of ground stations, high-precision sensors, clean rooms, etc.

Main	Sub	Rwanda	Kenya	Ghana	Senegal
Satellite Development		<ul style="list-style-type: none"> Training in satellite development has been received at Kyushu Institute of Technology, but the country is still in the early stages of satellite development. 	<ul style="list-style-type: none"> Many engineers have received training overseas, and there is a need to establish specialized courses within the country. Currently, three universities (University of Nairobi, JKUAT, and Technical University) are developing educational models for satellite development, including CubeSat design, development, and simulation. Regional satellite development projects are being promoted through collaboration with Egypt, Ghana, Nigeria, Uganda, and Sudan. In the future, Kenya also aims to build its own satellite constellation. 	<ul style="list-style-type: none"> Currently, GSSTI does not have its own satellite development project, nor does it have engineers specializing in satellite development. According to the Space Policy, the short-term focus is on utilizing satellite data, while in the medium term, domestic satellite development is being considered. 	<p>[MESRI]</p> <ul style="list-style-type: none"> Senegal's first satellite project, "GaindeSat-1A/1B," is underway. GaindeSat-1B is scheduled to be launched in 2026. GaindeSat-1A is already in operation and is equipped with a low-resolution optical sensor, working in conjunction with ground sensors (for water level and weather measurements). The manufacture of GaindeSat-1C is planned, with design and manufacturing to be carried out solely by Senegal. In the future, the "Ninki Nanka" Earth observation satellite constellation project is also being considered (currently at the needs assessment stage).
Other related technologies		<ul style="list-style-type: none"> IoT cameras are installed in mountainous areas to monitor incidents, with data stored in GEOHUB. This is expected to be used for early warning purposes. 	<ul style="list-style-type: none"> Taking advantage of its geographical location along the equator and the coast, Kenya is considering infrastructure development with a view to future spaceports and astronomical research. There is also interest in space situational awareness (SSA), space weather, and space traffic management. 	<ul style="list-style-type: none"> Ghana owns antenna facilities in the vicinity, including a 32-meter radio telescope, a laser probe, and a TAT telescope. It functions as an astronomy and space training center for the African region, accepting trainees from seven African countries. 	
Education		<p>[University of Rwanda]</p> <ul style="list-style-type: none"> The approval process for the aerospace engineering program is underway, with the goal of launching it in September 2026. 	<p>[KSA]</p> <ul style="list-style-type: none"> Plans to establish Earth Observation Innovation Labs at universities to provide incubation and mentorship. <p>[JKUAT]</p> <ul style="list-style-type: none"> Has a Department of Aerospace Engineering and continues to develop solid-fuel rockets. <p>[University of Nairobi]</p> <ul style="list-style-type: none"> Promotes the Tufti satellite development education program in collaboration with other universities. 	<p>[All Nations University]</p> <ul style="list-style-type: none"> Since 2015, has carried out Ghana's first artificial satellite project, "GhanaSat-1." Africa Space Station Project: Provides an online space education program with participation from 1,400 people across 19 African countries. <p>[University of Ghana]</p> <ul style="list-style-type: none"> Plans to launch an aerospace engineering program starting in 2026. 	<ul style="list-style-type: none"> The national space development program, SenSAT, is promoted in collaboration with research laboratories and faculty at domestic universities such as ESP Dakar and IPT Chess.
Private Sector		<ul style="list-style-type: none"> Czech satellite development company TRL has a base in Kigali. 	<ul style="list-style-type: none"> To foster the space industry, there is a strong focus on building an innovation ecosystem. Collaboration among government, industry, and academia, as well as regular dialogue and knowledge exchange, are promoted. There are satellite data utilization companies such as AMINI, but most are small-scale businesses. 	<ul style="list-style-type: none"> There are space-related consulting firms such as Spacehubs Africa, but the industry is still in its early stages. 	<ul style="list-style-type: none"> Tolbi: Contributes to sustainability and precision agriculture in the agricultural sector, mainly in West Africa, by utilizing AI and satellite remote sensing technologies. There are few companies utilizing satellite data.
Partners		<ul style="list-style-type: none"> ESRI Rwanda: Utilization of GIS Finnish Meteorological Institute: Meteorological data International Charter on Space and Major Disasters: Training on simulations IAF: Rwanda will host a meeting in 2026 AfSA: Research collaboration Currently, there are no bilateral partnerships 	<ul style="list-style-type: none"> Collaboration with other African countries (Egypt, Ghana, Nigeria, Uganda, Sudan, etc.) in space system engineering (CubeSat development) Cooperation with international agencies such as the Italian Space Agency (ASI) and the French CNES Collaboration with GIZ on establishing data infrastructure, data governance, and innovation sandboxes 	<ul style="list-style-type: none"> MIT: Monitoring deforestation due to mining activities University of Maryland: Monitoring air pollution (using NASA funding) KNUST: Collaboration on astronomy training programs 	<p>[ASES]</p> <ul style="list-style-type: none"> Has signed MoUs with many countries (France, UK, China, etc.) and international organizations (ESA, AfSA, WFP, UNESCO, etc.) <p>[MESRI]</p> <ul style="list-style-type: none"> University of Montpellier: Collaboration on GaindeSat development AfSA
Others			<ul style="list-style-type: none"> There is strong interest in supporting startups and strengthening the innovation ecosystem in the space sector. 		

Source: Prepared by JICA Project Team based on interviews with various organizations

2.2.2 Activities relating to “Output 2: Education and research capacity of the University of Rwanda in satellite development and the use of geospatial information is strengthened”

UR aims to establish the Aerospace Engineering Program within the Department of Mechanical Engineering. With the cooperation of domestic stakeholders such as RSA and RwandAir, as well as Kent State University in the United States, UR had been working on the development of an undergraduate-level aerospace engineering program prior to the start of this activity (Figure 54). Under this activity, the following were implemented:

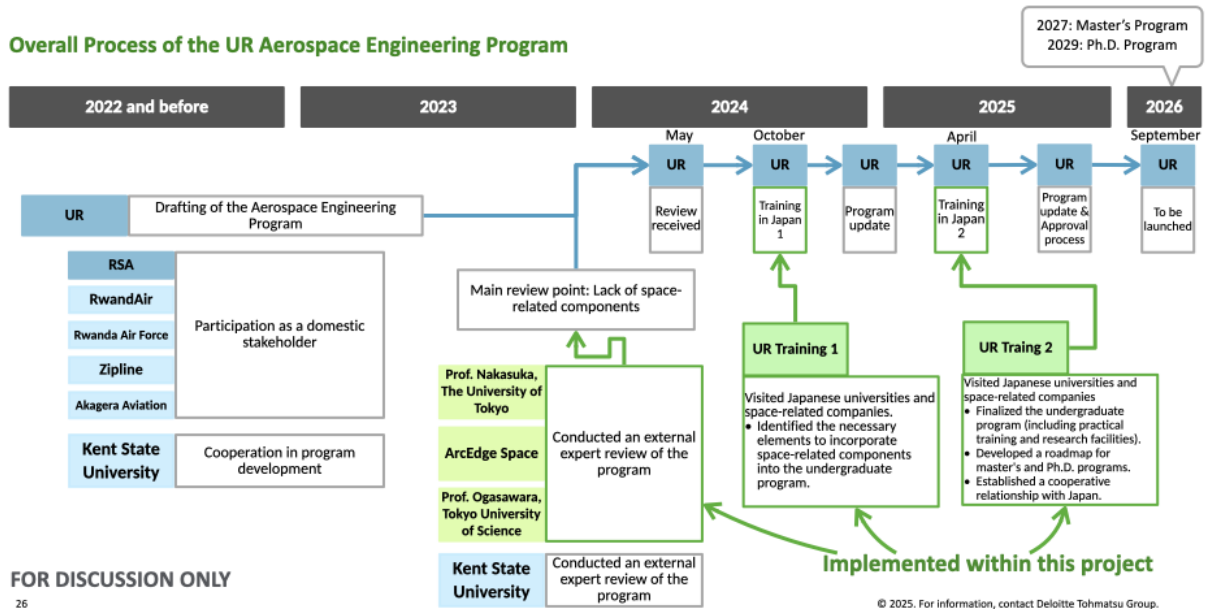
- Analysis of UR’s current status and formulation of necessary interventions
- Reviews by external experts required for program development
- Two Japan-based training sessions related to the development of the Aerospace Engineering Program, with follow-ups

Concerning the external expert reviews which are required for program development, the program was reviewed by Professor Shinichi Nakasuka of the University of Tokyo, Professor Hiroshi Ogasawara of Tokyo University of Science, and ArkEdge Space Inc. The reviewers pointed out that the draft of the aerospace program prepared at the start of this activity lacked space-related elements, and it was found that space-related elements needed to be added in order to establish a true Aerospace Engineering Program.

Accordingly, the two Japan-based training sessions and subsequent follow-ups aimed to enable UR faculty to acquire the knowledge necessary to develop a space engineering curriculum and thereby realize the formulation of the Aerospace Engineering Program. In the first training session, trainees from UR visited Japanese universities, research institutions, and space-related companies to identify the space-related elements to incorporate into the Aerospace Engineering Program, and updated the program plan with the results. In the second training session, UR trainees finalized the undergraduate Aerospace Engineering Program, developed a roadmap for the future opening of master’s and doctoral programs as medium- to long-term plans, and built collaborative relationships with Japanese universities, research institutions, and companies. Between the two training sessions, regular online meetings (with some held in person) were organized to follow up with the trainees. Together with the Kyushu Institute of Technology, advice was provided to UR and RSA on the efforts related to UR’s development of the Aerospace Engineering Program, including updates on the aerospace program; preparations for drafting the roadmap for the master’s and doctoral programs, which constitute part of the long-term plan; and preparations for cooperation with Japanese universities and institutions necessary for securing and developing faculty.

As a result of this activity, UR obtained internal approval for the undergraduate Aerospace Engineering Program in September 2025 and is proceeding with the approval process of the Higher Education Council (HEC), aiming to launch the program in September 2026. In addition, UR created a roadmap for the master’s and doctoral programs and was able to formulate an action plan for building collaborative relationships with Japanese institutions. Consequently, a vision for education and research in aerospace engineering at UR has been articulated from the bachelor’s to the doctoral level, and this time’s efforts successfully strengthened UR’s education and research capacity in satellite development and the utilization of geospatial information. On the other hand, particularly with respect to the implementation of the master’s and doctoral programs, constraints on Rwanda’s resources (facilities, equipment, faculty, etc.) are anticipated to be a challenge going forward.

Overall Process of the UR Aerospace Engineering Program

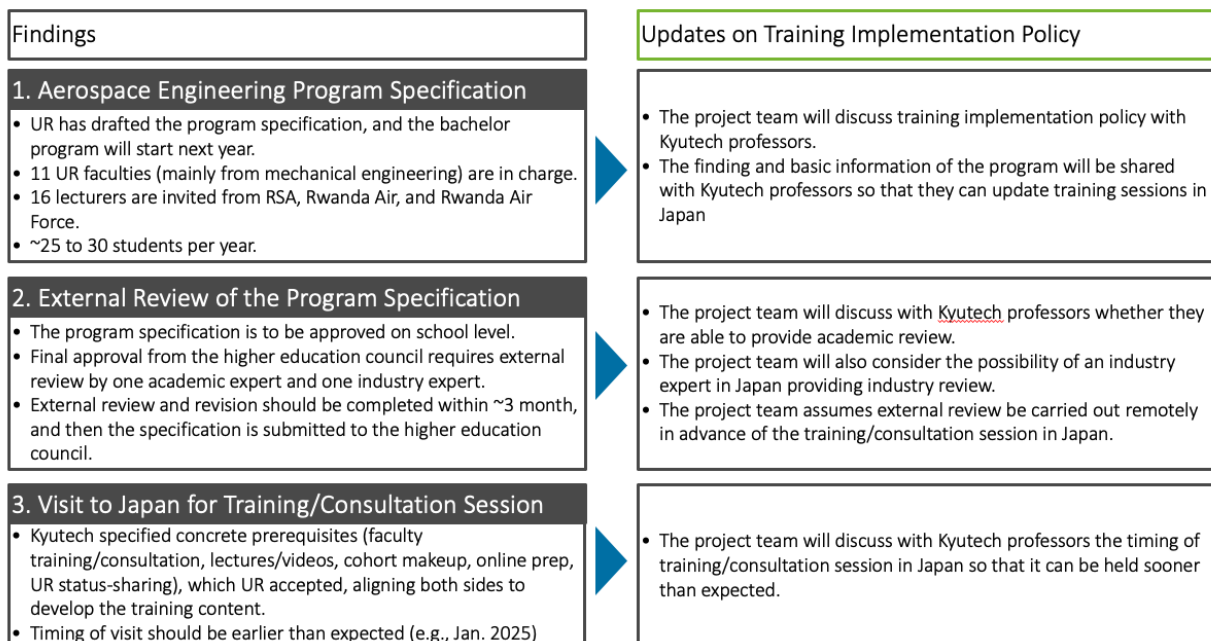


Source: JICA Project Team

Figure 54 Background of UR Aerospace Program Development

■ Analysis of UR's current status and formulation of necessary interventions:

During the on-site visit in November 2023, interviews were conducted with UR and other stakeholders to assess the current situation and to formulate the necessary interventions (an overview is presented in the figure below).



