

A Community Service Program: Online Basic Training on Remote Sensing Image Interpretation for Public Participation in Monitoring Marine Environmental Damage

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Abstract. The use of remote sensing as a means of coastal environmental education is a strategic approach to increase public literacy about the condition of marine ecosystems that are vulnerable to damage. This community service activity aims to introduce the basics of satellite image interpretation to participants from various coastal areas of Indonesia through online training which will be held on November 8, 2025 with a total of 30-50 participants for free. The training is designed using an experiential learning approach so that participants can learn concepts and practice them directly through online platforms. The material included an introduction to the basic principles of remote sensing, visual interpretation techniques, the use of a combination of image bands, and the application of satellite imagery to detect changes in mangrove cover. The results of the training showed a significant increase in scores in all competency categories after the training. Before training, the score is in the range of 25–40%, while after training it increases to around 70–80%. This indicates that the training is effective in improving the participants' understanding and skills in all aspects measured. In addition, online learning methods are quite effective in encouraging collaborative interaction across regions. This program shows that remote sensing technology can be simplified into educational materials that are easy for the public to understand.

Keywords: Training, remote sensing, community service, mangrove cover, online

Abstrak. Pemanfaatan penginderaan jauh sebagai sarana edukasi lingkungan pesisir merupakan pendekatan strategis untuk meningkatkan literasi masyarakat terhadap kondisi ekosistem laut yang rentan mengalami kerusakan. Kegiatan pengabdian masyarakat ini bertujuan memperkenalkan dasar-dasar interpretasi citra satelit kepada peserta dari berbagai wilayah pesisir Indonesia melalui pelatihan daring yang dilaksanakan pada 8 November 2025 dengan jumlah peserta 30–50 orang secara gratis. Pelatihan dirancang menggunakan pendekatan experiential learning sehingga peserta dapat mempelajari konsep sekaligus mempraktikkannya secara langsung melalui platform daring. Materi meliputi pengenalan prinsip dasar penginderaan jauh, teknik interpretasi visual, penggunaan kombinasi pita citra, serta penerapan citra satelit untuk mendeteksi perubahan tutupan mangrove. Hasil pelatihan menunjukkan adanya

peningkatan skor yang signifikan pada seluruh kategori kompetensi setelah pelatihan. Sebelum pelatihan, skor berada pada kisaran 25–40%, sedangkan setelah pelatihan meningkat menjadi sekitar 70–80%. Hal ini menandakan bahwa pelatihan efektif dalam meningkatkan pemahaman dan keterampilan peserta di semua aspek yang diukur. Selain itu, metode pembelajaran daring cukup efektif mendorong interaksi kolaboratif lintas daerah. Program ini memperlihatkan bahwa teknologi penginderaan jauh dapat disederhanakan menjadi materi edukatif yang mudah dipahami masyarakat.

Kata Kunci: Pelatihan, penginderaan jauh, pengabdian masyarakat, tutupan mangrove, daring

1. Introduction

Remote sensing is one of the key technologies in modern oceanographic studies due to its ability to provide extensive, fast, and efficient spatial and temporal information to understand the conditions of the marine environment. This technology allows the observation of various coastal and marine phenomena such as shoreline changes, sedimentation, mangrove cover, pollution, turbidity, and phytoplankton blooms (Miller & Groom, 2017). With the development of free satellite imagery platforms such as Sentinel, Landsat, and Google Earth Engine, the use of remote sensing is no longer limited to academics or technical agencies, but can be accessed by the wider community. This condition opens up great opportunities to strengthen coastal environmental literacy through an educational approach that involves the community as data users.

Damage to the marine and coastal environment in Indonesia continues to increase every year, especially due to human activities such as waste disposal, land conversion, resource exploitation, and pollution from the mainland (Setiawan et al., 2020). Many coastal areas have lost mangrove cover, experienced abrasion, and increased turbidity of the waters. Meanwhile, most people do not have the skills to read spatial data or satellite imagery that can help them understand environmental changes more objectively. The lack of access to technology education causes coastal communities or environmentalists to rely only on media information without the ability to interpret independently. In fact, according to Campbell & Wynne (2011), basic remote sensing literacy is able to increase public participation in environmental monitoring efforts.

The need for technology literacy is increasingly urgent when the pandemic and post-pandemic era force various educational processes to switch to digital platforms. Data on the implementation of service carried out through *teleconference* or *virtual learning* has proven to be effective in disseminating knowledge if it is designed with an interactive approach and supported by representative visual materials (Yulia, 2021). Based on this, Zoom Meeting-based community service is a strategic alternative to

expand the reach of remote sensing education to participants across regions. Through the online platform, people from the coast of Sumatra to Papua can take part in training simultaneously without geographical restrictions.

