REVITALIZATION OF THE MANGROVE AREA ON THE COASTAL COAST OF LOBUK VILLAGE

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ABSTRACT

Coastal areas that have an essential role in developing the environmental sector and improving air quality in Sumenep Regency are coastlines with mangroves as the primary vegetation in the coastal ecosystem. There are currently many problems directly related to coastal conditions in mangrove forests. Several villages in the district have mangrove vegetation that is not maintained, and in certain parts, it can even be said that the mangrove vegetation in these areas is seriously damaged. This can be seen from the absence of vegetation/mangrove species that grow well, including the coast in Lobuk Village and Bluto District. So, efforts to preserve mangrove forests are significant to carry out. Community service activities with the theme of revitalizing the mangrove area on the coast of Lobuk Village, Bluto District, aim to restore the primary function of the mangrove forest along the coast of Lobuk Village by maintaining mangrove plants as an effort to improve the ecosystem and mangrove vegetation and reduce the impact of coastal erosion. The activities include site inspection, outreach, training, planting and monitoring of planting results. The results obtained in the mangrove area revitalization activities on the coast of Lobuk Village, Bluto District, based on the third monitoring activity, recorded that 50.67% of the success of mangrove growth was in the pretty good growth category, increase in the Rhizhopora stylosa species was 51.66% in the fairly good growth category, species Ceriops decandra was 48% in the pretty good growth category, the Bruguera gymnorrhiza species was 40% in the reasonably good growth category and growth in the Sonneratia alba species was 63% in the excellent growth category.

Keywords: Revitalization Mangrove, Coastal, Lobuk Village

A. INTRODUCTION

Sumenep Regency is located at the eastern tip of the island of Madura and has an area of land area of 1,146.9 km2, islands of 946.5 km2, total area of 2,093.4 km2, water area of ±50,000 km2, and beach length of 577.7 km. Based on these data, it is unsurprising that Sumenep Regency has enormous potential for natural resource wealth (Hardiansyah & Mas'odi, 2022). Among the possibilities that can be developed in the Sumenep Regency is the coast, which is the main asset that can be set in the Semenep Regency (Suyanto, Sotyania, Wardhiyono, & Hendri, 2017).

One of the coastal ecosystems that has a vital role in developing the environmental sector and improving air quality in Sumenep Regency is the

mangrove/mangrove coastline, the area's primary vegetation. Mangroves have a vital ecological function for various types of marine animals to depend on for their lives, including as a natural place for fish, crabs, shrimp and shellfish to breed and a place for raising offspring (Irawan, Esthi, & Sari, 2023). Apart from these animals, it is a permanent or temporary residence for land animals, including birds, bats, monkeys, langurs, cats and galanga (Hardiansyah & Wahdian, 2023). Other animals, including groups of amphibians (frogs) and reptiles (caterpillars, monitor lizards, crocodiles), are closely related to the mangrove ecosystem (Limi et al., 2022).

The enormous benefits of the existence of mangroves also directly or indirectly impact society (Aye & Takeda, 2021). For a long time, coastal communities have used particular parts of mangrove plants for medicine, food, building materials, preservatives and dyes for fishing nets commonly used by fishermen (Junianto, Sugianto, & Basri, 2023). The mangrove ecosystem can also protect the coast from waves and wind. Apart from playing a role in maintaining coastal ecosystems, mangroves also play a role in helping improve air quality by producing oxygen through the process of photosynthesis (Irawan, Esthi, & Novitasari, 2023). Mangroves can absorb four times more carbon than tropical rainforests (KASKOYO et al., 2023).

Based on facts obtained in the field, national data that the mangrove area in Sumenep Regency, with an area of 1,176.56 Ha, consists of forests in good condition covering an area of 176.49 Ha, heavily damaged requirements covering an area of 764.77 Ha, and slightly damaged areas covering an area of 235.31 Ha (Nugroho, Suryanti, & Purnomo, 2020). In simple terms, damage that occurs both mildly and seriously has a significant impact and influence on the quality of the environment in coastal areas (Sambodo, Budiastuti, Setyono, & Sudarwanto, 2021). This aligns with the facts in the field; many problems are directly related to coastal conditions in several villages in the Sumenep district, which do not support the growth of mangrove vegetation, an essential element in maintaining the ecosystem (Dewi & Suriani, 2022).