Source: JICA Project Team

Figure 55 Overview of the analysis of UR's current situation and required interventions

Key points identified were as follows: it was confirmed that UR had already developed the curriculum for the Aerospace Engineering Program, with a plan to obtain approval from HEC by August 2024 and to launch the program in September 2024. It was also found that reviews by

external experts would be required to realize the program, and that the curriculum under consideration was centered on aeronautical engineering and lacked space-related elements. Accordingly, to enable the implementation of the Aerospace Engineering Program, support in two areas was decided to be considered: (i) support to conduct the reviews by external experts required for approval by the HEC; and (ii) support to add space-related elements to the curriculum. The latter support was decided to be provided through Japan-based training centered on visits to the Kyushu Institute of Technology (Kyutech). To ensure a meaningful training program, Kyutech set forth the following prerequisites: provide training and consultation to enable UR faculty to develop their own implementation plans; deepen understanding of space engineering through lectures and video lectures; organize a trainee group consisting of two full professors and one early-career faculty member; conduct advance preparations through online meetings; and provide information on UR's current status and plans. UR considered these conditions reasonable, and both parties were able to align their objectives and proceed with the development of the training content.

■External review:

According to UR, obtaining approval from HEC requires reviews by external experts from both academia and industry. In response, the project team commissioned reviews by experts in Japan as described below; the experts conducted the reviews, and the results were provided to UR. Furthermore, during the Japan-based training for UR trainees described later that was scheduled at the same timing with the experts' visit to Japan, the experts delivered in-person feedback to UR trainees and held discussions with them.

[Review by Academic Expert]

- Shinichi Nakasuka, Professor, Department of Aerospace Engineering, Graduate School of Engineering, The University of Tokyo (review conducted in January 2024)

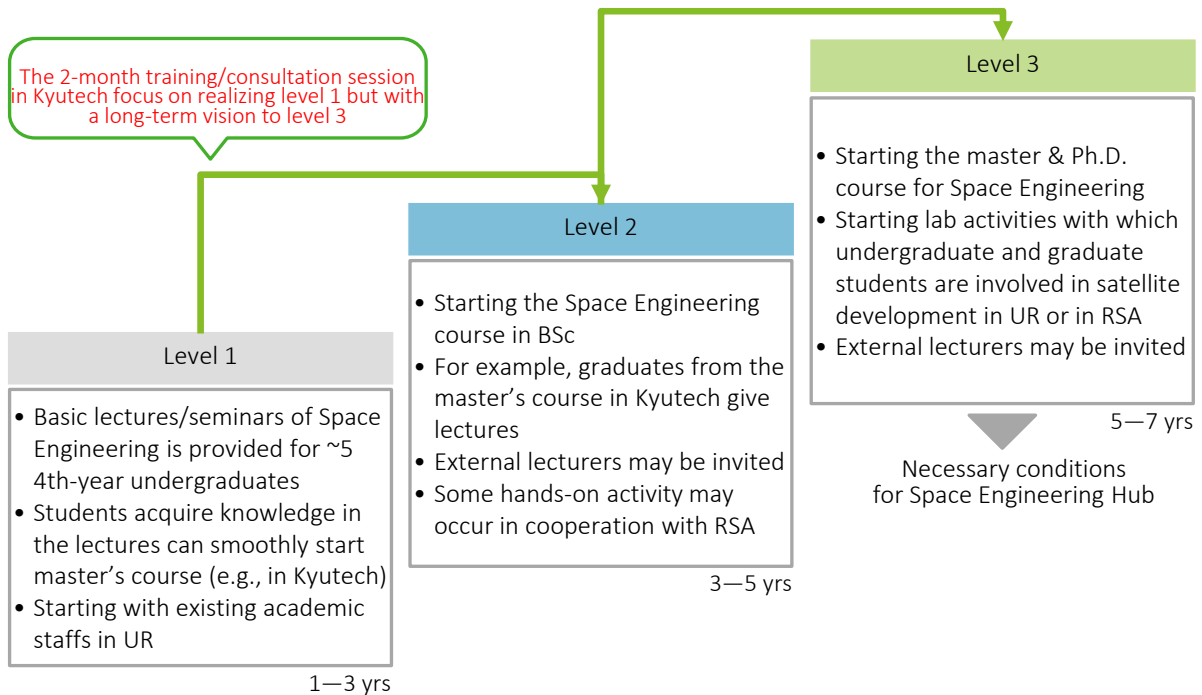
*Apart from the review by Professor Nakasuka, Meng-Yu Zhao, a professor of space systems engineering at Kyushu Institute of Technology, also commented on the curriculum.[Review by Industry Experts]

- ArkEdge Space Inc. (review conducted in April 2024)
- Hiroshi Ogasawara, Professor, Department of Mechanical Engineering, Faculty of Science and Engineering, Tokyo University of Science (review conducted in May 2024, based on the perspective of an experienced chief engineer of Mitsubishi Heavy Industries, Ltd.)

■Overview of the training program for UR:

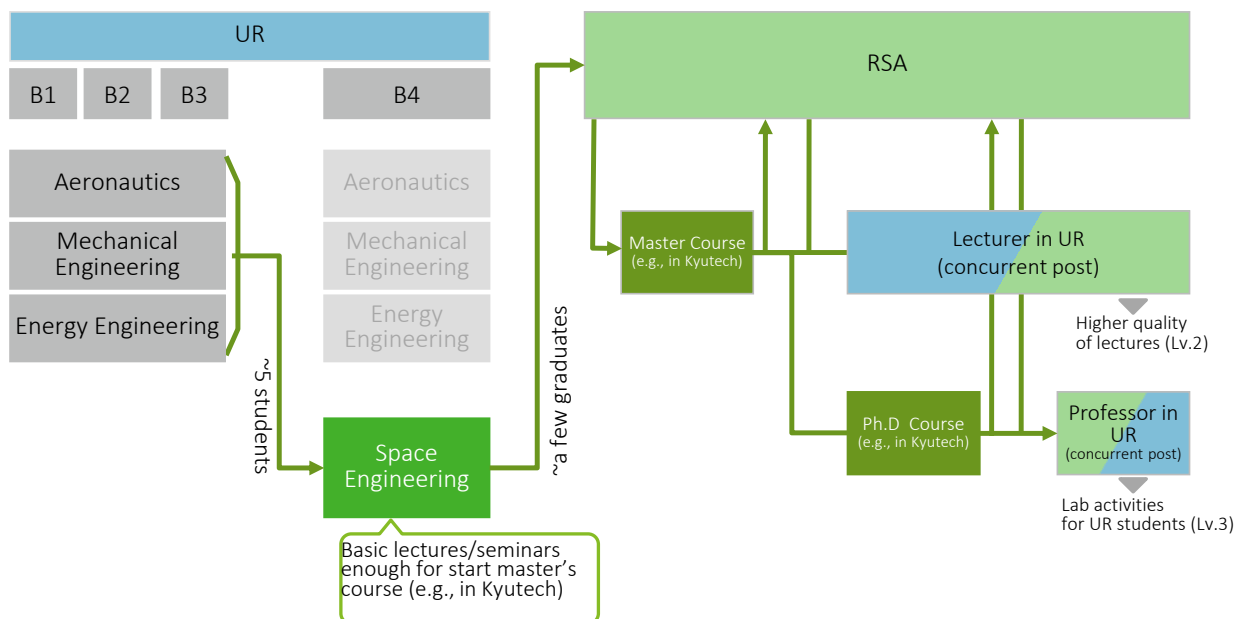
In March 2024, in response to the comments from Professor Cho of the Kyushu Institute of Technology and the review by Professor Nakasuka of the University of Tokyo, it was confirmed that the name of the program would be changed from "Aerospace Engineering Program" to "Aeronautics Program." As shown in Level 1 below, the first step is to start as an aeronautics program and offer a space engineering course to fourth-year undergraduates. After that, as shown in Level 2, the university will shift to a four-year undergraduate space engineering course, with the aim of opening Level 3 master's and doctoral courses.

With regard to this project's training for UR, training and consultation not only for the establishment of short-term courses (falling under Level 1) but also for the long-term vision (falling under Level 3) were planned. As the Aeronautics Program will begin as early as September 2024, the training content and travel schedule was considered accordingly.



Source: ICA Project Team based on discussion with RSA and UR

Figure 56 Roadmap for the establishment of a Space Engineering Course in UR



Source: ICA Project Team based on discussion with RSA and UR

Figure 57 Envisioned career paths (Early Level 1, UR Space Engineering)

■ **First Training Session in Japan for the Formulation of the Aerospace Engineering Program:**

The first training session in Japan for the formulation of the Aerospace Engineering Program was held from October 20 to November 3, 2024. The purpose of this training session was to provide the knowledge necessary for establishing a department and

formulating a program related to aerospace engineering as well as to promote the development of the Aerospace Engineering Program at UR (Table 22).

Table 22 Overview of the First Training for UR

Content	Aerospace Engineering Program Formulation 1
Purpose	To acquire the knowledge necessary for establishing a department and formulating a program related to aerospace engineering, and to promote the development of UR's Aerospace Engineering Program
Period	October 20 to November 3, 2024
Location	Kitakyushu City, Fukuoka Prefecture; Tokyo
Training Participants	UR: 2 members; RSA: 1 member
Training Implementing Institutions	Kyushu Institute of Technology, JICA Project Team

Source: JICA Project Team

During the first training session, emphasis was placed on enabling the trainees to experience and absorb the essential components of aerospace engineering. In addition to lectures and site visits at Kyushu Institute of Technology, visits were made to other universities, research institutions, and private companies related to aerospace engineering (Table 23). During the first half of the training session, lectures on aerospace engineering curricula, lab tours, and observations of classes, practical exercises, and research were conducted at Kyushu Institute of Technology, along with a visit to Yamaguchi University. In the latter half, the participants moved to Tokyo to visit universities, research institutions, and companies involved in aerospace engineering education, research, and business.

Table 23 Overall Training Schedule

Date	Time	Location	Content
October 20	Afternoon	Kitakyushu	Arrival in Japan
October 21	Morning	JICA Kyushu Center	Briefing on JICA regulations
	Afternoon	Kyushu Institute of Technology	Lecture on Aerospace Engineering Program; Campus tour; Research facility visit
October 22	All day	Yamaguchi University	Lecture on satellite data utilization by Prof. Masahiko Nagai; Facility visit
October 23	All day	Kyushu Institute of Technology	Lecture on Aerospace Engineering Program
October 24	All day	Kyushu Institute of Technology	Lecture on Aerospace Engineering Program
October 25	All day	Kyushu Institute of Technology	Lecture on Aerospace Engineering Program
October 28	All day	Kyushu Institute of Technology	Lecture on Aerospace Engineering Program
	14:30–19:30	Transfer	Transfer to JICA Tokyo Center
October 29	10:00–11:00	Infostellar	Lecture on ground station business
	11:30–12:00	Deloitte Tohmatsu	RESTEC presentation on project overview
	14:00–16:00	University of Tokyo	Explanation on aerospace engineering program review by Prof. Shinichi Nakasuka

October 30	10:00–12:00	Keio University	Lecture on the overall picture of space-related education
	14:00–16:00	JAXA Institute of Space and Astronautical Science	Lecture on the overall picture of space-related education and research
October 31	9:30–11:00	ArcEdge Space	Explanation on aerospace engineering program review
	13:00–14:00	Tokyo University of Marine Science and Technology	Lecture on the overall picture of space-related education by Prof. Nobuaki Kubo
	15:00–16:00	UNISEC	Explanation on UNISEC activities and membership process
November 1	9:30–10:30	Space Compass	Discussion and explanation on HAPS and optical communication business
	13:00–14:00	Synspective	Lecture on SAR constellation business
November 2	10:00–12:00	Mitsubishi Heavy Industries Minatomirai Technological Museum	Observation of space-related technologies
	13:00–14:00	Deloitte Tohmatsu	Explanation on aerospace engineering program review by Prof. Ko Ogasawara (Tokyo University of Science)

Source: JICA Project Team

Three participants attended the first training session: two lecturers from UR, including a candidate for department head, and one lecturer from RSA (Table 24).

Table 24 Training Participants

Name	Institution and Title (at the Time of Training)
Dr. MUNYAZIKWIYE B Bernard	Senior Lecturer, Mechanic and Energy Engineering, University of Rwanda
Dr. UWAYEZU Ernest	Senior Lecturer, UR-CGIS, University of Rwanda
Dr. NTWALI Didier	Lecturer, Earth and Space Science Division, Rwanda Space Agency

Source: JICA Project Team

The training session was conducted without issues as per the schedule and content outlined in Table 23. Below are photos at some of the sites.



