STRATEGY FOR ESTABLISHING THE WORLD MANGROVE CENTER AS A CLIMATE CHANGE MITIGATION EFFORT

Hardilina[1], Dewi Suratiningsih[2]

Article History: Received: 17.03.2023 **Revised:** 03.05.2023 **Accepted:** 17.06.2023

Abstract

Global warming is one step towards climate change. This can have a huge negative impact on people around the world. Therefore, there needs to be an effort made to reduce the causes of various human-caused climate changes. One of the steps that can be taken is to make mangrove forests a solution to reduce greenhouse gas emissions. This research then aims to look at how the strategy for establishing a world mangrove center is to mitigate climate change. This research will be carried out using a descriptive qualitative approach. Research data collection was carried out by reviewing various previous scientific publications. The results of this study then found that as a coastal ecosystem, mangroves have a function to be able to control climate change and improve people's welfare. Therefore, there is a need for a strategy to be able to take advantage of this mangrove forest. Strategies that can be used include increasing the sustainability of mangrove ecosystems, coordinating with stakeholders, and working with various parties to produce and distribute processed mangrove products.

Keywords: Mangroves, SWOT Analysis, Climate Change, Strategy.

[1,2]Universitas Tanjungpura, Indonesia
Email: hardilina@fisip.untan.ac.id

DOI: 10.31838/ecb/2023.12.s3.492

1. INTRODUCTION

The issue of global warming first appeared in the early 1970s. At that time, acid rain had occurred in France, which meant air and water pollution. Global warming is the impact of the high population which causes increased exploitation of the environment and widespread changes in land use, which results in reduced forest area. In addition, industrial progress causes pollution on land, sea and air, which continues with the destruction of ozone gas at the poles or the ozone hole at the poles and concentrations of exhaust gases which become blanket gases or greenhouse gases, which cause an increase in the earth's temperature (Binet et al., 2020).

The phenomenon of increasing global temperatures from year to year is due to the greenhouse effect caused by increased emissions of gases such as carbon dioxide (CO2), methane (CH4), dinitrooxide (N2O) and CFCs so that solar energy is trapped in the earth's atmosphere. The increase in CO2 gas concentration was caused by burning fuel oil (BBM), coal and other organic fuels, which exceeded the ability of plants and the sea to absorb them (Bakır et al., 2022).

Starting from the acid rain incident in France, the Human Environment Conference was held in Stockholm in 1972. Subsequently, the Earth Summit was held in Rio de Janeiro, Brazil, in 1992. This Earth Summit agreed to the UNFCCC (United Nations Framework Convention on Climate Change) (Paglia, 2021).

The 3rd UNFCCC in 1997, held in Kyoto, Japan, produced a set of regulations called the Kyoto Protocol, which was adopted to reduce greenhouse gas (GHG) emissions. Most of the Kyoto Protocol provisions apply to developed countries (Annex I). All ANNEX I countries must reduce their GHG emissions by an average of 5.2% from the emission level in 1990. (The year 1990 was stipulated in the Kyoto Protocol as a baseline for calculating GHG emission levels). Whereas for NON-ANNEX I countries, the Kyoto Protocol does not require GHG emission reductions, but participation mechanisms for emission reductions are included in it, this principle is known as "shared responsibility with different portions" (Kawanishi & Fujikura, 2020).

In 2015, all the country's leaders gathered at the COP 21 Paris Conference. This conference is under the auspices of the UNFCCC (United Nations Framework Convention on Climate Change) Council. At this conference, the main attention was focused on world climate conditions which were feared to worsen. All country leaders discussed and negotiated to form an agreement to carry out the mission of reducing gas emissions to combat climate change. As a result, almost 195 countries agreed to a draft international agreement called the Paris Agreement (Crowley, 2021).