The damage to coastal conditions is caused by a lack of knowledge among residents in maintaining and preserving ecosystems in coastal areas (Hilmi, Usman, & Iqbal, 2023). So, activities that should be carried out to reduce the process of destroying the mangrove ecosystem (including planting mangroves) are not/rarely carried out. In some facts, people tend not to care too much about the development and growth of mangroves in the surrounding coastal areas (Reis-Neto, Meireles, & Cunha-Lignon, 2019). This causes a tendency for changes in the function of mangrove land to become pond land, housing, and industry and is also not maintained for various reasons and interests to maintain the stability of the existing mangrove ecosystem (Lahjie, Ruchaemi, & Simorangkir, 2015).

Considering the significant losses due to the loss/damage of mangroves, it is essential to develop activities to revitalize mangrove areas; this process includes rehabilitation and conservation activities in ecosystems affected by damage to mangrove vegetation, both natural and caused by humans (Arifin, Rasyid, Jamaluddin, Setyo, & Armansyah, 2019). So, based on the existing problems, activities were carried out to revitalize the mangrove area in efforts to maintain, repair and preserve through mangrove area revitalization activities in Lobuk Village, Bluto District.

B. RESEARCH METHOD

Field supervisors and KKN students carry out the problem identification stage. The initial activities of the lecturers were conducting interviews and preliminary surveys and confirming locations in coastal areas in Lobuk village, Bluto District. In this stage, we look for the community's problems, including the felling of mangrove forests to be converted into housing land and erosion at river mouths/coasts in Lobuk Village, Bluto District. From the various solutions obtained, the main line can be drawn that a possible solution to be implemented in the existing cases and problems is by carrying out revitalization activities on the mangrove coast in Lobuk Village, Bluto District.

At this stage, the mangrove revitalization process is carried out to plant mangroves and care for mangrove plants on the coast of

Lobuk Village, Bluto District. In the initial stage, a briefing was carried out to Lobuk Village KKN student participants and Lobuk Village officials regarding the locations of the implementation of the revitalization activities that would be carried out. The material provided is about procedures for planting and caring for mangroves.

Abiotic factors are measured by observing and measuring environmental factors found in coastal locations. Observation and measurement of abiotic factors using several ecological measuring instruments. Namely: anemometer, lux meter, PH meter, and soil sample examination.

Identification of mangroves based on the results of abiotic factor mapping can be carried out using an assessment of appropriate reference sources. Several reference sources relate to the analysis of mangrove vegetation in Indonesia. Reference sources focus on electronic books and guidebooks about mangroves.

This stage begins with intercommunity and KKN students' producing the environment by the communitarians and carrying out plal essential points related to the planting process: 1. Depends on the readiness of the seeds, does not depend on the season, 2. Things that should be avoided are planting when the wind and waves are strong, 3. The seeds planted must be given bamboo for support, 4. The planting distance is adjusted to the purpose. If for production purposes, the planting distance is closer (2x1 meter), for conservation activities, 1x1 meter.

Special planting: this method is carried out in coastal conditions/mangrove forests that are hit by rather large waves. After the material provision activities were carried out, the participants and the community went straight to the planting location, bringing mangrove seeds which had previously been prepared and taken by the participants at the mangrove planting and nursery place in Kebun Dadap Timur Village, located to the north of the estuary. Big river in Saronggi District.

After planting is complete, a monitoring and replanting process is sometimes carried out. This activity is carried out to ensure that the mangroves planted are maintained and well maintained.

Reflecting on the long-term goals service implementers want to achieve,

efforts are needed to initiate and spearhead the community to maintain, repair, and care for the coast. At this stage, the community service implementer will start forming a community group that cares about the coastal environment, which will carry out the task of protecting and caring for the coastal environment, especially in the growth of mangroves.

At this point, mangrove planting and maintenance activity participants have their results evaluated. Further input and improvements can be made at this stage. Data gathering from training activities involving the planting and upkeep of mangrove plants provides evaluation. Data was taken during activities delivered using lecture and practice methods.

In this final stage, the field supervisor plans to create a research journal, considering several measurements of abiotic factors as the basis for selecting suitable vegetation for planting mangroves in the existing environment in Lobuk village, Bluto district. With this data, the field supervisor can choose a journal-title that is appropriate to the data results that will be obtained, namely: Measurement of abiotic parameters to determine speciation in mangrove vegetation in Lobuk, Bluto District, so that with one of the outputs in the form of a research journal, these results are expected. It can be used as a learning resource for students, the community and all parties who have an essential role in mangrove conservation.