Lecture by Prof. Kitamura at Kyushu Institute of Technology (October 23, 2024)



Lecture by Prof. Cho at Kyushu Institute of Technology (October 24, 2024)



Presentation by international students at Kyushu Institute of Technology (October 24, 2024)



Lecture by Prof. Kohtake and Associate Prof. Kodaka at Keio University (October 30, 2024)



Group photo at Keio University (October 30, 2024)



Lecture by ArcEdge Space (October 31, 2024)

Based on the summary materials prepared by the trainees which compiled the training content and the revisions to the Aerospace Engineering Program made during the training, the following overall comments regarding this training session were provided:

- The visits to various institutions were meaningful and provided numerous insights.
- All lectures and presentations aligned with the objectives of our mission.
- UR faculty members have started applications for admission and scholarships at Japanese universities under the framework of scholarship programs for international students.
- The program content (modules) was updated based on comments received during the training and experiences at the visited institutions. Detailed revisions, including course descriptions and strategic plans, will be implemented after returning home.

As indicated in the above comments, the training was perceived as contributing to the formulation of the Aerospace Engineering Program at UR and can be evaluated as having led to steps that are actionable by the trainees upon their return to their country.

■ Follow-up Activities After the First Training Session in Japan:

Following the first training session in Japan, regular online (and some on-site) meetings were held to follow up on the actions of the trainees after their return to their country (Table 25). These meetings aimed to provide guidance and advice for UR and RSA's efforts in formulating UR's Aerospace Engineering Program, including updates to the aerospace program, preparation for developing a roadmap for the master's and doctoral programs as part of the long-term plan, and preparation for collaboration with Japanese universities and institutions to secure and develop faculty members. These discussions were conducted with an eye toward the second training session in Japan scheduled for April 2025.

Table 25 Overview of Follow-up Activities After the First Training Session in Japan

#	Date (JST)	Participants (Honorifics omitted)	Discussion Overview
1	2024/12/18 16:30–17:30 (Online)	Rwanda: Munyazikwiye B Bernard; Uwayezu Ernest; Hakizimana Eustache (UR) Japan: Yasuo Matsuura; Kazuma Mitsuda; Michitoshi Sakata (Deloitte Tohmatsu); Tetsuto Fuse (Kyushu Institute of Technology); Tomohiro Ogawa (JICA)	<ul style="list-style-type: none"> • Sharing updates on the formulation of the Aerospace Engineering Program at UR • Explanation of application documents by UR • Explanation of the schedule for final approval by UR • Adjustments to the schedule for the second training session in Japan
2	2025/1/28 16:00–17:00 (Online)	Rwanda: Munyazikwiye B Bernard; Uwayezu Ernest; Mushirabwoba Bernard (UR) Japan: Yasuo Matsuura; Kazuma Mitsuda; Michitoshi Sakata (Deloitte Tohmatsu); Tetsuto Fuse (Kyushu Institute of Technology)	<ul style="list-style-type: none"> • Sharing updates on the formulation of the Aerospace Engineering Program at UR • Discussion on the themes of graduation research and preparation status of faculty • Adjustments to the schedule for the second training session in Japan
3	2025/2/26 16:00–18:00 (On-site & Online)	Rwanda: Munyazikwiye B Bernard; Uwayezu Ernest; Mushirabwoba Bernard; Mbereyaho Leopard (UR); Mutesi Immaculate (JICA Rwanda) Japan: Yasuo Matsuura (Online); Kazuma Mitsuda; Michitoshi Sakata (Deloitte Tohmatsu); Tetsuto Fuse (Online, Kyushu Institute of Technology)	<ul style="list-style-type: none"> • Sharing updates on the formulation of the Aerospace Engineering Program at UR • Explanation of the MOU proposal between UR and Kyushu Institute of Technology • Explanation of medium- and long-term collaboration requests between UR and Japan • Adjustments to the schedule for the second training session in Japan
4	2025/3/26 17:00–18:00 (Online)	Rwanda: Munyazikwiye B Bernard; Uwayezu Ernest; Mushirabwoba Bernard (UR); Didier Ntwali (RSA); Mutesi Immaculate; Takuro Asanuma (JICA Rwanda) Japan: Yasuo Matsuura (Online); Kazuma Mitsuda; Sachiyo Nakamura (Deloitte Tohmatsu); Tetsuto Fuse (Online, Kyushu Institute of Technology)	<ul style="list-style-type: none"> • Sharing updates on the formulation of the Aerospace Engineering Program at UR • Feedback from Japan on the MOU proposal between UR and Kyushu Institute of Technology • Feedback from Japan on the roadmap for the Master's and Doctoral programs • Adjustments to the schedule for the second training session in Japan

Source: JICA Project Team

■ Second Training Session in Japan for the Formulation of the Aerospace Engineering Program:

The second Japan-based training session on the development of the Aerospace Engineering Program was conducted from April 14 to 25, 2025. The objectives were to further develop the undergraduate Aerospace Engineering Program at UR and to draft a

roadmap with a view to future master’s and doctoral programs (Table 26 **Error! Reference source not found.**).

Table 26 Overview of the Second Training

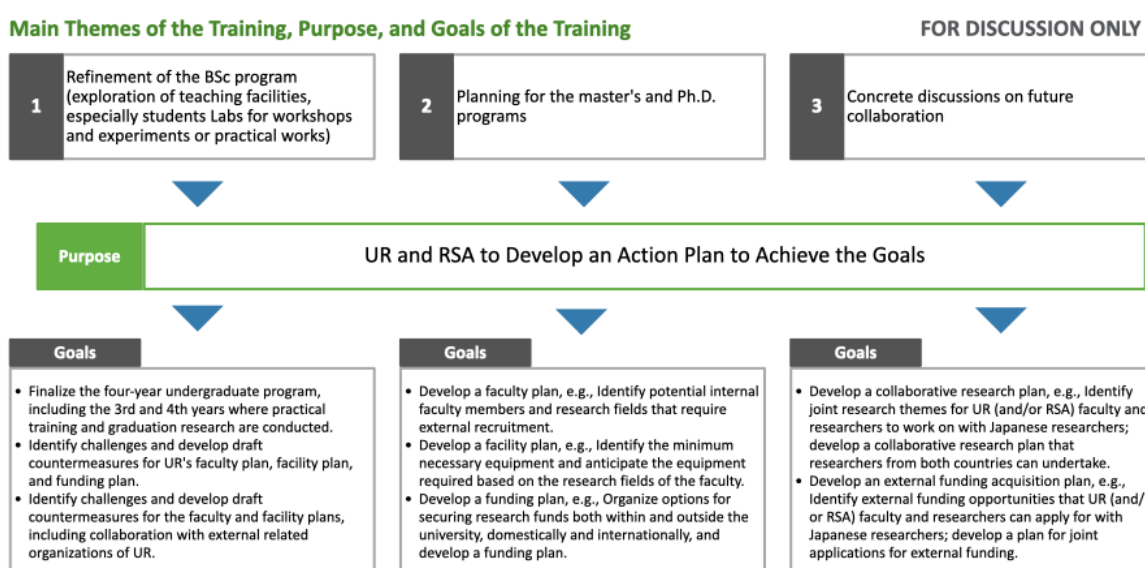
Content	Aerospace Engineering Program Formulation II
Objective	Acquire expertise for department establishment and curriculum development in aerospace and space engineering; facilitate the formulation of the Aerospace Engineering Program at UR
Period	April 14–25, 2025 (from arrival in Japan to departure)
Locations	Kitakyushu City, Fukuoka Prefecture; Tokyo
Participants	UR: 2 members; RSA: 1 member
Implementing Institutions	Kyushu Institute of Technology; Project Team

Source: JICA Project Team

During the second training session, the following three main themes were addressed, with the goal of formulating an action plan for UR and RSA (Figure 58):

- Finalization of the undergraduate Aerospace Engineering Program
- Development of a roadmap for the launch of master's and doctoral programs
- Formulation of concrete strategies for collaboration with Japanese universities, research institutions, and companies

For the undergraduate program, the focus was on planning the preparation of equipment for experiments and facilities required for practical training and graduation research for third- and fourth-year students. For master’s and doctoral programs, faculty planning, equipment planning, and funding strategies were discussed, with particular emphasis on preparing core teaching staff. Collaboration with Japanese institutions centered on joint research plans and strategies for securing external funding. Prior to the training, the Rwandan team prepared draft proposals on these topics, which were discussed and refined during the training, with feedback from Japanese aerospace experts.



Source: JICA Project Team

Figure 58 Main Themes, Purpose, and Goals of the Training

The second training session focused on visits to leading universities and promising companies in the aerospace sector to finalize the Aerospace Engineering Program, create a roadmap for the master’s and doctoral programs, and strengthen cooperation with Japanese institutions (Table 27).

Table 27 Training Visit Schedule

Date	Day	Start	End	Venue
April 15, 2025	Tue	13:30	15:30	Kyushu Institute of Technology (Kyutech): Prof. Fuse
April 15, 2025	Tue	16:30	18:00	Kitakyushu Science and Research City: Prof. Mito, Prof. Tamukai
April 16, 2025	Wed	9:00	16:00	Kyutech: Prof. Cho, Prof. Kitamura
April 17, 2025	Thu	10:00	11:00	ArcEdge Space
April 17, 2025	Thu	14:00	15:00	JAXA: Mr. Kikuchi
April 18, 2025	Fri	10:00	12:00	Keio University: Prof. Kotake, Assoc. Prof. Kodaka
April 18, 2025	Fri	15:00	17:00	University of Tokyo: Prof. Nakasuka
April 21, 2025	Mon	10:00	12:00	Yamaguchi University: Prof. Nagai
April 21, 2025	Mon	13:00	15:00	Tokyo University of Science: Prof. Ogasawara
April 21, 2025	Mon	15:30	16:30	Wakayama University: Prof. Akiyama
April 22, 2025	Tue	10:00	11:00	Elevation Space
April 22, 2025	Tue	13:00	15:00	Tohoku University: Prof. Makihara, Prof. Kuwahara
April 23, 2025	Wed	10:00	16:00	Nihon University (UNISEC-Global): Prof. Yamazaki
April 24, 2025	Thu	10:00	12:00	Chiba Institute of Technology: Prof. Wada, Prof. Cho
April 25, 2025	Fri	10:00	12:00	Synspective Inc,

Source: JICA Project Team

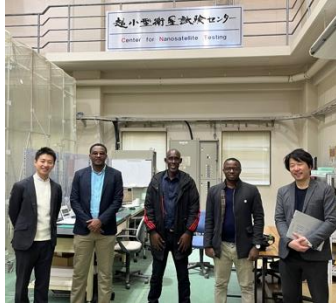
A total of three participants attended the training session: two lecturers from UR, including the Head of the Department of Mechanical Engineering, who is overseeing the development of the Aerospace Engineering Program, and one Division Manager of Earth Space Sciences Education from RSA, who also lectures at UR (see Table 24). Dr. Munyazikwiye B. Bernard and Dr. Ntwali Didier had also participated in the first training session. Dr. Mushirabwoba Bernard, who serves as the practical leader for the Aerospace Engineering Program, joined the training for the first time.

Table 28 Participants in the Second Training

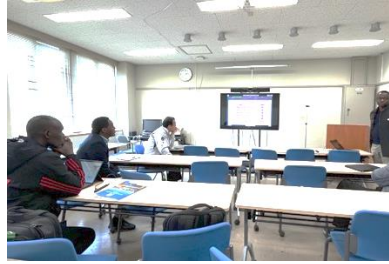
	Name	Institution and Title (at the Time of the Training)
1	Dr. MUNYAZIKWIYE B Bernard	Senior Lecturer, Mechanic and energy Engineering, University of Rwanda (Head of Department of Mechanical Engineering)
2	Dr. MUSHIRABWOBA Bernard	Lecturer, Mechanical and Energy Engineering, University of Rwanda (Leader of the Aerospace Engineering Program)
3	Dr. NTWALI Didier	Division Manager, Earth Space Sciences Education, Rwanda Space Agency

Source: JICA Project Team

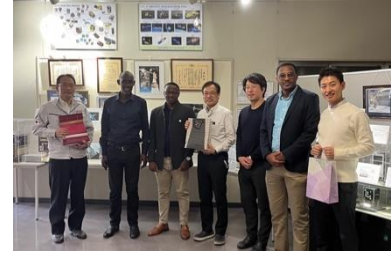
The training session was carried out without issues according to the planned schedule and content. The following are highlights from each visit:



Inspection of the Kyushu Institute of Technology Center for Nanosatellite Testing (April 16, 2025)



Discussion with Prof. Cho and Prof. Kitamura at Kyushu Institute of Technology (April 16, 2025)



Group photo at Kyushu Institute of Technology (April 16, 2025)



Lecture by Prof. Kotake and Associate Prof. Kodaka at Keio University (April 18, 2025)



HEPTA-SAT training at Nihon University (April 23, 2025)



Visit to Chiba Institute of Technology Nanosatellite Development Facility (April 24, 2025)

The objectives of the second Japan-based training session (finalizing the undergraduate Aerospace Engineering Program, formulating a roadmap for the master's and doctoral programs, and developing an action plan for collaboration with institutions in Japan) were largely achieved. The undergraduate program was judged to have been finalized without issue during this training session, and preparations for its launch are progressing. A stakeholder meeting that included external experts from Japan was held on May 22, 2025. On September 30, 2025, UR completed its internal approval procedures and moved forward in the approval process by HEC. In addition, UR compiled risk factors and mitigation measures for the undergraduate program launch (Table 29), and, for the master's and doctoral programs, prepared lists of preparatory items and an implementation schedule leading up to the programs' launch (Table 30). Regarding relevant institutions in Japan, concrete proposals, such as priority institutions for deeper collaboration and joint research themes, were organized (Tables 31). In parallel, the trainees prepared summary documents and a concrete action plan for each theme (Tables 32 and 33).