This community service program was prepared to provide basic training in satellite image interpretation for coastal communities, students, teachers, environmental volunteers, young fishermen, and marine observers from various regions in Indonesia. With a total of 30–50 participants, this activity is designed to remain interactive through *screen-sharing sessions*, live demonstration of image processing, visual quizzes, and small group discussions in *breakout rooms*. This training format is in line with the *experiential learning* principle of Kolb (1984), where participants not only receive material, but also practice it independently during the session.

The urgency of this training is increasingly evident considering the low spatial literacy of the Indonesian people. In fact, a basic understanding of satellite imagery can help them identify environmental damage that occurs in their respective regions. For example, changes in the color of the waters can indicate sedimentation or pollution, changes in the coastline can indicate abrasion or stockpilation, while the degradation of mangroves can be identified through changes in the hue of vegetation (Pettorelli et al., 2014). When people are able to read this phenomenon independently, public participation in ocean conservation becomes stronger and *evidence-based action*.

In addition, remote sensing education has great potential to support increasing public awareness of climate change issues. Rising sea levels, increasing abrasion incidence, and changes in sea surface temperature can now be monitored through satellite data. Open access to such data allows anyone to understand the conditions of their environment more accurately. According to Lehmann et al. (2017), satellite data literacy is a form of modern science literacy that must be introduced to the public so that they can adapt to global technological transformation.

The service activity, which was carried out on November 8, 2025 through a national Zoom Meeting, aims to bridge the literacy gap. By utilizing online platforms, training can be reached by participants from various professions and backgrounds, including coastal communities who usually rarely have access to technology training. The program provides an introduction to the basic concepts of remote sensing, how to read satellite

imagery, understanding the elements of image interpretation, and simple applications for detecting damage to the marine environment.

This kind of online-based devotional does not require physical field documentation, but still provides a rich learning experience through visual demonstrations and hands-on interaction. Participants can practice interpreting the images displayed by the speakers, asking questions in real-time, and saving material for further study. This format has proven to be effective in building community capacity even though it is not done face-to-face.

Thus, the introduction of remote sensing for coastal communities not only expands technological literacy, but is also the first step in strengthening public participation in monitoring marine environmental damage independently and sustainably.

2. Methods

The methodological approach used in the community service program entitled "The Utilization of Remote Sensing for Coastal Education: Basic Training on Satellite Image Interpretation for Coastal Communities in Monitoring Marine Environmental Damage" is designed to ensure the active participation of participants in online platforms, comprehensive but still applicable, and able to increase remote sensing literacy independently. This section systematically describes the design of the activity, the implementation mechanism, the tools and materials used, the data collection techniques, and the data analysis techniques used to evaluate the achievement of the program's objectives.

2.1 Design Activities

This training uses a participatory-interactive design based on *experiential learning* that combines theory and hands-on practice in an online platform. *Kolb's (1984) experiential learning model emphasizes four phases of learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation.* This design is perfect for online activities because it combines material exposure, image demonstrations, interactive discussions, and self-paced exercises between sessions. Figure 1 of a brochure distributed via the internet.



Figure 1. Design training brochure

The activity was carried out via Zoom Meeting on November 8, 2025 and was recorded and supported by the Google Meet: <https://meet.google.com/dun-bnpv-nst> link as a parallel communication medium for additional materials or *breakout sessions*. The reason for using the two platforms is to increase the technical flexibility of participants who have bandwidth limitations or device constraints.

The interactive design was chosen because, according to Anderson (2008), the two-way online learning process results in higher engagement than just one-way online lectures. Active interaction between facilitators and participants will enhance conceptual understanding, especially for complex topics such as interpretation of satellite imagery.

2. Participants and Recruitment

Program participants consisted of 30–50 people from various communities throughout Indonesia, including:

1. Coastal communities (fishermen, environmental cadres)
2. Students of marine related study programs
3. High School / Vocational School Teacher

4. Environmental volunteers
5. Marine NGO practitioners

Participant recruitment is carried out through online announcements: the department's social media, the environmental community mailing list, as well as a network of lecturers and alumni. The inclusion criteria are:

1. Be at least 18 years old
2. Have a computer/cellphone device with a stable internet connection
3. Able to use Zoom/Google Meet
4. Interest in marine environmental issues and/or remote sensing

This approach is in line with *the principle of community learning* which emphasizes cross-background involvement (Rogers, 2003), so that the program not only provides technical knowledge but also expands the participants' social networks.