C. FINDINGS AND DISCUSSION

The location survey was conducted to find problems in coastal areas and perform a location analysis of the suitability of the mangrove species to be planted. Before planting seeds in the field, several activities must be carried out so that the plants planted have a high chance of growing mangrove seedlings in the field. Based on the location analysis, several problems were found, namely that the coastal area in Lobuk Village has very minimal mangrove vegetation, so in the growth category, it can be said to be poor because there are many spots and parts of the coast that are not covered with mangroves at all.

The substrate and coastal conditions are sandy soil filled with coral, which makes it very difficult to plant certain species of mangroves. So through this initial analysis, the

mangrove species that are suitable for these conditions (according to the literature) are determined, namely Rhizophora stylosa, Xenoratia alba, Ceriops decandra/tagal, and Bruguera gymnorriza (Hardiansyah, AR, & Hidayatillah, 2022). The determination of the species above for mangrove planting was carried out in the coastal area of Lobuk Village, Bluto District, taking into account the terrain and location conditions with the highest and lowest tides as measured from the most down tide line towards the beach with a width of more than 5 metres, which is influenced by seawater.

Implementing this activity is one of the efforts in coastal revitalization activities to improve the quality of the environment as a place for mangroves to grow. It is hoped that implementing efforts to clean up the coast from rubbish will reduce the pollution level in the soil, which can reduce soil fertility as a growing medium for mangroves.

Planting depends on the fruit's readiness (propagules), not the season. Things that should be avoided include planting during strong winds and waves. But if this has to be done, the planted seeds must be given bamboo for support. The planting distance is adjusted to the purpose. If, for production purposes, the planting distance is closer (2x1 metre), for conservation activities, it is 1x1 metre. Special planting: this method is carried out in coastal conditions or mangrove forests that are hit by rather large waves. The first way is to use bamboo stakes. The type planted is Rhizophora. Plant the bamboo 50 cm deep, then tie the seeds to the prepared bamboo stakes.

Planting is still carried out using mangrove fruit, using two additional species different from the previous planting implementation. The species used were Ceriops decandra/tagal, with a total number of seeds/fruit of 100 propagules/fruit, and Bruguera gymnorriza, with an unlimited number of sources/fruit of 40 propagules/fruit. Meanwhile, 20 Rhizophora stylosa species were used to replant (replace) previously planted seeds that experienced death or failure to grow.

The species mentioned above are based on supporting literature studies, namely Ceriops sp. It is very suitable to be planted in sandy media and has a coral structure as a water base. This type of species, especially Ceriops decandra, is still relatively difficult to find in the Sumenep area, so

the propanol fruit was ordered from one of the residents in Saronggi village who lives near the area directly bordering the mangrove forest.

Meanwhile, Bruguera can survive in a high salinity range, identical to the salinity conditions found on the coast. Apart from planting the two species above, small quantities of the Rhozophora stylosa species were also produced to carry out and maintain follow-up monitoring activities, which were also carried out 1 day before (will be discussed at the first stage of planting monitoring points).

Post-planting plant maintenance activity is focused on recording and evaluating planting results. Monitoring is carried out until the plants planted show good adaptation to the area where they are produced, including the characteristics of plants that have adapted, namely being able to grow well within a specific time (in 3 monitoring activities with an estimated time of 5 months) and showing signs of growth and development that is suitable for the leaves and are not attacked by pests. In the initial monitoring process, seedling growth can be checked. The growth data collection process was carried out to determine the continued growth percentage after planting stages 1–3. From the results of existing data collection, we can find further prospects for implementation and use it as data for future planting.

The results of monitoring the Rhizhopora stylosa species from a total of 120 plants planted showed that the number of seeds that successfully grew and survived was 62. With a success percentage of 51.66%, this latest data collection result is more significant than the previous data collection process, namely 50.5% (in the second monitoring). This is probably because the data collection process in the third monitoring stage was more thorough than the previous data collection. So, the results of calculating the number of seeds that grow have a percentage of 51.66%. After the follow-up data collection process and comparison of the effects of seed counting, it was found that 4 seedlings in 2 separate locations had not been counted in stage 2 monitoring. With the final calculation, a percentage of 54.1% in stage 2 monitoring had decreased to 51.66% in the planting of the Rhizhophora stylosa species, with a pretty good planting category. The decline in

growth percentage is still relatively small, with three tree seedlings dying. From the observations, it was found that seeds planted close to the shoreline were successful in surviving.