Table 29 Risk Management Plan

Risk	Mitigation & Preventive Strategy	Contingency Plan	Timeline
Delayed HEC Accreditation	<ul style="list-style-type: none"> Engage HEC early in the process. Hire external accreditation consultants if needed. Submit draft documents 6 months ahead. Conduct pre-assessment workshops. 	<ul style="list-style-type: none"> Fast-track review with HEC leadership. Adjust academic calendar if needed. 	Q3 2025 – Q1 2026
Low Student Enrollment	<ul style="list-style-type: none"> Offer competitive scholarships. Partner with Space Sector for recruitment. Launch early marketing (2026). Collaborate with STEM schools for pipeline. 	<ul style="list-style-type: none"> Extend application deadline. Reduce cohort size (min. 15 students). 	Q2 2026 – Q4 2026
Insufficient Industry Linkages	<ul style="list-style-type: none"> Leverage Rwanda Space Agency. Host annual industry-academia forums. Sign MoUs with 3+ companies by 2026. Integrate industry projects into coursework. 	<ul style="list-style-type: none"> Partner with international institutions in the space sector in Japan (e.g., JAXA, etc.). Strengthen alumni network. 	Q1 2026 – Ongoing
Faculty Shortage	<ul style="list-style-type: none"> Recruit diaspora Rwandan experts. Partner with foreign universities for visiting faculty (e.g., Kyushu Institute of Technology). Advertise globally. Offer competitive salaries. 	<ul style="list-style-type: none"> Use hybrid teaching (recorded lectures from partners). Prioritize critical courses. 	Q3 2025 – Q2 2026
Inadequate Lab Infrastructure	<ul style="list-style-type: none"> Phase-wise lab setup. Seek equipment donations (e.g., JICA). Prioritize essential labs by 2026. Apply for research grants. 	<ul style="list-style-type: none"> Partner with local industries for lab access. Use simulations as a stopgap. 	Q4 2025 – Q3 2026
Budget Shortfalls	<ul style="list-style-type: none"> Diversify funding (govt, EU grants, SATREPS, private sector). Allocate contingency funds. Submit grant proposals early (2026). Track expenditures quarterly. 	<ul style="list-style-type: none"> Scale down non-essential activities (e.g., elective courses). 	Q4 2025 – Q3 2026

Source: Compiled by the JICA Project Team based on UR's training summary materials

Table 30 Master's and Doctoral Program Roadmap

Phase	Timeline	Key Activities	Outputs/Deliverables	Responsible Parties
Conceptualization & Planning	Jan 2025 – July 2025	<ul style="list-style-type: none"> Market needs assessment. Stakeholder engagement (industry, govt, academia). Benchmark global programmes*. 	<ul style="list-style-type: none"> Needs report. Draft programme objectives. Committee formed. 	<ul style="list-style-type: none"> Department of Mechanical & Energy Engineering, School of Engineering, College Academic Council, Senate, Industry Partners, HEC

Curriculum Design	Aug 2025 – Dec 2025	<ul style="list-style-type: none"> - Define core/specialization courses. - Align with HEC/RQF standards. - Industry input on practical modules. 	<ul style="list-style-type: none"> - Approved curriculum draft. - Lab requirements list. - Initial HEC submission. 	<ul style="list-style-type: none"> • Curriculum Committee, • External Experts
Infrastructure & Faculty Prep	Jan 2026 – Jun 2026	<ul style="list-style-type: none"> - Set up labs (CFD, UAV, simulators). - Recruit/train faculty. - Sign MoUs with industry. 	<ul style="list-style-type: none"> - Functional labs. - Faculty hired. - 3+ industry MoUs signed. 	<ul style="list-style-type: none"> • UR Admin, • Finance Dept,
Accreditation & Recruitment	Jul 2026 – Dec 2026	<ul style="list-style-type: none"> - Address HEC feedback. - Marketing campaigns. - Student applications open. 	<ul style="list-style-type: none"> - HEC accreditation granted. - 30+ qualified applicants enrolled. 	<ul style="list-style-type: none"> • Department of Mechanical Energy Engineering • UR HR, • Admissions Office
Programme Launch	Jan 2027 – Dec 2027	<ul style="list-style-type: none"> - Inaugurate programme. - Monitor first cohort. - Plan PhD expansion. 	<ul style="list-style-type: none"> - First classes running. - Industry internships secured. - Annual review report. 	<ul style="list-style-type: none"> • UR Faculty, • Industry Advisory Board

Source: Compiled by the JICA Project Team based on UR's training summary materials

Table 31 Strategic Focus Areas for UR

Activity	Milestones
Curriculum Alignment	<ul style="list-style-type: none"> • Adopt BIRDS Program for hands-on satellite projects. • Integrate Japanese universities' AI/ML modules for autonomous flight systems.
Lab Development	<ul style="list-style-type: none"> • Partner with Japanese universities for CFD software (OpenFOAM/ANSYS). • Use Japanese universities' materials testing protocols.
Faculty & Student Exchanges	<ul style="list-style-type: none"> • JICA-funded short-term training at Kyutec.
Research Collaboration	Joint Supervisions & publications

Source: Compiled by the JICA Project Team based on UR's training summary materials

Table 32 Action Plan for Japanese Partnerships

Activity	Timeline	Japanese Partner	UR Responsibility
Sign MoU for student exchanges	Q1 2026	Kyushu University,	Draft agreement; identify candidates
JICA grant application for lab equipment	Q2 2026	Japanese universities	Submit proposal with technical specs
Joint webinar on CubeSat development	Q3 2026	Japanese universities	Coordinate with UR IT department and Department of Mechanical and Energy Engineering

Source: Compiled by the JICA Project Team based on UR's training summary materials

Table 33 Key Performance Indicators (KPIs)

Metric	Target by 2027
HEC Accreditation Status	Fully Accredited
Student Enrollment (Cohort 1)	15–20 Students
Industry Partnerships	5+ MoUs
Lab Readiness	100% Operational (CFD, UAV, Avionics Labs, Thermal Chamber, PCB Lab)
Graduate Employment Rate	80% in Aerospace Sector within 6 Months

Source: Compiled by the JICA Project Team based on UR's training summary materials

■Summary of activities under Output 2:

Through this time's activities, UR was able to finalize the Aerospace Engineering Program, develop a roadmap for the master's and doctoral programs, and formulate an action plan to build collaborative relationships with institutions in Japan. It is considered that Rwanda's capability to cultivate human resources in the space sector has been enhanced and that UR's educational and research capabilities in satellite development and the utilization of geospatial information have been strengthened.

While the launch of the undergraduate program is on track, medium- to long-term challenges remain: sustaining the program after launch; producing skilled graduates; enriching education in the latter half of the undergraduate program where specialized education is provided; and realizing the master's and doctoral programs in which specialized research will be conducted. Securing faculty capable of teaching specialized content, securing researchers capable of supervising master's and doctoral students, developing the environment and facilities for specialized research, and obtaining funding to sustain ongoing research are considered to be key challenges for strengthening the latter half of the undergraduate program and for realizing the graduate programs.

Regarding resource constraints such as researchers and faculty, follow-up by UR and RSA, along with flexible approaches including collaboration with Japanese universities are considered necessary. For example, in order to establish a system for providing online lectures and intensive in-person courses by Japanese university faculty, it is anticipated that support will be necessary for strengthening partnerships between UR and Japanese universities as well as for travel costs. Necessity of support is also envisaged for improving the research environment and equipment (direct financial assistance, support for fundraising, and advisory on know-how), as well as for securing research funding (budget requests to the national government and applications to external organizations).

2.2.3 Activities relating to “Output 3: Cooperation between RSA and related institutions (international organizations, Japanese institutions, others) is enhanced”

For satellite data utilization training as described in 2.2.1 “Activities relating to Output 1 'Development of satellite and/or related infrastructure is promoted and satellite data utilization at the RSA and related institutions (end users of data) is enhanced'” and training for formulation of aerospace engineering program as described in 2.2.2 “Activities relating to Output 2 'Education and research capacity of the University of Rwanda in satellite development and the use of geospatial information is strengthened',” opportunities for matching with relevant organizations in Japan were provided during the training in Japan. The key points in selecting candidates were (1) whether it would be possible to learn about satellite data from upstream (satellite development and operation), midstream (data reception), and downstream (data utilization), and (2) whether it would be possible to focus on initiatives and knowledge related to use cases in each sector. The following organizations and companies were visited during training in Japan.

Table 34 Organizations and Companies Visited and Discussed for Japanese Training

#	Category	Organization/company name	Training				
			Agriculture	Disaster management	Infrastructure	Satellite development	Aerospace engineering
1	Government	Director for Statistics Planning, Statistics Division, Minister's Secretariat, the Ministry of Agriculture, Forestry and Fisheries	✓				
2	Government	River Environment Division, Disaster Prevention Division, the Ministry of Land, Infrastructure, Transport and Tourism		✓			
3	Government	International and Digital Policy Division, the Ministry of Land, Infrastructure, Transport and Tourism City Department			✓		
4	Government	Japan Aerospace Exploration Agency (JAXA)	✓	✓			✓
5	Government	National Agriculture and Food Research Organization	✓				
6	Government	National Institute for Environmental Studies		✓			
7	Government	National Research Institute of Civil Engineering		✓			
8	Government	National Research Institute for Earth Science and Disaster Prevention		✓			
9	Government	JAXA Institute of Space and Astronautical Science					✓
10	Government	Kitakyushu Industrial Science and Technology Promotion Organization					✓
11	Government	United Nations Office for Outer Space Affairs (UNOOSA)		✓			
12	University	Graduate School of Creative Science, Yamaguchi University	✓	✓	✓	✓	✓
13	University	Department of Architecture and Urban Environment, Faculty of Science and Engineering, Tokyo Denki University	✓	✓	✓		
14	University	Center for Spatial Information Science, University of Tokyo			✓		
15	University	Kyushu Institute of Technology Laboratory for Innovative Space Applications				✓	✓
16	University	Department of Human Intelligence and Systems Engineering, Graduate School, Kyushu Institute of Technology					✓
17	University	Graduate School of System Design and Management, Keio University					✓
18	University	Graduate School of Engineering, The University of Tokyo					✓
19	University	Tokyo University of Marine Science and Technology					✓
20	University	Tokyo University of Science					✓
21	University	Tohoku University					✓
22	University	Department of Mechanical and Electronic Engineering, Faculty of Engineering, Chiba Institute of Technology					✓
23	University	Faculty of Science and Engineering, Nihon University					✓
24	University	Wakayama University					✓
25	Private sector	Remote Sensing Technology Center of Japan	✓	✓	✓		✓
26	Private sector	ArkEdge Space Inc	✓	✓			✓
27	Private sector	Space Shift Inc.	✓	✓	✓		
28	Private sector	LocationMind Inc.	✓	✓	✓		
29	Private sector	Ridge-i Inc.	✓		✓		
30	Private sector	Sagri Co., Ltd	✓				
31	Private sector	Axelspace Corporation	✓				
32	Private sector	PASCO Corporation	✓				
33	Private sector	Tellus Co., Ltd.	✓				

34	Private sector	GLODAL Inc.	✓				
35	Private sector	Japan Space Forum	✓	✓			
36	Private sector	TOPPAN Digital Inc.		✓			
37	Private sector	Japan Weather Association		✓			
38	Private sector	Spectee Inc.		✓			
39	Private sector	Infostellar		✓			✓
40	Private sector	Synspective, Inc.		✓	✓		✓
41	Private sector	Shimizu Corporation			✓		
42	Private sector	SKY Perfect JSAT Corporation			✓		
43	Private sector	New Space Intelligence, Inc.				✓	✓
44	Private sector	Space Compass Corporation					✓
45	Private sector	UNISEC GLOBAL					✓
46	Private sector	ElevationSpace Inc.					✓

* “Agriculture”, “Disaster management” and “Infrastructure” in the training column were visited and discussed for training related to the utilization of satellite data in Output 1, “Satellite Development” for training related to satellite development in Output 1, and “Aerospace Engineering” for training related to the establishment of the Aerospace Engineering Program in Output 2.

