

## Application of Solar Energy Bank as a Energy Source for Fisherman Community

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### ABSTRACT

*Lopo is one of the village in Batudaa Pantai District and the center of the community's socio-economic activities. The major source of livelihood for the people in Lopo Village is by utilizing local potential in the coastal area so that majority of the fisherman with category of living below the poverty line. Thus, a literature review was carried out to suumarize stages and processes for developing coastal economic potential and environmental management as well optimizing creative economic potential as an effort to improve quality of life for the coastal communities of Lopo Village, which includes the use of advanced materials re-charge "energy bank" was made from silicon solar panel. The results program was a form installation of solar energy bank 220 Voltage that can be used by fisherman. The society had used continuously which the product was a result by this program. This tool is very useful for fishing activities at sea at night because it is a lighting tool to replace the flashlights that fishermen have been using.*

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## **INTRODUCTION**

Lopo Village is one of the villages in Batudaa Pantai District, Gorontalo Regency. This village is about 12 km from the provincial capital of Gorontalo. In addition, this village is located 2,5 km from campus IV, State University of Gorontalo. The majority of the villagers work as fisherman. Based on BPS data for 2019, population of Gorontalo Regency is 141.915 people with population growth rate is 2,14% per year. Batudaa Pantai District has the highest population growth rate among all the existing District, namely 2,63% per year (Supu et al., 2023). Development is defined ability related to what can be done and owned to improve the quality of life. The word of development is synonymous with the desire to improve conditions accompanied by the ability to make it happen. So it can be concluded that development is a process of changing limited potential so as to create new potential to improve the welfare of life in an area. Regional development is an effort to build and develop an area based on a spatial approach by considering aspects of socio-culture, economy, physical environment and institutions within an integrated development planning and management framework. Thus, social development in regional autonomy gave a participation chance for society in developing and reaching for sustainable goals (Pratiwi & Susiyanto, 2021).

One area, has considerable potential for regional development, is coastal and marine areas. Coastal areas have various natural resources, both renewable and non-renewable resources. In addition, this area also has excellent accessibility for various economic activities, such as transportation, ports, industry, settlements, and tourism. However, the development of coastal areas must pay attention to the balance between level of development and carrying capacity of the environment as well as the balance of development between regions. Regional development must be an effort to grow economy of regional and local, so that the region can grow and develop independently by utilizing local resources. This regional development strategy that relies on local resources is known as the concept of local economic development.

One of the economic indicators needed to measure the performance of a region's economic growth is need to determine the basis (leading) sector to give influence that has a role in a regional economy, so that progress and decline of this sector will have an impact on the regional economy. The basis theory is basic for determining the basis sector used to determine the potential or role of a leading sector in the regional economy and the effects it has. An increase base sector activity in an area will increase the income of a region due to an increase in demand for goods/services in an area (Citra, 2017). Approximately 70% of ocean covered the world, and the aquatic resources to develop electrical energy have great potential (Kumar et al., 2015).

Indonesia, a country where most of its territory, is water territory. Indonesia is referred to as the Maritime Country. Indonesia is also a country with the largest number of islands in the world, there are around 17,000 islands. This condition brings its own advantages for Indonesia. The coastal area is almost always the main attraction and is always used as a marine tourism area. In addition, many natural resources are produced from the sea. If seen from this perspective, Indonesia is a very rich country, especially for people who live in coastal areas (Nanang Martono, 2016). Indonesia was a world second longest coastline and most of the population of Indonesia is the fifth largest in the world consist of about 220 million people and approximately 60 percent of them live in coastal areas (Brotosusilo et al., 2016).

Based on the results of a direct survey at the location, information was obtained that precisely in February 2023, Batudaa Pantai District was one of several sub-districts in Gorontalo Regency where most of the people had their livelihood as fisherman. However, in carrying out their activities, fisherman are still limited in fishing technology. So that efforts to be made, one of which is saving energy in charging and re-charging small boat lighting devices such as "ketinting" and other energy needs. The level of education in this village has also increased (Febriani et al., 2019) (Djarmiko et al., 2022)

This was supported by increased economic growth compared to the previous year. However, there are still villagers whose lives on below the poverty line and do not know the importance of going to school. This greatly affects the insight and awareness of the community about managing marine products and even marine debris into items of high value to support the economy.