3. Training Materials

The material is designed to provide basic but applicable knowledge about remote sensing, especially related to the interpretation of satellite imagery in the context of monitoring the marine environment. Key materials include:

a. Basics of Remote Sensing and Satellite Imagery

Participants are introduced to the basic concepts:

- What is *remote sensing*,
- Types of sensors (optical, radar),
- The difference between multispectral imagery and spatial resolution (Campbell & Wynne, 2011).

b. Introduction of Free Satellite Imagery Platform

Some of the popular platforms introduced are:

- Google Earth Engine (GEE)
- Sentinel Hub EO Browser
- USGS EarthExplorer

Interactive tutorials are done with simple examples, for example loading optical images of Sentinel-2 and Landsat 8.

c. Basic Techniques of Image Interpretation

The material includes how to read the image display, understand color band combinations, recognize natural and anthropogenic features in coastal areas, and identify indications of damage to the marine environment, such as:

1. Shoreline changes (abrasion/accretion)
2. Coastal vegetation cover (e.g. mangroves)
3. Water turbidity that can be related to sedimentation or pollution

This material is structured based on the concept of visual interpretation (Lillesand et al., 2015), but simplified so that it is easy for non-technical participants to understand.

d. Marine Environmental Monitoring Applications

In this session, participants practiced hands-on with case studies (examples of Indonesia's coastal areas) to:

1. Observing changes in coastal landscapes from two different periods
2. Evaluating coastal vegetation cover
3. Exploring the relationship between image conditions and environmental phenomena

4. Tools and Technology

Since the activities are online, the tools used include:

1. Zoom Meeting for keynote presentation, discussion, and Q&A sessions
2. Google Meet (link) as an alternative medium and *breakout rooms* for group practice
3. Participant's computer/laptop/cellphone with internet access
4. Satellite imagery from open access sources such as the Copernicus Open Access Hub and USGS

The use of Google Meet as the main link helps overcome the various technical limitations of Zoom alone, according to the recommendations of online learning technology (Martin et al., 2020).

5. Implementation Procedure

The online training was carried out in one full day with the following arrangement of events:

a. Opening and Introduction

- Remarks by the Head of the Department of Marine Sciences
 - Explanation of the objectives, scope, and benefits of the training
- b. Session 1: Introduction to Remote Sensing
- The basis of the remote sensing theory
 - Sensor structure and image classification
- c. Session 2: Satellite Image Platform
- Demonstration of the use of GEE/EO Browser
 - Participants in independent practice follow the facilitator's instructions
- d. Session 3: Image Interpretation
- Visual interpretation exercises of imagery
 - Joint discussion on thematic findings
- e. Session 4: Environmental Monitoring Case Study
- Participants were divided into *breakout rooms* based on regional interests
 - Analyzing coastal changes on two different dates
 - Presentation of interpretation results
- f. Session 5: Reflection and Evaluation
- Review of findings
 - Participant feedback and recommendations
 - Closing

The preparation of this session considers the principle of *scaffolding* in digital learning, where the material starts from basic to application, so that even new participants can grow progressively (Vygotsky, 1978).

6. Data Collection Techniques

To evaluate the effectiveness of training, several instruments are used:

a. Participatory Observation

The facilitator actively recorded participant participation, quality of questions and answers, and involvement in imagery practice during breakout sessions. This observation uses a skills-based observation operational guideline (*skills engagement checklist*) which is compiled based on image interpretation indicators (Creswell, 2014).

b. Pre-Post Test

Participants filled out a short questionnaire before and after the training to measure the improvement in basic knowledge of satellite image interpretation. The Likert scale is used to facilitate quantitative analysis of the level of comprehension.

c. Post-Training Brief Interview

Structured interviews were conducted via Zoom/Google Meet chat to get participants' feedback, including their perceptions of the benefits of the training and the challenges faced.

d. Training Evaluation Questionnaire

This questionnaire covers aspects of the usefulness of the material, the effectiveness of delivery, and the potential use of image interpretation skills in each participant's area.