Source: JICA Project Team

Regarding the above-mentioned organizations, cooperation methods were proposed and investigated as follows:

- Satellite data utilization/satellite development: Each Rwandan institution introduced the current situation and issues of each sector (agriculture, disaster management, urban infrastructure) in Rwanda as well as the use cases under consideration, and discussed the possibility of cooperation with the visited organizations.
- Formulation of the Aerospace Engineering Program: In formulating the Aerospace Engineering Program at UR, UR received feedback based on the knowledge of Japanese universities and the private sector and discussed possible cooperation in terms of education and research after the program is established.

As a result, the following specific cooperation was discussed and started:

- UNOOSA: Discussions between UNOOSA and MINEMA resulted in a shared recognition of the need to seek authorization in the International Disaster Charter, of which UNOOSA is an observer, in order to facilitate the acquisition of satellite data in emergencies. Subsequently, MINEMA applied for membership in the International Disaster Charter and was approved.
- JAXA: MINEMA and METEO received a lecture on GSMaP when they visited JAXA Tsukuba Space Center. After returning to Rwanda, METEO started using GSMaP for weather forecasting. (The use case for GSMaP was shared with METEO through the JICA project team.)
- Professor Nakasuka of the University of Tokyo, Professor Ogasawara of the Tokyo University of Science, and ArkEdge Space: UR received feedback on its curriculum from external reviewers.
- Kyushu Institute of Technology: Continued support in the training for the formulation of the Aerospace Engineering Program at UR was provided, including online follow-up between the two training sessions in Japan. Discussions on possible cooperation in education and research after the program is established are also being conducted.

2.2.4 Activities relating to “Output 4: The social economic impact of space technology in Rwanda is measured”

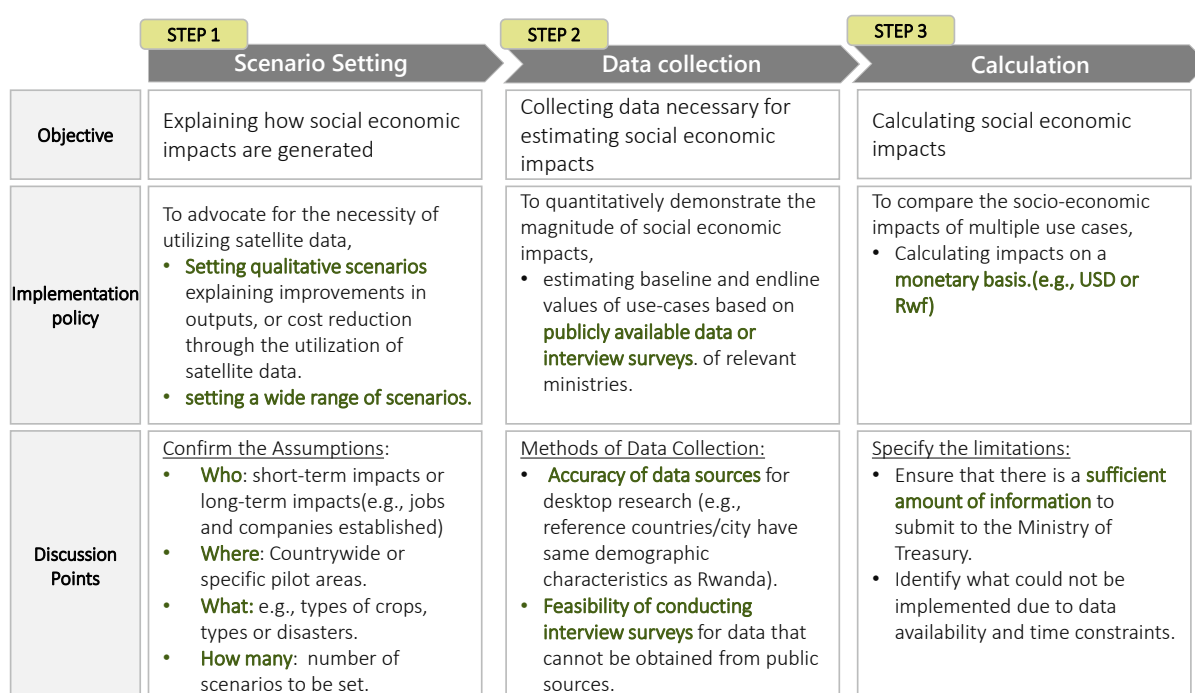
Concerning Output 4, the following efforts have been made since November 2023: evaluation methods for social economic impact that can be implemented in Rwanda have been examined,

Social Economic Impact Workshops ("WS") were organized, and, based on comments from RSA and relevant ministries received during monthly meetings and quarterly coordination meetings, a Social Economic Impact Report was prepared.

■ Consideration of Social Economic Impact Evaluation Methods

At the first quarterly coordination meeting in November 2023, a draft of the steps for evaluating the social economic impact of satellite data utilization was prepared together with the RSA and relevant ministries, and discussions were held to establish a common understanding regarding the objectives and policies for implementing the evaluation.

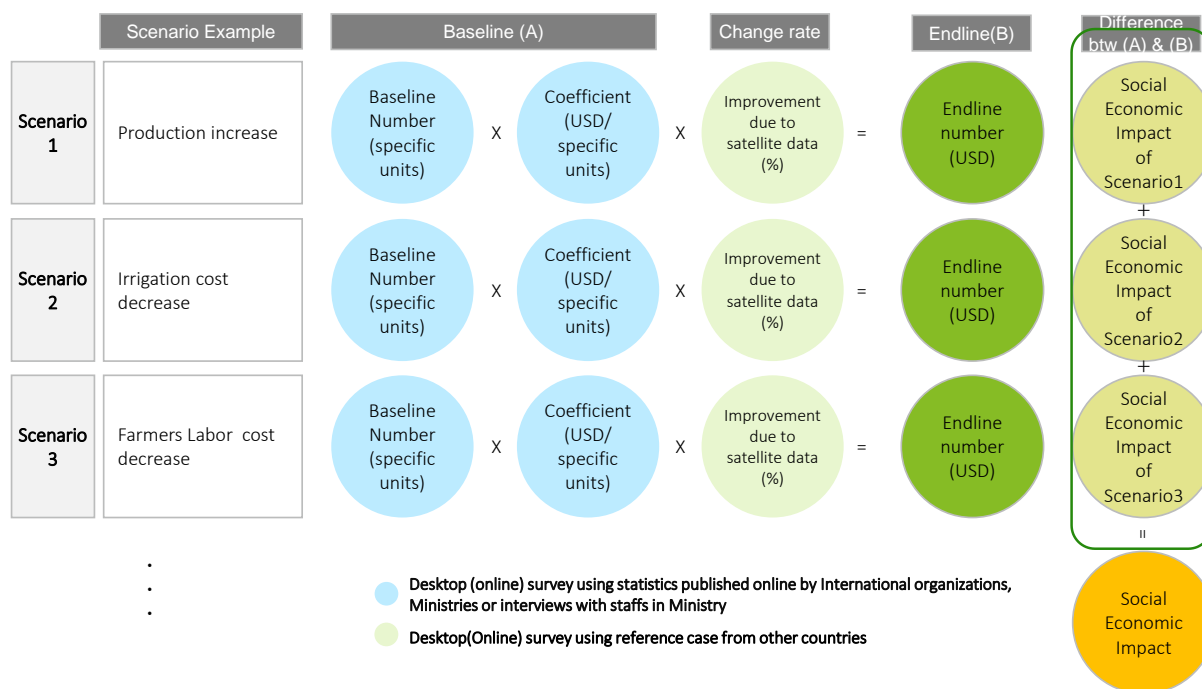
The JICA project team also proposed an analysis of economic ripple effects using an input-output table; however, it was found that input-output tables and similar statistical data necessary for such analysis are not available in Rwanda. Therefore, it was decided to develop qualitative scenarios for generating social economic impacts and to collect data to quantify these scenarios.



Source: JICA Project Team

Figure 59 Evaluation Steps for Social Economic Impact

The quantitative method for estimating social economic impact involves selecting use cases (scenarios) for satellite data utilization undertaken by RSA and relevant ministries (MINAGRI, MINEMA and METEO, MININFRA), setting baseline values (such as market size and economic loss), collecting change rates from various publicly available sources, and calculating endline values. The difference between the baseline and endline values is regarded as the social economic impact generated by the utilization of satellite data. The total sum of the impacts produced by multiple use cases (scenarios) is considered to represent the overall social economic impact of satellite data utilization.



Source: JICA Project Team

Figure 60 Conceptual Image of Social Economic Impact Estimation

■ Implementation of Social Economic Impact Workshops

In order to build a common understanding among ministries regarding the usefulness and necessity of satellite data as well as to deepen the understanding of the methods for measuring social economic impact, Social Economic Impact Workshops ("WS") were held. The WS was conducted at the following timings: June 2024 for MINAGRI, the Rwanda Agriculture and Animal Resources Development Board (RAB), and RSA; October 2024 for MINEMA, METEO, RSA in October 2024; and February 2025 for MININFRA and RSA.

Objective	<ul style="list-style-type: none"> To promote understanding of the usefulness and necessity of satellite data utilization among relevant institutions. To deepen understanding of methods for measuring the social economic impact of satellite data utilization. 			
Participants	<ul style="list-style-type: none"> MINAGRI, RSA, private sector and other relevant stakeholders (maximum of approximately 20 people) 			
Program	Time	Type	Contents	Instructor
	10:00-10:15	-	Introduction	Deloitte
	10:15-10:35	Presentation	1. Overview of satellite data utilization in agriculture	RESTEC
	10:35-10:50	Presentation	Introduction to ongoing use-cases	RSA
	10:50-11:15	Presentation	2. Introduction to Social Economic Impact Evaluation	Deloitte
	11:15-12:00	Groupwork	2-1: Consider purpose and utilization of social economic impact estimation	Deloitte
	12:00-13:30	-	Lunch break	-
	13:30-14:00	Presentation	3. Logic model	Deloitte
	14:00-15:00	Groupwork	3-1: Identify the purpose and beneficiaries of the project 3-2: Set outcomes 3-3: Identify initial impacts, activities, and resources 3-4: Creating the logic model	Deloitte
	15:00-15:30	-	Tea Break	-
	15:30-16:00	Presentation	4. Evaluating outcomes	Deloitte
	16:00-16:30	Groupwork	4-1: Prioritizing outcomes 4-2: Consider evaluation indicator 4-3: Methods of data collection	Deloitte
	16:30-16:55	Presentation	5. Introduction to further social economic impact estimation methods*	Deloitte
	16:55-17:00	-	6. Wrap-up and confirm next actions	Deloitte

Source: JICA Project Team

Figure 61 Schedule of Social Economic Impact Workshop (Agriculture)

Objective	<ul style="list-style-type: none"> To promote understanding of the usefulness and necessity of satellite data utilization among relevant institutions. To deepen understanding of methods for measuring the social economic impact of satellite data utilization. 			
Participants	<ul style="list-style-type: none"> MINEMA, METEO, RSA and other relevant stakeholders (if any) 			
Venue	<ul style="list-style-type: none"> Conference room at Highlands Suites Hotel in Kigali 			
Program	Time	Type	Contents	Instructor
	10:00-10:15	-	Introduction and overview of workshop	Deloitte
	10:15-10:25	Presentation	Overview of satellite data utilization in disaster management	ESRI
	10:25-10:35	Presentation	Satellite data utilization: opportunity and challenges	RESTEC
	10:35-10:45	Presentation	Introduction of practical use-cases (Disaster area detection/ Hazard monitoring)	METEO, MINEMA
	10:45-11:00	-	Introduction group work	Deloitte
	12:00-12:30	-	Tea break	-
	12:30-14:00	Group work	Create Logic model for evaluating social economic impact	Deloitte
	14:00-15:00	-	Lunch break	-
	15:30-16:30	Group work	Prioritize outcomes and consider the indicators	Deloitte
	16:30-17:00	-	Wrap-up and confirm next actions	Deloitte

Source: JICA Project Team

Figure 62 Schedule of Social Economic Impact Workshop (Disaster Management)