Contents of the Paris Agreement are as follows; first, trying to limit global temperature rise to a minimum of 1.5º Celsius and below 2º Celsius for pre-industrial levels. Second, reduce the level of greenhouse gas emissions and similar activities to minimize gas emissions and achieve the net zero or net zero emissions target. Third, all countries are required to have and set their emission reduction targets. This target will be reviewed every five years to increase climate change eradication ambitions. Fourth, developed countries assist poor countries in climate funding or financing, support the implementation of more effective renewable energy, and adapt to climate change (Barriopedro et al., 2023).

Based on the Paris Agreement, all countries that agreed to the Agreement must reduce greenhouse gas emissions to

withstand rising global temperatures. According to Carbon Brief analysis, the United States will be the largest contributor to CO2 emissions from 1850 to 2021, namely 509 billion tons or 20 percent of total global emissions. After that, China (11 percent), Russia (7 percent), Brazil (5 percent) and Indonesia (4 percent) took second place. Emissions produced by Brazil and Indonesia are due to deforestation. Therefore, Indonesia should have taken serious and ambitious steps to reduce greenhouse gas emissions (Rajamani et al., 2021).

At COP 26 in Glasgow in 2021, the President of Indonesia stated that Indonesia is currently restoring mangrove ecosystems which play an important role in absorbing and storing carbon. Mangrove forests can be a solution to reduce greenhouse gas emissions because mangrove forests can absorb carbon of more than four gigatons C/year to 112 gigatonnes C/year. The ability to absorb carbon in mangrove forests is three times greater than in tropical rainforests (Indrajaya et al., 2022).

However, global mangrove ecosystems are threatened by rising sea levels due to climate change. In the high sea level rise scenario, mangroves cannot survive until the end of the century, with the highest level of vulnerability in mangroves in the archipelago. Research data on surface elevation change (SEC) and sediment accretion rate (SAR) from all global mangrove ecosystems. These results are then compared with the sea level rise (SLR) scenario in the Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC AR5) (Mafi-Gholami et al., 2020).

In IPCC AR5, it is stated that the global average sea level is projected to rise between 0.52 and 0.98 m in 2100 in several Representative Concentration Pathway (RCP) scenarios, namely RCP 2.6 and RCP 8.5. These data show interior and fringe mangrove types can overcome the RCP 2.6 scenario for the next 100 years through sedimentation rates under normal conditions. However, for the RCP 8.5 scenario, interior mangroves can only survive until 2070, and margin mangroves only last until 2055 (Rahman et al., 2019).

Therefore, the establishment of the World Mangrove Center is the right step taken by the Indonesian government as a form effort to address climate change. Indonesia is a country that has the largest mangrove forest in the world, which is 20% of the world's mangrove area. National data says there were 3.58 million hectares in 2018. Thus, forming the World Mangrove Center is the right step taken by the government (Sasmito et al., 2023).

The establishment of World Mangrove Center is spread across several regions in Indonesia, one of which is in Kubu Raya Regency. The mangrove area in Kubu Raya Regency is recorded as the widest in West Kalimantan, 129,604.125 ha. In addition, this area also has a variety of rare flora and fauna, including Crocodile Eye Mangroves, which are only found in 4 countries, namely Singapore, Malaysia, Papua New Guinea, and Indonesia. In the mangrove forest of Kubu Raya, there are also 33 true mangrove species out of 40 true mangrove species in Indonesia (Adalina & Heryati, 2019).

Sea and coastal ecosystems are important in controlling climate change and improving people's welfare. By carrying out efforts to strengthen blue carbon ecosystems, it is also a commitment from the Government of Indonesia to protect marine and coastal ecosystems. Based on this, it is expected to contribute to handling climate change. From the data presented by the Ministry of Maritime Affairs and Fisheries, Indonesia has an important role in mitigating climate change from the aspect of blue carbon (Rifai et al., 2023). Apart from the mangrove ecosystem covering an area of 3.36 million hectares, there are also seagrass beds covering an area of 3 million hectares, which can reach 17 percent of the world's blue carbon reserves. The ability of this blue carbon is

often said to be greater than the same ability of land vegetation or green carbon (Simpson et al., 2021).