Based on observations, the growth of Rhizhopora sp. can be identified as having sufficient tub growth; the plant with the highest number of leaves has 10 leaves, and the plant with the least number of leaves has 6 leaves; this indicates that the growth of this species is not the same but is still in the tank category with a supportive substrate and salinity. In the Ceriops decandra species, out of 200 plants planted, the number of seeds that managed to grow and survive was 96. With a growth success percentage of 48%, the beginnings of leaf growth can be seen in all the seedlings. This percentage shows the success rate of mangrove planting in the medium category, even though there is a decrease in the percentage of success compared to previous monitoring.

The observations on the growth of Ceriops sp. growth during the 3 months after planting showed that development and growth had increased by 2-4 leaves; this indicated an increase in growth compared to the 2nd stage of monitoring. In the Bruguera gymnorrhyza species, out of 40 plants planted, the number of seeds that managed to grow and survive was a total of 16 sources, with the percentage of success growing by 40%. This percentage shows the success rate of mangrove planting in the medium category.

In the results of the observations carried out, it was also found that there was a decrease in the percentage of growth in this species; this was because some of the seedlings that had successfully grown had their shoots broken due to the impact of waves or being entangled in plastic waste at the planting location. However, apart from the problems above, excellent growth results were obtained for this species, and the growth process for the Bruguera species experienced quite significant growth. This can be seen from the drastic increase in the number of leaves compared to other species. The average leaf growth on this plant is 8 to 12 leaves. Several factors that support and maximize this growth include suitable substrate and salinity levels that can optimize growth.

For the Sonneratia alba species, monitoring results at the location

showed a growth percentage of 63%, with the number of seeds growing being 63 out of 100 plants planted. The delay in the growth process of this species is because this species is the only one that is produced by stockpiling. However, from the results of observations carried out, growth in this species is still minimal, and the most that can be observed is only a maximum of 2 to 4 leaf growth.

In the third monitoring, plastic waste pollution was still the main factor in the growth problem, so if it were not addressed immediately, it would cause more severe damage to mangrove plants. In the case of plastic waste, which can be seen directly during the monitoring implementation, it is necessary to dispose of plastic waste entangled in mangrove seedlings. And the importance of making people aware of the need not to throw away waste or garbage carelessly. In this section, researchers and activists clean up plastic waste wrapped around the mangroves so that the mangroves can grow well and optimally.

E. CONCLUSION

The mangrove revitalization activities carried out are right on target and answer the needs of residents regarding the minimal mangrove vegetation in Lobuk Village, Bluto District. Revitalization activities started with socialization, beach cleaning, and mangrove planting and resulted in monitoring activities at several points in the coastal area of Lobuk village. Apart from that, the presence of IST Annuqayah students also makes it easier to carry out activities; the participation of village officials and the community is expected to be the spearhead of the continuation of this nation's struggle so that they can take part in the future to develop and preserve mangroves jointly.

The results obtained in the mangrove area revitalization activities on the coast of Lobuk Village, Bluto District, based on the third monitoring activity, recorded that 50.67% of the success of mangrove growth was in the pretty good growth category, an increase in the Rhizophora stylosa species was 51.66% in the reasonably good growth category, the species Ceriops decandra was 48% in the sufficiently good growth category, the Bruguera mycorrhiza species was 40% in the reasonably good growth category, and growth in the

Sonneratia alba species was 63% in the excellent growth category.

REFERENCES

Arifin, M., Rasyid, A. R., Jamaluddin, J., Setyo, D. P., & Armansyah, A. (2019). The existence of a mangrove ecosystem as nature tourism-based on global warming mitigation in Lakkang island. *IOP Conference Series: Earth and Environmental Science*, *235*(1), 12014. IOP Publishing.

Aye, W. M., & Takeda, S. (2021). Development and Abandonment of Mangrove Paddy Fields and the Impacts Thereof in a Mon Village in Taninthayi Region, Myanmar. *Southeast Asian Studies*, *10*(3), 359–390.