From this description, we take topic at service activity about "utilization of solar energy bank as a source of creaiive energy for fisherman in lopo village society" One of the manifestations of a good environment is the availability of a good environmental management system to boost the community's economy" as a focal point for making a Solar Energy Bank (saving energy) using advanced materials. The role of the village community in environmental management is very important, so that in this activity a fishing community empowerment system was carried out (Purwanto, 2020). This group will carry out management techniques starting from the creation of an energy bank to the product maintenance techniques that are produced. This is done to create an energy independent village, a creative community and improve the economy, as well as increase awareness for all elements of the Lopo Village people.

LITERATURE REVIEW

Theoretical studies related to community development carried out are as follows:

Activity Stages	Activity Outputs
<ul style="list-style-type: none"> <li>Conducting surveys and observations of the need for electrical energy for fishermen</li> </ul>	<ul style="list-style-type: none"> <li>Data about number of people working as fisherman and the needs of fisher to doing activity</li> </ul>
<ul style="list-style-type: none"> <li>Conducting discussions with fishing communities regarding work programs for creating solar energy banks.</li> </ul>	<ul style="list-style-type: none"> <li>Design of the Solar Energy Bank and distribution of jobs between service teams, village officials and the community.</li> </ul>
<ul style="list-style-type: none"> <li>Penyiapan alat dan bahan pembuatan bank energi surya</li> </ul>	<ul style="list-style-type: none"> <li>Tersedianya alat dan bahan yang pembuatan bank energi surya.</li> </ul>
<ul style="list-style-type: none"> <li>Coordinating with the Lopo village community about the installation location and management of the solar energy bank</li> </ul>	<ul style="list-style-type: none"> <li>The location for the management of the Solar Energy Bank which has been determined by the Lopo Village apparatus</li> </ul>
<ul style="list-style-type: none"> <li>Perancangan dan pemasangan bank energi surya Bersama dengan masyarakat.</li> </ul>	<ul style="list-style-type: none"> <li>Energy Bank that has been properly installed and installed based on a jointly determined location.</li> </ul>
<ul style="list-style-type: none"> <li>Training on the use and maintenance of the Solar Energy Bank to work together with fishing communities</li> </ul>	<ul style="list-style-type: none"> <li>The maintenance schedule is carried out by the community on a regular basis and has been determined by Lopo Village officials</li> </ul>

## **MATERIAL AND METHOD**

Preliminary information was obtained the results of a survey conducted by the community service team, there are community groups who work as fisherman and become object of this activity. This village group will be involved as participants in activities to increase the creative economy in Lopo Village, with a total of 30 members involved in the activity. The method steps carried out in this activity are as follows:

### **A. Preliminary Survey and Preparation**

At the first stage, the team conducted an initial survey in Lopo Village and prepared all the tools and materials needed in carrying out activities based on the types and topics of activities that had been planned.

### **B. Socialization to the Community**

At this stage, the team was socializing with the Lopo Village community regarding the importance of using advanced materials to facilitate the activities of the community who work as fisher. This activity took place in the Lopo Village Office Meeting Hall.

### **C. Observation and Preliminary Data on Site Conditions**

At this stage, data collection and retrieval of solar intensity is carried out using secondary data and directly observing the installation site so as to produce maximum output.

### **D. Preparation of Solar Energy Bank Installation**

At this stage, training and techniques for assembling the required components are carried out. Furthermore, the installation will be carried out by the team based on initial observation data and possible locations to produce maximum output

### **E. Implementation of Solar Energy Bank**

At this stage, the community service team and assisted by Lopo Village officials conducted trials of the installed tools.