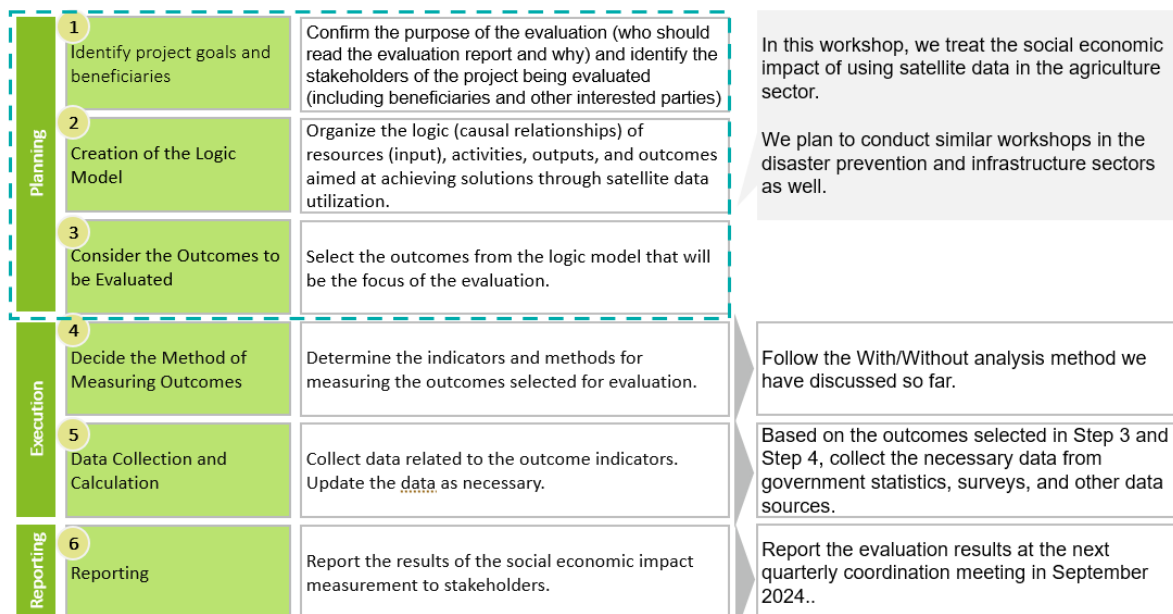
Objective	<ul style="list-style-type: none"> To promote understanding of the usefulness and necessity of satellite data utilization among relevant institutions. To deepen understanding of methods for measuring the social economic impact of satellite data utilization. 			
Participants	<ul style="list-style-type: none"> MININFRA, RSA and other relevant stakeholders (if any) 			
Venue	<ul style="list-style-type: none"> Conference room at Highlands Suites Hotel in Kigali 			
Program	Time	Type	Contents	Instructor
	10:00-10:15	-	Welcome Tea	
	10:15-10:45	-	Introduction	Deloitte
	10:45-12:00	Group work	[Group work 1]Logic Model	Deloitte
	12:00-13:00	-	Lunch break	-
	13:00-13:30	Presentation	[Group work 1]Logic Model	
	13:30-14:15	Group work	[Groupwork 2] Prioritize outcomes [Group work 3]consider the indicators	Deloitte
	14:15-14:30	Presentation	[Group work2] Prioritize outcomes [Group work 3]consider the indicators	-
	14:30- 15:00		Tea Break	
	15:00-15:30	-	Presentation and Wrap-up	Deloitte
15:30-16:00		Certificate awarding ceremony	RESTEC & Deloitte	

Source: JICA Project Team

Figure 63 Schedule of Social Economic Impact Workshop (Infrastructure)

At the WS, six steps for evaluating the social economic impact were established. Of these, establishment of the project goal (Step 1), development of a logic model (Step 2), and consideration of outcomes to be evaluated (Step 3) were carried out. The evaluation method for the outcomes (Step 4) was already discussed and organized based on the quarterly coordination meetings. Data collection and estimation (Step 5), as well as report preparation (Step 6), are to be carried out in collaboration with each ministry after the WS.

Steps: social economic impact evaluation



Source: JICA Project Team

Figure 64 Evaluation steps of Social Economic Impact

For MINAGRI, RAB, and RSA, establishment of the project goal, development of a logic model, and consideration of outcomes to be evaluated were conducted using four ongoing agricultural use cases of satellite data utilization (cropland mapping, cultivated mapping, crop type mapping, and yield estimation) as examples. Among the four use cases, project objectives were examined jointly for cropland mapping and cultivated land mapping, as the content of the initiative were similar.

Usecase 1: Cropland mapping and Cultivated land mapping

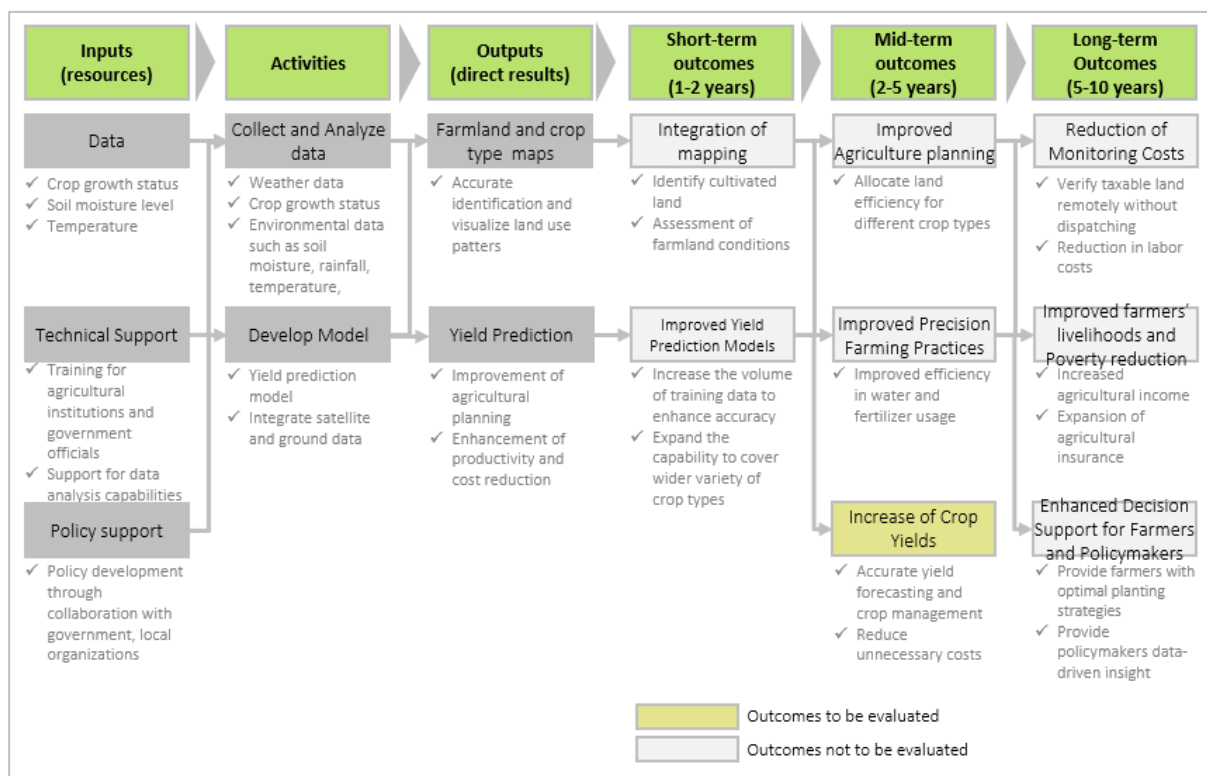
Project goal: Accurately identify the extent of cultivated land, improve planning accuracy of PSTA-4 progress, and enhance monitoring of seasonal agricultural performance. Assessment of social economic impacts by policymakers and researchers will enable the development of best practices and improved decision-making.

Usecase 2: Crop type mapping.

Project goal: Identify the cultivation status of each crop and establish an early warning system for food security. It is important for governments to measure the impact of agricultural policies, improve decision-making, and reduce risks.

Usecase 3: Yield Estimation

Project goal: Improve the accuracy of yield forecasts by integrating satellite data with ground-based meteorological and hydrological observation data and contribute to the government's food security and trade strategies (management of shortages and surpluses). In addition, stakeholder mapping and identification of required partners will be done.



Source: JICA Project Team

Figure 65 Logic model that is the output of the Social Economic Impact Workshop (Agriculture)

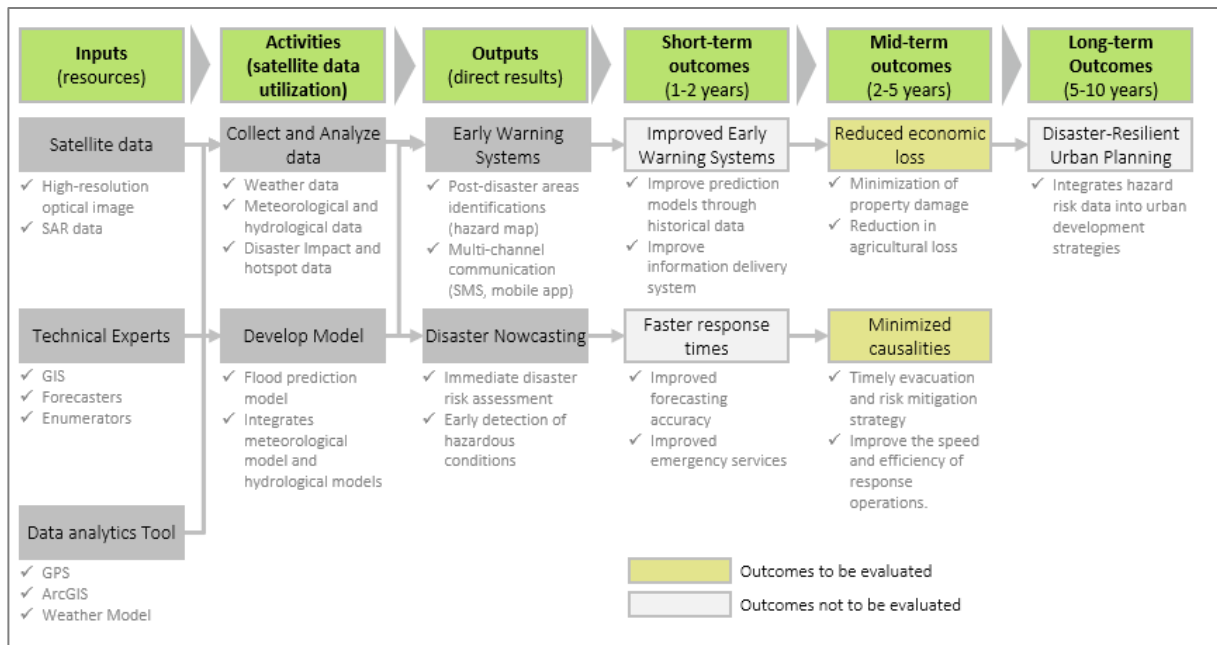
At the WS for MINEMA, METEO, and RSA, the same activities were conducted using satellite data use cases in the disaster management sector (disaster area detection and hazard monitoring) as examples.

Usecase 1: Disaster area detection (Flood, Landslides, Drought, Volcanic Eruption)

Project goal: Identify disaster-prone and vulnerable areas and minimize human suffering, infrastructure damage, and property loss. Assess infrastructure with high disaster risk as well.

Usecase 2: Hazards monitoring (Satellite Observation)

Project goal: Strengthen the early warning system by integrating satellite data with ground-based meteorological and hydrological observation data.



Source: JICA Project Team

Figure 66 Logic model that is the output of the Social Economic Impact Workshop (Disaster Management)

Finally, at the WS for MININFRA and RSA, the same activities were conducted using use cases in the infrastructure sector (illegal construction monitoring and urbanization change detection) as examples.