Dewi, A. L., & Suriani, B. T. (2022). Implementation of integrated coastal protection and management policies on the development of the Kendari bay mangrove area based on ecotourism. *International Journal of Management and Education in Human Development*, *2*(01), 85–90.

Hardiansyah, F., AR, M. M., & Hidayatillah, Y. (2022). IPAS Learning Assessment To Measure Science Process Skill In Elementary School. *International Journal of Elementary Education*, *6*(3), 612–623. https://doi.org/https://doi.org/10.23887/ijee.v6i4.54217

Hardiansyah, F., & Mas'odi, M. (2022). The Implementation Of Democratic Character Education Through Learning Of Social Science Materials Of Ethical And Cultural Diversity In Elementary School. *Journal of Innovation in Educational and Cultural Research*, *3*(2), 234–241. https://doi.org/10.46843/jiecr.v3i2.101

Hardiansyah, F., & Wahdian, A. (2023). Improving Science Learning Outcomes Through the Development of the Magic Card Box Learning Media. *AL-ISHLAH: Jurnal Pendidikan*, *15*(1), 823–833. https://doi.org/https://doi.org/10.35445/alishlah.v15i1.2711

Hilmi, E., Usman, U., & Iqbal, A. (2023). The External, Internal Factor and Ecosystem Services to Support Mangrove Rehabilitation Planning in North Coast of Jakarta. *Proceeding ICMA-SURE*, *2*(1), 186–197.

Irawan, N. C., Esthi, R. B., & Novitasari, S. (2023). The nexus between stakeholders' role, eco-empowerment, and community perceptions on mangrove ecosystem management's sustainability. *IOP Conference Series: Earth and Environmental Science*, *1260*(1), 12016. IOP Publishing.

Irawan, N. C., Esthi, R. B., & Sari, E. N. (2023). Formulating a revitalization strategy for a sustainable mangrove environment with natural and human resource management. *IOP Conference Series: Earth and Environmental Science*, *1260*(1), 12038. IOP Publishing.

Junianto, M., Sugianto, S., & Basri, H. (2023). Analysis of Changes in Mangrove Land Cover in West Langsa District, Langsa. *Jurnal Penelitian Pendidikan IPA*, *9*(3),

1155–1162.

KASKOYO, H., HARTATI, F., BAKRI, S., FEBRYANO, I. G., DEWI, B. S., & NURCAHYANI, N. (2023). Satellite based analysis of mangrove cover and density change in mangroves of Tulang Bawang District, Lampung Province, Indonesia. *Biodiversitas Journal of Biological Diversity*, *24*(5).

Lahjie, A. M., Ruchaemi, A., & Simorangkir, B. (2015). Ecological Aspect Of Non Productive Fishponds At Mahakam Delta Area: Revitalization With Silvofishery System Suwarto. *Global Journal of Agricultural Research*, *3*(1), 27–35.

Limi, M. A., Ningsih, S. R., Fyka, S. A., Syarni, P., Dewi, H. S., & Attamimi, U. (2022). Analysis of crab fisherman's household structure and livelihood strategy after the Kendari Bay revitalization. *IOP Conference Series: Earth and Environmental Science*, *1118*(1), 12075. IOP Publishing.

Nugroho, P. E. R., Suryanti, S., & Purnomo, P. W. (2020). Analysis Of Changes In Mangrove Area In The North Coast Of Central Java Province Indonesia. *Saintek Perikanan: Indonesian Journal of Fisheries Science and Technology*, *16*(3), 208–218.

Reis-Neto, A. S. dos, Meireles, A. J. de A., & Cunha-Lignon, M. (2019). Natural regeneration of the mangrove vegetation on abandoned salt ponds in Ceará, in the semi-arid region of northeastern Brazil. *Diversity*, *11*(2), 27.

Sambodo, W., Budiastuti, S., Setyono, P., & Sudarwanto, A. L. S. (2021). Political Ecology Study: Implementation of Presidential Decree Number. 52 of 1995 About the Jakarta Bay Reclamation and Revitalization. *ICHELSS: International Conference on Humanities, Education, Law, and Social Sciences*, *1*(1), 405–413.

Suyanto, E., Sotyania, W., Wardhiyono, F. X., & Hendri, R. (2017). *Social Engineering on Mangrove Preservation Based on Fishermen's Local Wisdom*. Bandung Islamic University.