

# Coastal Area Development Through Mangrove Planting And Tree Foster Parents As Climate Change Restoration And Mitigation Efforts Sedari Village, Cibuaya District, Karawang Regency

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## **Abstract.**

*The global community is faced with a number of problems such as the climate crisis. The coastal area is one area that is vulnerable to abrasion and the impact of the climate crisis. Sedari Village is one of the areas on the coast that has the risk of abrasion and climate change. Therefore, PT Pertamina Patraniaga Cikampek BBM Terminal carries out a coastal area development program through planting mangroves and foster parent trees. Community empowerment activities aim to map the activities needed for environmental restoration. Within the framework of management science in general, activities consist of planning, organizing, implementing, and evaluating. Within the framework of management science in general, activities consist of planning, organizing, implementing, and evaluating. Based on community empowerment activities, it is concluded that coastal area development activities through mangrove planting and OTAP initiation have a high urgency value. then the activity is a collaboration between communities based on academic, industrial, community, government and media groups.*

**Keywords:** Mangrove, OTAP, innovation and Climate Change.

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## **I. INTRODUCTION**

The global community is faced with a number of problems such as the climate crisis, the food crisis, and the economic crisis. In 2022 the world economic forum (world economic forum) released a report on risk threats with 50% of the 10 main problems of the global community being environmental problems [1]. The environmental problems that have been mentioned have an impact, both in terrestrial or inland areas to coastal areas. The coastal area is an important strategic area to be developed. This is because the proportion of coastal areas in the world is 10%, but almost 1 third of the world's population lives in coastal areas. Viewed from the climate crisis, coastal areas can be one of the locations that are affected in various forms [2][3]. The coastal area is according to UU No. 1 of 2014 can be interpreted as a transitional area between land and sea ecosystems that are affected by changes on land and at sea. Based on case studies in Indonesia, there are a number of areas in coastal areas that face a number of environmental problems. Sedari Village is located in Karawang Regency on the north coast of Java Island. In terms of tourism potential, Sedari Village, which is located in a coastal area, is one of the potential destinations.

Based on data from the Regional Government (PEMDA) of Karawang Regency, there are 7 natural attractions with the dominance of mangrove tourism in Sedari Village. However, inseparable from the coastal area, Sedari Village has consequences in the form of the risk of abrasion and other climate crisis impacts because it is located in a coastal area. Historically, according to a number of sources, Sedari Village has a fairly extensive mangrove forest, the distance between settlements and the shoreline is quite far. However, the current condition, the distance between the settlement and the shoreline is very close. Mangroves as plants that function in preventing climate change in order to reduce abrasion in Sedari village [4]. This condition triggers PT Pertamina Patraniaga Fuel Terminal Cikampek to carry out community empowerment activities. Community empowerment activities carried out by PT Pertamina Patraniaga Fuel Terminal Cikampek aim to (1) formulate an action plan for coastal area restoration and (2) planting programs and initiation of post-planting maintenance systems

## II. METHODS

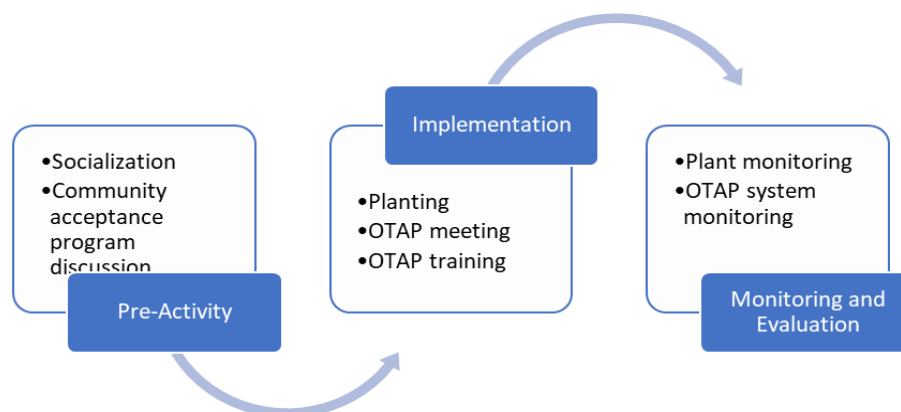
The community empowerment program in Sedari Village consists of several stages, namely institutional formation, institutional training, and biophysical development through mangrove planting. Institutional initiation was carried out at the Sedari Village Hall, Cibuaya District, Karawang Regency. The tools used in the implementation of institutional initiation include laptops, LCD projectors, questionnaires, institutional guides, cameras. As for planting activities, the tools used include bamboo stakes, banners, and seed markers. While the material used is *Avicennia marina* seeds with a total of 7,777 seeds. In addition, data collection was carried out by direct interviews with informants who had a direct relationship with the location of mangrove planting and based on literature studies regarding efforts to develop mangrove planting programs.