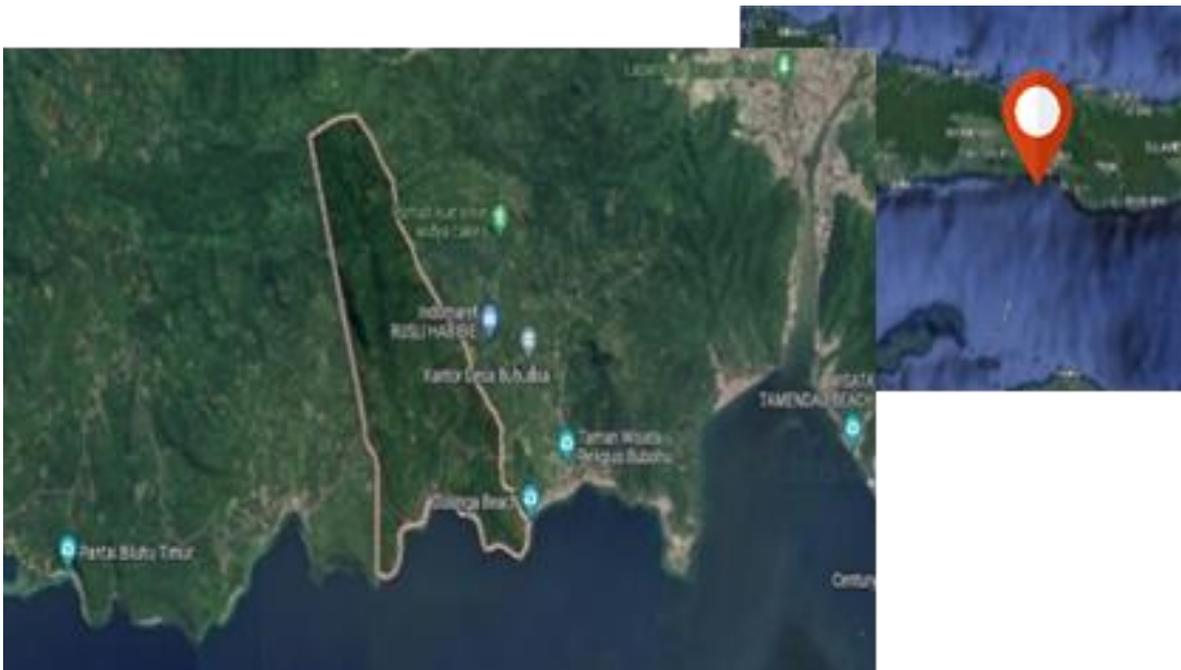
### **F. Training of Solar Energy Bank Maintenance**

At this stage, training and procedures are carried out in carrying out the maintenance of the Solar Energy Bank so that the performance of the solar panels remains optimal and protected from dirt.

## RESULT AND DISCUSSION

Based on the results of the initial observations, Lopo Village is a located on the southern coast of the Batudaa Pantai District, Gorontalo Province and is one of the areas in Tomini Bay, the area of this Lopo village is approximately 160 Ha with a population of 965 people (Figure 1). The location of the village which is on the coast makes this village has its own charm in the field of marine tourism. As a village located on the coast, the community's biggest livelihood is fishing.

Therefore, in Lopo Village, where the majority of their livelihoods are fisherman, there are several problems in supporting their activities to catch fish. One of these problems is the lack of provision of lights that can be used by fisherman.



**Figure 1.**

Map of Lopo Village, Batudaa Pantai District, Gorontalo Province  
(<https://www.google.com/maps/place/Lopo>)

The most needed in this initial survey is the willingness of village and community officials to collaborate with the activity team in accommodating the availability of lighting (lamps) used by fishermen to carry out fishing activities. In addition, initial data collection was carried out on the types of community groups and the number of their members who would be directly involved as training participants in community service activities.

### Outreach to Society

In this activity, the community service team socialized fishermen about the importance of using advanced materials to support the fishing profession. The community is given education about the potential beneficiaries of renewable energy, especially solar energy based on solar panels. The aim at this stage is to introduce the potential of solar energy for people living in coastal areas as well as introducing the scheme and design of the Solar Energy Bank to the people of Lopo Village. The presentation of the material was explained directly by the service activities team and received feedback from the participants. The socialization took place in the Lopo Village Office Hall.