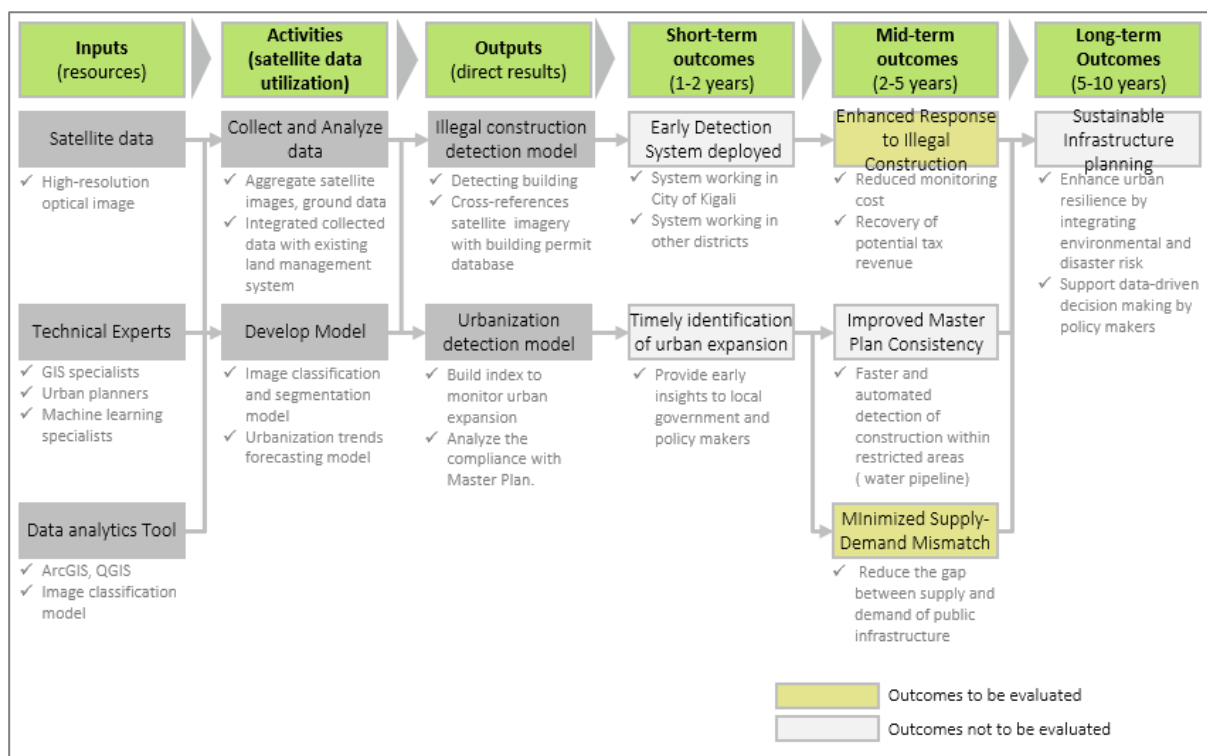
Usecase 1: Illegal Construction Monitoring

Project goal: Enhance illegal construction detection models and improve human settlement planning and disaster preparedness using satellite data.

Usecase 2: Urbanization Change Detection

Project goal: Monitor urban expansion and land-use changes to inform efficient urban

planning, while mitigating negative impacts of urbanization such as traffic congestion and environmental degradation.



Source: JICA Project Team

Figure 67 Logic model that is the output of the Social Economic Impact Workshop (Infrastructure)

■ Estimation of Social Economic Impact:

First, among the short-, medium-, and long-term outcomes defined in the aforementioned logic model, those that can be evaluated quantitatively and expressed in monetary terms were selected. Next, information on the corresponding baseline values and rates of change were gathered through a literature review. By multiplying the baseline values by the rates of change, the endline values were derived, and by taking the difference between the baseline and endline values, the social economic effects were estimated.

The outcomes targeted for evaluation in the agriculture, disaster management, and infrastructure sectors, together with the evidentiary basis for their baseline values and rates of change, are as follows.

Table 35 Sources of Baseline and Change Rate

#	Sector	Outcome	Baseline		Change Rate	
			Value	Sources	Value	Sources
1	Agriculture	Increase of Crop Yields	1,106 M RWF	Estimated in MINAGRI's annual report by multiplying the production of target crops (corn, potatoes, beans) by market price https://www.minagri.gov.rw/index.php?eID=dumpFile&t=f&f=87019&token=4b614ef2bca23247b616cacb693bbdc909e9e33	4.8% increase	Adopting the Productivity Improvement Effect of Using Earth Observation Data for Precision Agriculture (Word Economic Forum (2024)) https://www.weforum.org/publications/amplifying-the-global-value-of-earth-observation/
		Optimal use for Resources	35 M RWF	Estimated by multiplying the total fertilizer use in agriculture in Rwanda by the percentage of target crops (maize, potatoes, beans) in the total agricultural value added (FAO) https://www.fao.org/faostat/en/#home	4.0% decrease	Reduction rate of fertilizer use based on Earth observation data (Word Economic Forum (2023)) https://www3.weforum.org/docs/WEF_Space_Applications_in_Agriculture_2023.pdf
3	Disaster Management	Reduced Economic Loss	6.3 M RWF (Drought) 46.6 M RWF (landslide)	Disaster type damage data from the Rwanda National Risk Atlas was adopted https://www.gfdr.org/sites/default/files/publication/National_Risk_Atlas_of_Rwanda_01.pdf	30% decrease (Drought) 13.2 % decrease (landslide)	<ul style="list-style-type: none"> Adoption of disaster loss avoidance through early warning system (Global Commission on Adaption (2019)) https://gca.org/wp-content/uploads/2019/09/GlobalCommission_Report_FINAL.pdf?gl=1*18cticb*ga*NDA1MTM3MDMzLjE2OTA0NzkyMjI1*up*MQ Adopting the amount of capital stock loss avoided by detecting landslides using earth observation data (landslides) (Word Economic Forum (2024)) https://www.weforum.org/publications/amplifying-the-global-value-of-earth-observation/
		Minimized Casualties	391 M RWF (Drought) 154 M RWF (landslide)	Estimated by multiplying the number of people vulnerable to disasters in the Rwandan National Risk Atlas by Rwanda's GDP per capita https://www.gfdr.org/sites/default/files/publication/National_Risk_Atlas_of_Rwanda_01.pdf	0.8 % decrease	Estimates of the extent of reduction in the number of disaster casualties due to early intervention were adopted (GFDRR (2019)) https://www.gfdr.org/sites/default/files/publication/Social_Protection_Guidance_Note_FIN_AL.pdf
5	Infrastructure	Reduced illegal Construction Monitoring	1,700 M RWF	Estimated by multiplying the number of unauthorized housing units by the number of unauthorized housing units of RWF of 50,000 RWF by the Kigali City Authority to curb unauthorized housing Spot Any Illegal House and Get Reward of Rwf 50,000 - KT PRESS	0.03 % decrease	Adopting the Productivity Improvement Effect of Using Earth Observation Data in Urban Planning (Word Economic Forum (2024)) https://www.weforum.org/publications/amplifying-the-global-value-of-earth-observation/
		Minimized Supply-Demand Mismatch	211.5 M RWF	Estimated economic losses due to traffic congestion in Lusaka, Zambia, as a percentage of the country's GDP of 1.5% applied to Rwanda (WWF (2017)) WWF 2017 WWF ICLEI Workshop Report-Kigali Rwanda.pdf	1.6 % decrease	Adoption of Reduction in Congestion-related Costs by Earth Observation Data and Route Optimization in Cairo, Egypt (World Bank (2014)) https://documents1.worldbank.org/curated/en/705761468022757858/pdf/886540v10ESW0w0Study0Summary0Report.pdf

Source: JICA Project Team

Using the aforementioned baseline values and rates of change, the social economic effects of satellite data utilization in the agriculture, disaster management, and infrastructure sectors were estimated as follows.

- Agriculture sector: USD 54.5 million
- Disaster management sector: USD 12.4 million
- Infrastructure sector: USD 3,000

Using Rwanda's national budget (approximately USD 5 billion¹) as a benchmark, the estimated social economic effects amount to approximately 1.1% for the agriculture sector, approximately 0.25% for the disaster management sector, and 0.0% or less for the infrastructure sector. However, the magnitude of the social economic impact is measured not only by the differences

¹ Budget speech materials from the Ministry of Finance and Economic Planning of Rwanda (https://www.cabri-sbo.org/uploads/bia/Rwanda_2025_Formulation_External_BudgetFramework_Institution_EACECCASCOMESA_English_314183.pdf) (last accessed January 19, 2026)

in baseline values and rates of change across sectors, but also by the nature of the impact satellite data brings about in each sector. In the agriculture sector, providing information derived from satellite data analysis to farmers is expected to enhance productivity, such as more precise agricultural planning for harvesting and fertilization, improved yields, and reductions in resource-use costs, thereby potentially exerting a direct impact on the agricultural market, which already accounts for a large share of Rwanda's economy. In contrast, in the disaster management sector, satellite data are integrated into early warning systems and the social economic effects materialize through reductions in losses from disasters. For the infrastructure sector, certain impacts, such as administrative cost savings from monitoring illegal construction and improvements in urban planning, are difficult to quantify in monetary terms, resulting in a more limited estimation of social economic impact.

Table 36 Estimated Social Economic Impact (Agriculture)

#	Outcomes	Crop type	Production(ton)	Price (USD/ton)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
1	Increase of Crop Yields	Irish potato (2023 A)	454,355	480	218	4.8 % increase (WEF)	228	10.5
2		Irish potato (2023 B)	326,677	480	157	4.8 % increase (WEF)	164	7.5
3		Maize (2023 A)	390,879	520	203	4.8 % increase (WEF)	213	9.7
4		Maize (2023 B)	117,613	520	61	4.8 % increase (WEF)	64	2.9
5		Bean (2023 A)	197,212	1,060	209	4.8 % increase (WEF)	219	10.0
6		Bean (2023 B)	244,194	1,060	258	4.8 % increase (WEF)	271	12.4
#	Outcomes	Fertilizer use (M USD)		% of target crops (Irish potato, Maize, Beans)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
7	Optimal use for Resources	101		34.3%	35	4 % decrease (WEF)	33	1.4
sum								54.5

Source: JICA Project Team

Table 37 Estimated Social Economic Impact (Disaster Management)

#	Outcomes	Disaster type	Indicator	Baseline (M RWF)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
1	Reduced economic loss	Drought	Loss from crops due to drought in Season A	1,954	1.4	30 % decrease (GCA)	1.0	0.4
2		Drought	Loss from crops due to drought in Season B	6,927	4.9	30 % decrease (GCA)	3.4	1.5
3		Landslide	Loss of damaged houses due to landslide	9,230	6.5	13.2 % decrease (WEF)	5.6	0.9
4		Landslide	Loss of damaged health facilities due to landslide	2,703	1.9	13.2 % decrease (WEF)	1.6	0.3
5		Landslide	Loss of damage on paved national roads due to landslide	54,536	38.2	13.2 % decrease (WEF)	33.1	5.0
#	Outcomes	Disaster type	Number of people affected	GDP per capita (USD)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
6	Minimized casualties	Drought in Season A	48,808	975.5	343	0.8 % decrease (GFDRR)	340	2.7
7		Drought in Season A	157,786	975.5	48	0.8 % decrease (GFDRR)	47	0.4
8		Landslide	351,233	975.5	154	0.8 % decrease (GFDRR)	153	1.2
sum								12.4

Source: JICA Project Team

Table 38 Estimated Social Economic Impact (Infrastructure)

#	Outcomes	Number of illegal construction (housing unit)	Reward amount per report (RWF)	Baseline (M RWF)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
1	Reduced Illegal Construction Monitoring Cost	34,000	50,000	1,700	1.19	0.03% (WEF)	1.19	0.000
#	Outcomes	GDP (M RWF)	Rate of Congestion Cost	Baseline (M RWF)	Baseline (M USD)	Change rate	Endline (M USD)	Social Economic Impact (M USD)
2	Minimized Supply-Demand Mismatch	14,100	1.5%	211.5	0.15	1.6 % (WB)	0.15	0.002
sum								0.003

Source: JICA Project Team

■ Preparation of the Social Economic Impact Report:

The outputs and discussion points from the Social Economic Impact WS and quarterly coordination meetings conducted so far were compiled and organized in the form of a Social Economic Impact Report.

The report is structured as follows: Background and Objectives (Chapter 1), Key Sectors and Definition of Social Economic Impacts (Chapter 2), Literature Review (Chapter 3), Evaluation Method (Chapter 4), Evaluation Results (Chapter 5), and Conclusions and Future Actions (Chapter 6). Chapter 5 covers the calculation of the social economic impact in the agriculture, disaster management, and infrastructure sectors, including the outputs of the workshops.

Contents of Social Economic Impact Report	
<p>1. Background and Objectives</p> <p>2. Key Sectors and Definition of Social Economic Impacts</p> <p>3. Literature Review</p> <p>3.1. Social Impact Assessment</p> <p>3.1.1. United Nations "Space Supporting the Sustainable Development Goals"</p> <p>3.2. Economic effects of satellite data utilization</p> <p>3.2.1. Ministry of Economy, Trade, and Industry (2017) "Report of the Study Group on Making Government Satellite Data Open & Free and Developing an Environment for Data Utilization."</p> <p>3.2.2. World Economic Forum (2021) "Unlocking the Potential of Earth Observation to Address Africa's Critical Challenges"</p> <p>3.2.3. World Economic Forum and Deloitte (2024) "Amplifying the Global Value of Earth Observation. "</p> <p>3.3. Interview survey of companies utilizing satellite data</p> <p>3.4. Summary of Literature Review</p> <p>4. Evaluation method</p> <p>4.1. Implementation steps</p> <p>4.2. Social Economic Impact Workshop (Steps 1, 2, 3)</p> <p>4.3. Evaluation of social economic impact (Steps 4 and 5)</p>	<p>5. Evaluation results</p> <p>5.1. Agriculture</p> <p>5.1.1. Identify project objectives and beneficiaries (Step1)</p> <p>5.1.2. Creating a logic model and selecting outcomes to evaluate (Steps 2 and 3)</p> <p>5.1.3. Data Collection (Step 4)</p> <p>5.1.4. Calculation of social economic impact (Step5)</p> <p>5.2. Disaster Management</p> <p>5.2.1. Identify project objectives and beneficiaries (Step1)</p> <p>5.2.2. Creating a logic model and selecting outcomes to evaluate (Steps 2 and 3)</p> <p>5.2.3. Data Collection (Step 4)</p> <p>5.2.4. Calculation of social economic impacts (Step 5)</p> <p>5.3. Infrastructure</p> <p>5.3.1. Identify project objectives and beneficiaries (Step1)</p> <p>5.3.2. Creating a logic model and selecting outcomes to evaluate (Steps 2 and 3)</p> <p>5.3.3. Data Collection (Step4)</p> <p>5.3.4. Calculation of social economic impacts (Step 5)</p> <p>6. Conclusions and Future Actions</p> <p>6.1. Summary of social economic impact evaluation</p> <p>6.2. Limitations</p> <p>6.3 Next Steps</p> <p>References</p>

Source: JICA Project Team

Figure 68 Table of contents of Social Economic Impact report.