On the other hand, as additional information for programming, we conducted interviews with 10 key informants including village leaders, village officials, and the community. Informants were selected using purposive sampling method. Informants include people who have direct activities on the location of mangrove planting. Analysis of the sustainability of the Sedari Village Environmental Program was carried out using the SWOT method (Strength, Weakness, Opportunity, and Threats) [5]. The SWOT method provides a list of statements or factors accompanied by a description of the current and future internal and external environmental conditions, statements from individuals are general and concise with a subjective view. Nevertheless, SWOT is a suitable and promising method for assessing a condition.

## III. RESULT AND DISCUSSION

### *Action Plans and Institutions*

In the framework of management science in general, activities are composed of planning, organization, implementation, and evaluation. The planning stage of empowerment activities in Sedari Village includes the socialization of the program that has been implemented with the number of participants involved is 40 people. In general, the stages in community empowerment activities are listed in Figure 1 regarding the flow chart of community empowerment activities. The socialization activities aim to describe the program plans that will be carried out; get a picture of the response of the community's acceptance of the program to be implemented. After the socialization, the program led to the presentation of the plan for planting activities and the initiation of Tree Foster Parents (OTAP). The selection of mangrove commodities or species is based on the function of the existence of mangrove plants. In terms of function, mangroves can have benefits as a wave barrier, habitat for marine life, windbreaks, sediment traps, and seawater intrusion barriers [6].



**Fig 1.** Flowchart of community empowerment activities in Sedari Village, Karawang Regency

Foster parents are a community-based tree maintenance program by providing education about the urgency of mangroves and being aware of the environment. The stages of initiation of the OTAP program consist of initial discussions on OTAP, OTAP training, preparation of a supporting policy framework related to OTAP, to the inauguration of the name of the OTAP management.



**Fig 2.** Tree Foster Parents Training

In general, both planting and OTAP activities are within the framework of the big theme SEDARI KANG HARI which has the meaning of Sedari Village as a sustainable and independent green village. The big theme is inseparable from the condition of Sedari Village which requires efforts to deal with the risk of abrasion and the continued impact of the climate crisis[7][8].

### ***Mangrove Planting***

Mangrove planting activities with *Avicennia marina* species were carried out as many as 7,777 seedlings. The mangrove planting program by PT Pertamina Cikampek does not only involve external parties from Sedari Village, but also involves community participation. Approximately 20 people are involved in the mangrove planting program. Community participation is one of the important elements in the implementation of empowerment programs so as to increase public awareness of the environment. Planting activities cannot be separated from the abrasion condition of Sedari Village which is getting worse. Now the distance between settlements and the shoreline in Sedari Village is only about 20 meters, according to information from key informants interviewed, the distance between the shoreline and settlements is quite far. In line with this, the information obtained from [9] mentions that the description of the distance between settlements and the shoreline states that people still pass through the plantation area to the mangrove forest first. In line with this, mangrove planting activities have a high level of urgency for areas affected by abrasion. areas with large and dense mangrove areas have lower abrasion values[10].



**Fig 3.** Planting activities by PT Pertamina Patraniaga Fuel Terminal Cikampek

The planting activities that have been carried out are 7,777 with a spacing of 50 cm x 50 cm. A spacing of 75 cm and 50 cm showed better results than a distance of 25 cm, between the spacing of 75 cm and 50 cm, there was no significant difference. At the time of monitoring the planting of the planting area, additional protection is given in the form of paranet tied to the bamboo [7]. This protective treatment is carried out so that the new plants planted can be protected from goats in the planting area. The mangrove planting program is expected to provide positive benefits for the environment. This is in line with the case study of mangroves in Cuba which states that the existence of mangroves is able to contribute to protection for 22,000 people per year and avoid the risk of losses due to disasters of 150 million dollars with an area of 222 km<sup>2</sup> or the equivalent of 40,000 football fields [11].