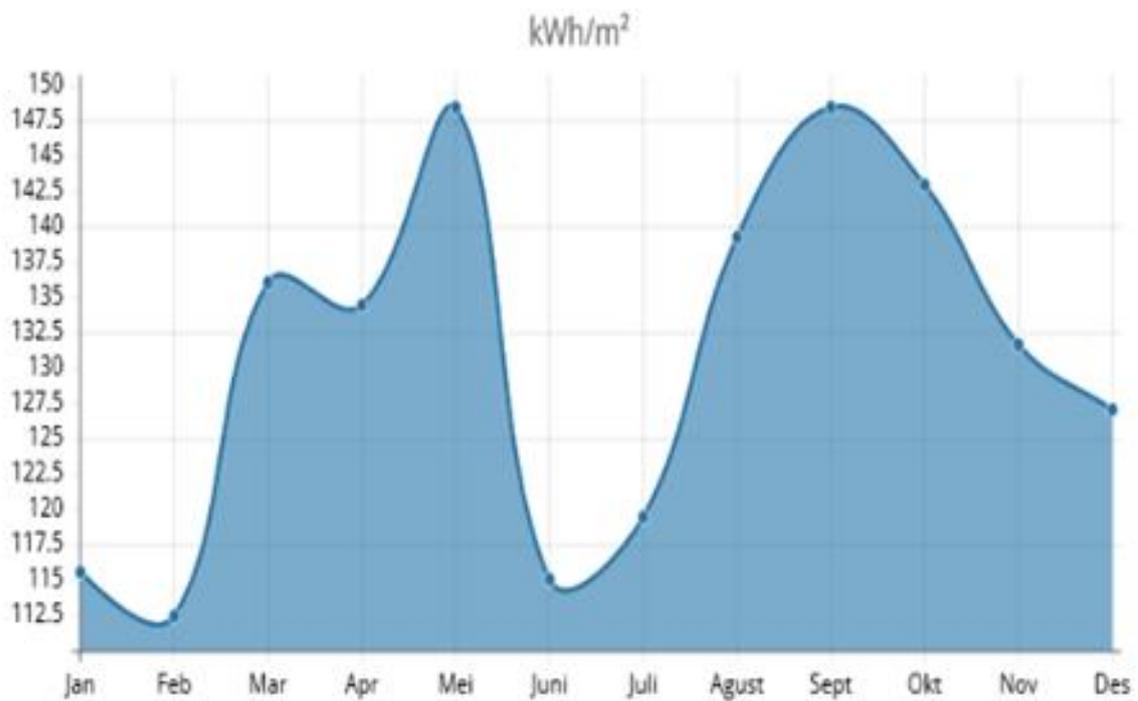
### Observations and Initial Data on Site Conditions

In this activity, the service team went directly to the field to collect solar intensity data at several points. Solar intensity data for Lopo Village can also be obtained using secondary data through the website <https://globalsolatlas.info/> as shown in figure 2 below. In addition, the service team accompanied by village and community officials held discussions regarding strategic locations for solar panel installation locations and determining the location of the battery and the required cable measurements