At the wrap-up meeting with RSA in December 2025, discussions were held to finalize this report, and the limitations of this study as well as recommendations for future activities required in Rwanda were summarized in Chapter 6.

The limitations identified include the lack of change rate data that sufficiently reflect Rwanda’s unique social economic and environmental conditions as well as the need for regular review and update of data and evaluation models.

Furthermore, in order to actually generate social economic impact in Rwanda, it is important for RSA and relevant ministries to collaborate on the social implementation of satellite data through a three-stage approach: (1) demonstration in pilot areas, (2) scale-up to other regions and sectors aligned with policy objectives, and (3) full-scale implementation through institutionalization, establishment of operational frameworks, human resource development, and continuous monitoring and evaluation. These steps were organized in the form of a roadmap.

Field	Entity	Demonstration, pilot (2025)	Expansion, scale-up (2026-2027)	Full-scale implementation (2028-2030)
Agriculture	RSA	<ul style="list-style-type: none"> Acquisition of satellite and ground data on crop classification and yield estimation Prototype crop classification and yield estimation models 	<ul style="list-style-type: none"> Higher accuracy of crop classification and yield estimation models and expansion of target crops Provision of crop classification maps in pilot areas 	<ul style="list-style-type: none"> Provision of nationwide crop classification maps
	Relevant ministries	<ul style="list-style-type: none"> Selection of target crops Monitoring of fertilization, irrigation, and cropping conditions in pilot fields 	<ul style="list-style-type: none"> Strengthening Cooperation with Local Governments Implementation and dissemination of fertilizer application and harvest timing diagnostic tools in pilot areas 	<ul style="list-style-type: none"> Implementation and dissemination of fertilizer application and harvest time diagnostic tools nationwide
	Beneficiaries /stakeholders	<ul style="list-style-type: none"> Cooperation with pilot field demonstration tests Cooperation with agricultural cooperatives and local extension agents (RAB) 	<ul style="list-style-type: none"> Increase yield by optimizing planting and harvesting time Creation of cost reduction effects of irrigation and fertilization 	<ul style="list-style-type: none"> Optimize fertilization, irrigation, planting, and harvesting at their own discretion Stabilization of yields and income
Disaster Management	RSA	<ul style="list-style-type: none"> Start of satellite data monitoring of landslide, flood and drought risks Providing data for EWS for pilot regions 	<ul style="list-style-type: none"> Higher accuracy of damage prediction models (Use of rainfall and topographic data) 	<ul style="list-style-type: none"> Improving the accuracy of damage prediction models by disaster type Providing data for national EWS
	Relevant ministries	<ul style="list-style-type: none"> List vulnerable areas and integrate with past disaster data Piloting an Early Warning System in a Pilot Region 	<ul style="list-style-type: none"> Testing EWS at the national level Knowledge transfer to local governments 	<ul style="list-style-type: none"> Maximizing damage reduction effect by satellite data and EWS Optimal allocation of disaster recovery funds
	Beneficiaries /stakeholders	<ul style="list-style-type: none"> Cooperation with trial EWS operation 	<ul style="list-style-type: none"> Updating evacuation and action plans for each type of disaster Expanding access to weather forecasts and EWS (smartphone applications, etc.) 	<ul style="list-style-type: none"> Standardization of evacuation activities during disasters
Infrastructure	RSA	<ul style="list-style-type: none"> Collection of high-resolution satellite images around urban areas Prototype of illegal building detection model Trial of Time Series Analysis of Urban Change 	<ul style="list-style-type: none"> Improvement of detection accuracy of buildings, roads and vehicles Start providing data to ministries in the form of APIs/platforms 	<ul style="list-style-type: none"> Provision of an alert system for illegal construction Provision of urban monitoring systems
	Relevant ministries	<ul style="list-style-type: none"> Development of building permit data and urban planning GIS data Verification in hot spots (e.g., Kigali) for illegal construction and mismatching of supply and demand of transportation infrastructure 	<ul style="list-style-type: none"> Construction of an early correction order process using analysis results Review of master plans for urban and transportation planning 	<ul style="list-style-type: none"> Institutionalization of building permits and congestion monitoring systems linked to satellite data
	Beneficiaries /stakeholders	<ul style="list-style-type: none"> Use of illegal building reporting system Cooperation in investigation of illegal construction 	<ul style="list-style-type: none"> Provision of building guidelines Trial of measures to improve full-year routes and peak hours 	<ul style="list-style-type: none"> Stabilization of real estate value by avoiding the risk of illegal construction Reduction of commuting and distribution costs

Source: JICA Project Team

Figure 69 Roadmap for creating Social Economic Impact

2.2.5 Other activities (Monthly monitoring meetings, quarterly coordination meetings, etc.)

Since the start of this project in October 2023, monthly monitoring meetings and quarterly coordination meetings have been held as follows.

Table 39 Monthly Monitoring Meetings

October 2023	
Date and Time	Tuesday, October 17, 2023, 16:30-17:30 JST
Methods	Online
Attendee	RSA, JICA and JICA project teams
Contents	<ul style="list-style-type: none"> - Introduction of the members of this project - Sharing of project outline (focusing on overall and initial activities) - Confirming of next actions: Work plan review, on-sight survey and meeting on November 6 to 10 (including the 1st Quarterly Coordination Meeting), and etc.
December 2023	
Date and Time	Monday, December 11, 2023, 18:00-19:00 JST
Methods	Online
Attendee	RSA, JICA and JICA project teams
Contents	<ul style="list-style-type: none"> - Confirmation of Project Overview - Confirmation on progress on training preparation - Confirmation on relating activities (including questionnaire, social economic impact, etc.) - Confirming of next actions
January 2024	
Date and Time	Friday, January 12, 2024, 17:00-18:00 JST
Methods	Online
Attendee	RSA, JICA and JICA project teams
Contents	<ul style="list-style-type: none"> - Confirmation of Project Overview - Discussion on Social Economic Impact - Confirming of next actions
February 2024	
Date and Time	Wednesday, February 14, 2024, 16:00-17:00 JST
Methods	Online
Attendee	RSA, JICA and JICA project teams
Contents	<ul style="list-style-type: none"> - Confirmation of Project Overview - Confirming of next actions
April 2024	
Date and time	Friday, April 26, 2024 19:00-20:00 JST
Methods	Online
Attendees	RSA, JICA, JICA Project Team
Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirmation on progress and next actions * Including Draft plan of follow-up for satellite data utilization training in Rwanda (in June)
May 2024	
Date and time	Wednesday, May 29, 2024 16:30-17:30 JST
Methods	Online
Attendees	RSA, JICA, JICA Project Team
Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirmation on progress and next actions

		* Including Draft plan of follow-up for satellite data utilization training in Rwanda (in June) - Social Economic Impact
July 2024		
	Date and time	Tuesday, July 30, 2024 16:00-17:00 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity
August 2024 (* Early September due to scheduling)		
	Date and time	Friday, September 6, 2024 16:30-17:30 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity
September 2024 (* As the quarterly coordination meeting was moved to October, a monthly monitoring meeting was held in September. It will be held in early October due to scheduling.)		
	Date and time	Thursday, October 3, 2024 16:00-17:00 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity
November 2024		
	Date and time	Tuesday, November 26, 2024 11:00-12:00 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on progress and next actions for each activity
January 2025		
	Date and time	Wednesday, January 22, 2025 17:00-18:00 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on progress and next actions for each activity
March 2025 (* Conducted on April 1 due to schedule adjustment)		
	Date and time	Tuesday, April 1, 2025 17:30-18:30 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity - Training for Aerospace Engineering Program 2 - Updates of Social Economic Impact Report
May 2025		
	Date and time	Wednesday, May 7, 2025 17:00-17:30 JST
	Methods	Online
	Attendees	RSA, JICA, JICA Project Team
	Content	- Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity - Training for Aerospace Engineering Program 2 - Updates of Social Economic Impact Report
June 2025		
	Date and time	Wednesday, June 4, 2025 17:00-18:00 JST

Methods	Online
Attendees	RSA, JICA, JICA Project Team
Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirmation on Progress and Next Actions for Each Activity - Updates of Social Economic Impact Report - Additional training course

Source: JICA Project Team

Table 40 Quarterly Coordination Meetings

November 2023	
Date and Time	Tuesday, November 17, 2023, 11:30-12:30 CAT
Methods	Face-to-Face @RSA Conference Room
Attendee	RSA, MININFRA, JICA Rwanda Office, JICA Project Team
Contents	<ul style="list-style-type: none"> - Introduction of the participants of the 1st Quarterly Coordination Meeting - Confirmation and discussion on project outline (focusing on activities relating to the Quarterly Coordination Meeting) - Discussion on social economic impact to be created through the use of satellite data - Confirming of next actions
March 2024	
Date and Time	Thursday, March 28, 2024, 10:00-12:00 CAT
Methods	Face-to-Face @RSA Conference Room
Attendee	RSA, MININFRA, MINEMA, Kyushu Institute of Technology, JICA Rwanda Office, JICA Project Team
Contents	<ul style="list-style-type: none"> - Introduction of the participants of the 2nd Quarterly Coordination Meeting - Confirmation of Project Overview and Progress - Discussion on estimation methodology for social economic impact through the utilization of satellite data - Confirming of next actions
June 2024	
Date and time	Thursday, June 20, 2024 10:00-12:30 CAT
Methods	Offline @RSA Conference Room
Attendees	RSA, MININFRA, MINEMA, METEO, UR, JICA Rwanda Office, JICA Project Team
Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirming of Progress and Next Actions for Each Activity - Discussion on estimation methodology for social economic impact through the utilization of satellite data
October 2024	
Date and time	Tuesday, October 22, 2024 10:00-11:30 CAT
Methods	Face-to-face @RSA Conference Room
Attendees	RSA, MINAGRI, MININFRA, MINEMA, METEO, JICA Rwanda Office, JICA Project Team, JICA Headquarters (online)
Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirming of Progress and Next Actions for Each Activity - Progress update on the Social Economic Impact Report - Discussion on current status of use cases and their challenges
December 2024	
Date and time	Thursday, December 19, 2024 11:00-12:00 CAT

	Methods	Online
	Attendees	RSA, UR, MININFRA, MINEMA, METEO, JICA Rwanda Office, JICA Project Team, JICA Headquarters
	Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirming of Progress and Next Actions for Each Activity - Progress update on the Social Economic Impact Report
February 2025		
	Date and time	Friday, February 28, 2025 9:00-11:20 CAT
	Methods	Face-to-face @RSA Conference Room
	Attendees	RSA, UR, MININFRA, MINEMA, METEO, MINICT, JICA Rwanda Office, JICA Project Team
	Content	<ul style="list-style-type: none"> - Confirmation of Project Overview and Progress - Confirming of Progress and Next Actions for Each Activity - Progress update on the Social Economic Impact Report
October 2025		
	Date and time	Tuesday, October 21, 2025 11:00-12:00 CAT
	Methods	Face-to-face @RSA Conference Room
	Attendees	RSA, MININFRA, MINEMA, METEO, JICA Rwanda Office, JICA Project Team
	Content	<ul style="list-style-type: none"> - Project Overview - Discussion on Current Situation of Utilization of Space Technology (Satellite Data Utilization, Satellite Development, and others) and Current Environment around Space Sector in Rwanda
December 2025		
	Date and time	Tuesday, December 9, 2025 10:00-11:00 CAT
	Methods	Face-to-face @RSA Conference Room
	Attendees	RSA, JICA Rwanda Office, Embassy of Japan in Rwanda, JICA Project Team
	Content	<ul style="list-style-type: none"> - Completion report on the Project - Report on Social Economic Impact Estimation in Rwanda - Presentation on key takeaways and lessons learnt in the Project - Discussion about the project and the future collaboration

Source: JICA Project Team