### ***SWOT Analysis for the Sustainability of the Sedari Village Environment Program***

After planting and initiating OTAP activities, it is known that the community has a positive response to environmental sustainability programs. Public acceptance of mangrove forests is positive [12]. The SWOT analysis is intended to see opportunities for program sustainability related to improving the quality of the environment in Sedari Village. SWOT analysis is used to analyze internal and external conditions. Internal

condition analysis is aimed at identifying resources, capabilities, basic competencies. While the analysis of external conditions identifies market or external conditions [13].

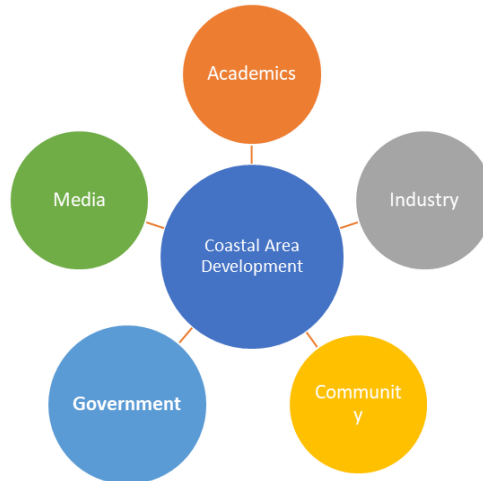
<p>Strength</p> <ul style="list-style-type: none"> <li>• High public awareness</li> <li>• High level of community participation</li> </ul>	<p>Weakness</p> <ul style="list-style-type: none"> <li>• There is no measurable data related to the rate of abrasion</li> <li>• Need more involvement</li> </ul>
<p>Opportunity</p> <ul style="list-style-type: none"> <li>• Areas of natural tourism potential</li> <li>• Access to Sedari Village is getting better from time to time</li> </ul>	<p>Threat</p> <ul style="list-style-type: none"> <li>• Abrasion rate</li> <li>• Environmental hazards, pond waste</li> </ul>

**Fig 4.** SWOT analysis matrix on coastal area development

Based on Figure 4 regarding the SWOT analysis matrix, it is known that programs or activities related to improving environmental quality have the potential for sustainability. This is based on a column of strengths, weaknesses, and opportunities that tend to be positive or have opportunities for the involvement of other sectors. Such as the need for measurable data and the involvement of many parties can actually be a trigger to expand the level of impact[14]. In the threat column, a number of external threats are the main threats to the sustainability of the program. If the rate of abrasion is much faster than planting activities, it is not impossible, the challenges of planting activities in the next period will be more severe because they require physical infrastructure support to withstand waves. Likewise with the threat of environmental hazards in the form of waste from community pond activities.

***Penta Helix Collaboration: Other Stakeholder Involvement***

The implementation of the community empowerment program by PT Pertamina Patraniaga Fuel Terminal Cikampek is inseparable from the collaboration between stakeholders. The concept of community empowerment collaboration carries the concept of Penta Helix Collaboration consisting of academia, industry, community, government, and media.



**Fig 5.** Penta helix collaboration concept

In the concept of Penta Helix Collaboration, each stakeholder has their own role and function. Academics in community empowerment programs provide input in the form of scientific data that can support decision making. Industry as a strategic partner, in this case can be intended as PT Pertamina Cikampek which can act as investors and agents in regional development. Community, means people who are directly involved. Not only involved, the community is also part of the affected. The government, as the policy maker, is the government in question at the provincial level to the village government. The real manifestation of the role of the village government is the issuance of a certificate from the OTAP management. The next stakeholder is the mass media. Mass media is needed to increase public awareness regarding a particular problem so as to create public attention in Sedari Village, Cibuyaya District, Karawang Regency[15].

#### IV. CONCLUSION

Biodiversity activities in the form of developing coastal areas in Sedari Village have a high level of urgency. This is in line with the public's interest in environmental programs and the high level of public awareness of the environment. A positive situation can be an opportunity for similar environmental activities to be implemented in Sedari Village so that the main problems related to abrasion can be resolved. Furthermore, similar environmental restoration activities can be one of the efforts to mitigate the climate crisis or other worse risks in Sedari Village.

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