7. Data Analysis Techniques

Data were analyzed using a mixed methods approach (Creswell, 2014):

a. Quantitative Analysis

- Comparison of *pre-test* and *post-test* scores with simple statistical tests (e.g. paired sample t-test) to assess knowledge improvement.
- The frequency distribution of questionnaire answers was evaluated to see the participants' perceptions.

b. Qualitative Analysis

- Interview transcripts and observation notes were analyzed thematically to identify patterns of change in attitudes, learning difficulties, and planned applications by participants.
- Thematic codes are then formed based on manual *coding* to unearth the deep meaning of the participants' experiences (Miles & Huberman, 1994).

8. Validity and Reliability

To improve internal validity:

- The pre-test/post-test is prepared based on the guidelines of image interpretation theory (Lillesand et al., 2015).
- Observations are made by more than one facilitator to reduce subjective bias.

For reliability of data collection:

- The questionnaire was tested on 5 people before the training to assess the consistency of the question interpretation.
- Structured interviews follow the same guidelines for each participant.

3. Results and Discussion

3.1 Results

The implementation of the training "The Utilization of Remote Sensing for Coastal Education: Basic Training on Satellite Image Interpretation for Coastal Communities in Monitoring Marine Environmental Damage" which was carried out online via Zoom Meeting on November 8, 2025 was attended by 30-50 participants from various coastal areas in Indonesia. This training resulted in a number of important achievements that included increasing technical knowledge, visual image interpretation skills, changing attitudes towards spatial literacy, and increasing the motivation of participants to use remote sensing technology in environmental monitoring activities in their respective regions.

1. Increased Knowledge of Remote Sensing Basics

Based on the results of *the pre-test* and *post-test*, there was a significant increase in participants' understanding of the basic concept of remote sensing. Before taking part in the training, most participants only understood remote sensing as "images from satellites" without knowing the principle of the sensor, the type of resolution, or the components of the image. After participating in the material, participants were able to explain in simple terms the differences in spatial, temporal, and spectral resolutions, as well as their respective functions in spatial analysis.

These changes were evident in the question and answer session, where participants began to ask technical questions such as how to choose a combination of color bands to map vegetation, or how to know the level of turbidity of water through hue changes in Sentinel-2 imagery. This shows that there is an increase in basic concept literacy as the initial goal of the training.

2. Early Visual Interpretation Ability of Satellite Imagery

Through demonstration sessions and *hands-on practice*, participants showed their initial ability to interpret images. Participants can:

1. Identify the coastline and distinguish between abrasion and accretion zones.
2. Recognize the pattern of mangrove cover from differences in vegetation hue.
3. Observing changes in the color of the waters as an indication of sedimentation or light pollution.
4. Assess the difference in coastal conditions between the two time periods (e.g., Landsat 2015 vs Sentinel-2 2023 comparison).

In the group interpretation exercise through *a breakout room*, participants were given random coastal images from various regions (Aceh, South Sulawesi, NTB, and West Kalimantan). The results of the discussion showed that participants were able to identify at least two indicators of environmental damage per image, although not all of them were able to carry out advanced interpretation.

3. Improving the Ability to Use the Online Image Platform

Prior to the training, some participants had never accessed remote sensing platforms such as Google Earth Engine or EO Browser. After the training, participants demonstrated improved abilities in:

1. Access imagery independently.
2. Change the appearance of the color band (*false color composite*).
3. Checks image metadata (date, sensor, resolution).
4. Taking footage for local documentation.

Participants were even enthusiastic about trying simple analyses such as seeing changes in the coastline from year to year using *the time lapse* feature on Google Earth. This interest shows that platforms that were previously considered complicated can now be understood with the right guidance.

4. Positive Response to Remote Sensing Applications for Marine Environmental Monitoring

The trainees showed a positive response to the real benefits of remote sensing in monitoring the marine environment. Many participants from coastal regions reported that this technology was very helpful in:

1. Identify areas prone to abrasion.
2. Seeing the development of mangrove damage.
3. Visually track changes in water quality.
4. Interpreting sedimentation patterns at river mouths.

Some fishermen even said that they were interested in using satellite imagery to monitor fishing areas affected by turbid water conditions.

High school/vocational teachers who participated in the training also said that this material is very relevant for geospatial learning in schools and plans to include it in extracurricular activities.

5. Active Participation and Discussion Dynamics in Online Spaces

Even though the activity took place online, the participation rate of participants was very high. The facilitator noted that more than 70% of the participants were active in the discussion, either through *chat*, microphone, or during *breakout room sessions*. Participants also shared environmental conditions in their respective areas using screenshots of satellite imagery. Dynamics like these support the findings of Martin et al. (2020) that online learning can result in intensive interaction when participants are given a space for collaboration. Participants from Papua observed changes in coastal vegetation due to the construction of new roads, while participants from Kalimantan observed mangrove damage due to ponds. This cross-regional discussion enriched participants' understanding of the diversity of Indonesia's marine environmental problems.