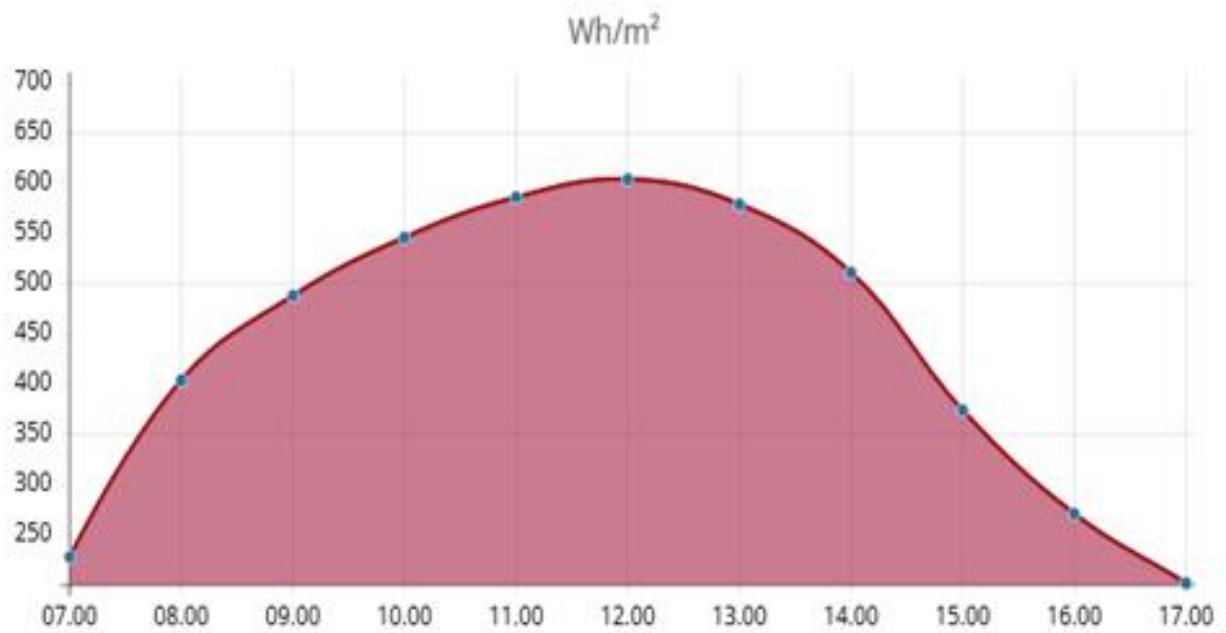


Figure 2.

Map of Solar Radiation Intensity in Lopo Village



**Figure 3.**  
Average Monthly Solar Radiation Intensity in Lopo Village



**Figure 4.**  
Average Hourly Solar Radiation Intensity in May 2023 in Lopo Village

The results of data collection in Figure 3 and Figure 4 show the suitability of using solar panels as a renewable energy source in Lopo Village. In addition to collecting data on solar radiation intensity, the service team also observed the needs of fishing communities for energy needs to help community fishing activities. Observations were made in the form of interviews and filling out questionnaires which were then analyzed to become the basis for determining the characteristics of the solar panels to be installed.

### **Preparation of Solar Energy Bank Installation**

The next stage is the installation of a Solar Energy Bank based on solar panels. In this activity, the community service team prepared for the installation of the Solar Energy Bank accompanied by Lopo Village officials and the community. Installation begins with the preparation of the tools and materials needed. In the installation process, there are several main components used, including a 100 wp solar panel, a 10 Ampere solar charger controller, a 12 volt 100 Ah battery, a 5 volt DC lamp and a connecting cable (Purwanto, 2020) (Nagel & Sinaga, 2021). The Solar Energy Bank installation is carried out through the stages of installing solar panels, installing batteries, installing box controllers and installing battery charging devices (Rachmanita et al., 2021) as shown in figure 5.



**Figure 5.**

Solar Energy Bank installation process for fishing communities

### Implementation of Solar Energy Bank

At this stage, the community service team accompanied by Lopo Village officials conducted trials of the installed tools. The community charges the battery which is used as a lighting device when fishing in the sea. In principle, solar panels will harvest energy from the sun which is then used to charge the battery through the controller. The results of charging the battery are then used by the community for electricity needs when going out to sea at night (Jody et al., 2021)

### Training of Solar Energy Bank Maintenance

At this stage, the service team provides training to fisherman in Lopo village regarding the components and techniques for assembling the components needed. The discussion process took place to understand the community about the importance of skills on installing a Solar Energy Bank as shown in figure 6. The community took the initiative to bring the batteries that have been used so far to be able to conduct trials of the Solar Energy Bank. The next material is the maintenance procedure for the Solar Energy Bank. To get maximum solar panel performance, solar panels must be protected from dirt. Dust or dirt can block sunlight. Training on how to maintain the Solar Energy Bank system components as well as maintenance and use of appropriate cables.



**Figure 6.**

Presentation and training on how to maintain the Solar Energy Bank for fisherman farmers in Lopo Village.

In the implementation of training and mentoring, giving directions by demonstrating related procedures for caring for solar panels which include cleaning solar panels using a cloth and water or doused with water, providing directions regarding pruning trees if they block the entry of solar radiation. When light intensity decreases, the number of photons per second that penetrate the cell will also decrease. Therefore, an understanding of the importance of maintaining solar panels so that their performance remains optimal.

## **CONCLUSION AND SUGGESTION**

Socialization about maintenance and how to use tools was very important. Before used the solar panel as “re-charge energy bank”, user have understood of tools working principle to make it easier to use. It can provide education to the public about awareness of the importance of using advanced materials to assist fishermen in catching fish in the sea. In addition, providing insight to the public on how to care for the Solar Energy Bank so that its use can be sustainable and shared between Lopo Village community. Thus, through this community service activity and the existence of this tool, it is hoped that it can become a superior and competitive source of the creative economy of the people of Lopo Village.

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