6. Participant's Perception of Training Effectiveness

Based on the training evaluation questionnaire:

- 92% of participants rated the training as very beneficial.
- 88% of participants felt more confident using satellite imagery after training.
- 95% of participants stated that they wanted to take part in advanced training (intermediate level).
- 100% of participants stated that the material was relevant to environmental issues in their area.

Participants also provided input so that in the future a basic competency certificate of image interpretation would be made to improve professional values for teachers,

students, and members of the environmental community. Figure 2 shows the success of the training program.

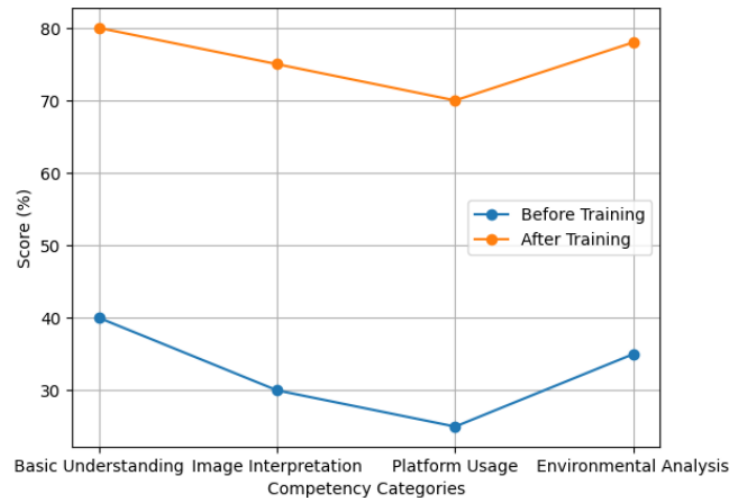


Figure 2. The success of the program is seen from the pretest and posttest scores

The graph shows a significant increase in scores in all competency categories after training. Before training, the score is in the range of 25–40%, while after training it increases to around 70–80%. This indicates that the training is effective in improving the participants' understanding and skills in all aspects measured.

3.2 Discussion

The online training on the use of remote sensing for coastal education provided a number of findings that not only showed an increase in the technological literacy of the participants, but also showed how coastal communities and environmental observers in Indonesia can play an active role in monitoring marine environmental damage. This discussion integrates field findings with theoretical studies, and shows the relevance of the results of activities to marine conservation efforts and technology-based community empowerment.

1. Improving Remote Sensing Literacy as a Pillar of Modern Environmental Education

The results of the activity showed that basic training in satellite image interpretation was able to significantly improve participants' understanding. These findings are in line with Campbell & Wynne (2011), who stated that the ability to understand satellite imagery is one of the most important forms of "spatial literacy" in

the digital age. Participants not only understand the concept of image resolution or sensor types, but are also able to apply them directly in environmental analysis.

In the context of community service, this increase in technology literacy is very relevant because most of the participants come from non-technical communities such as young fishermen, environmental activists, teachers, and individuals who have concerns about coastal conditions. Thus, this training succeeded in bridging the knowledge gap between academics and the wider community, so that remote sensing technology became more inclusive and was no longer considered an "elite" technology.

Furthermore, compared to face-to-face training, online training does not reduce the quality of learning. In line with the findings of Martin et al. (2020), virtual learning can provide equal effectiveness when participants are actively engaged through discussions, screen simulations, and real-time practice. This can be seen from the enthusiasm of the participants in the *breakout room* when they were asked to observe the image of the beach from different areas.

2. The Effectiveness of Experiential Learning in an Online Context

Kolb' s (1984) *experiential learning* approach used in training proved to be very relevant. Participants not only received the material, but directly practiced satellite image analysis using concrete examples. This kind of learning allows participants to build a deeper understanding as they experience the process of data visualization firsthand.

For example, when participants were asked to compare the 2015 Landsat imagery with the 2023 Sentinel-2 imagery in a specific coastal area, they not only saw the difference in hues, but were able to interpret the environmental processes that occurred, such as abrasion, accretion, or changes in mangrove cover. This process reinforces the argument of Lillesand et al. (2015) that visual image interpretation is a basic skill that anyone can learn through structured practice.

The use of online platforms also allows participants to access various data sources independently. Some participants reported that they tried to explore their hometown area after the training session was over. This shows that the learning experience provided is able to foster curiosity and *self-directed learning*.

3. Online Collaboration and Discussion Dynamics as a Factor to Strengthen Understanding

One of the strengths of this activity is the high interaction between participants even though the activity takes place online. Cross-regional discussions, for example, with participants from Aceh, East Java, Kalimantan, and Maluku, resulted in diverse perspectives on coastal environmental issues in Indonesia. This dynamic reinforces the view of Rogers (2003) that adult learning is effective when participants are able to relate the material to their own experiences. When a participant from Kalimantan observed the degradation of mangroves in his area through satellite imagery, another participant from Sulawesi also compared it to their local conditions. This kind of multi-location comparison is rare in small-scale face-to-face training, but it can be realized in national-scale online training. This also shows that online technology not only expands access, but also expands the scope of scientific discussion that was previously difficult to reach. In other words, this kind of national online training can serve as a forum for the exchange of knowledge based on spatial data.

4. The Community as a Partner in Monitoring Marine Environmental Damage

One of the objectives of this activity is to empower the community to play a role in monitoring the marine environment independently. The finding that participants were able to identify shoreline changes, turbidity, and vegetation degradation from satellite imagery was a strategic achievement. This is in line with the idea of Pettorelli et al. (2014) that *citizen science* based on satellite imagery can strengthen people's capacity in data-driven decision-making. In the discussion, some fishermen stated that the interpretation of satellite imagery could be combined with traditional knowledge of current patterns, fishing areas, and seasons. Such integration is a clear example of the synergy between local knowledge and technological knowledge. The teachers who attended also acknowledged the great potential of remote sensing to be taught to high school/vocational school students as part of science literacy. These findings open up the possibility that this training did not stop at participants, but could potentially be contagious to hundreds of students in their schools.

5. Challenges That Arise During Online Training

Although the program is running well, there are some challenges that need to be noted as evaluation and development material. Key challenges include:

a. Internet Network Limitations

Some participants experienced network obstacles so they were left behind when participating in the live demonstration. This condition is common in online training, especially for participants from remote areas where internet access is not stable.

b. Variation of Participant's Technical Ability

Some participants understand the material very quickly, but others take longer to adjust to the EO Browser platform or Google Earth Engine. This is natural considering that the participants' backgrounds are very diverse.

c. Limited Time for Independent Practice

Participants wanted more time for individual image exploration. They said that a 20-30 minute practice session was not enough to explore the area they were interested in.

However, this limitation does not reduce the effectiveness of training.

6. Relevance of Training to Conservation Efforts and Sustainable Agenda

This training has strong relevance to marine conservation efforts and sustainable development goals (SDG 14: Life Below Water). Improving the ability to interpret satellite imagery allows people to understand environmental damage based on visual evidence, not just perception. This is important because changes in the marine environment are often gradual, making it difficult for people to feel it without the help of technology (Mora et al., 2011).

Thus, this activity not only increases the technical capacity of participants, but also builds social awareness that environmental monitoring is not only the task of the government or academics, but a shared responsibility.

4. Conclusion

The training "The Utilization of Remote Sensing for Coastal Education: Basic Training on Satellite Image Interpretation for Coastal Communities in Monitoring Marine Environmental Damage" which was held online via Zoom Meeting on November 8, 2025 has succeeded in increasing spatial literacy and participants' understanding of remote sensing technology. This increase can be seen from the ability of participants to recognize basic elements of satellite imagery, understand changes in hue, and identify indicators of

coastal environmental damage such as abrasion, sedimentation, and mangrove degradation. These findings are in line with Campbell & Wynne (2011) who assert that the interpretation of visual imagery can be learned through a gradual approach and hands-on practice.

In addition to improving technical capabilities, this training shows that participants from various coastal areas are able to take on the role of partners in environmental monitoring. Group discussion and analysis activities showed that the interpretation of satellite imagery can be combined with local knowledge of the community to produce a more contextual understanding of coastal dynamics. This reinforces the view of Pettorelli et al. (2014) that remote sensing technology can support *citizen science* in ecosystem conservation.

The implementation of online training has proven to be effective and inclusive, allowing the participation of participants from different regions without geographical restrictions. This training model also supports collaborative learning that enriches participants' understanding of environmental issues across regions. Thus, this training not only provides technical knowledge, but also builds critical awareness and motivation for participants to use satellite data in monitoring coastal conditions in an ongoing manner. Going forward, advanced intermediate level training is recommended to strengthen participants' analytical skills.

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