Based on the problems and potential in Indonesia related to mangrove forests. This interesting matter is the main reason for the author to examine the extent to which the strategy undertaken by the Kubu Raya Regency government in establishing the World Mangrove Center is so that it can optimally mitigate climate change.

LITERATURE REVIEW

Strategy

Wheelen and Hunger stated that strategic management is a series of managerial decisions and actions that determine the company's performance in the long term. Strategic management includes environmental monitoring, strategy formulation (strategic or long-term planning), evaluation and control (Addae-Korankye & Aryee, 2021).

According to Rangkuti, strategy is a tool to achieve goals. In its development the concept of strategy continues to develop. The concept develops from just a tool to achieve goals and then develops into a tool for creating competitive advantage, and then becomes a dynamic action to respond to internal and external forces, to a tool to provide motivational strength to stakeholders so that the company can make an optimal contribution (Zhao et al., 2022).

Chandler stated that strategy is a tool to achieve company goals regarding long-term goals, follow-up programs and resource allocation priorities. Learned explained that strategy is a tool to create competitive advantage. Thus, one strategy focus is to decide whether the business should exist or not exist. Meanwhile, Mintzberg stated that strategy is a continuous and adaptive response to external opportunities and threats and internal strengths and weaknesses that can affect the organization. Porter stated that strategy is important for achieving competitive advantage (Fuertes et al., 2020).

According to Rangkuti, strategy is an action that is incremental (always increasing) and continuous and is carried out based on the point of view of what customers expect in the future. Thus, strategic planning almost always starts from "what happened" the speed of new market innovation and changes in consumer patterns requires core competencies. Companies must look for core business competencies (Dwivedi et al., 2023).

According to David, strategy is a potential action requiring top-level management decisions and large company resources. This aligns with Hunger and Wheelen, that corporate strategy is a comprehensive planning formulation of how the company will achieve its mission and goals. According to Heizer and Render, strategy is an organization's plan to achieve its mission and goals (Filatotchev et al., 2022).

In strategic management, companies generally have three levels or three levels of strategy, namely:

a. Corporate Strategy

This strategy describes the direction of the company as a whole regarding the company's general attitude towards the direction of growth and management of various business and product lines to achieve a balanced portfolio of products and services (Reim et al., 2022).

b. Business strategy

This strategy is usually developed at the divisional level and emphasizes improving the competitive position of the company's goods or services in the industry or market segment served by the division. The implemented business strategy is usually one of the overall cost leadership strategies or differentiation (Farida & Setiawan, 2022).

c. Functional Strategy

This strategy emphasizes maximizing productivity resources. Within the

company's boundaries and the business strategy surrounding them, functional departments, such as marketing, HR, finance, and Product Operations, have strategies to collect their various activities and competencies together to improve company performance (Perifanis & Kitsios, 2023).

SWOT Analysis

Albert Humphrey initiated SWOT analysis in the 1960-1970s. This analysis is an acronym from the initial letters: Strengths, Weaknesses, Opportunity and Threat. The SWOT analysis method can be considered the most basic and useful for looking at a topic or problem from 4 different sides. The analysis results are usually directives/recommendations to maintain strengths and increase the advantages of existing opportunities while reducing deficiencies and avoiding threats. If used correctly, SWOT analysis will help us to see the sides that have been forgotten or not seen so far (Zima et al., 2020).

This analysis is descriptive and sometimes very subjective because it could be that two people who analyze an organization will have a different view of the four parts. This is reasonable because a SWOT analysis is an analysis that will provide output in the form of directions and does not provide a magical solution to a problem (Wang et al., 2021). SWOT analysis only describes the situation that occurs, not as a problem solver, so it can be interpreted as follows:

a. Strength
   Strengths are various advantages that are unique to an organization, which, if utilized, will play a major role not only in facilitating multiple activities to be carried out by the organization but also in achieving the goals that the organization has. The strength is the organization's excess in performance management (Venkatesh, 2022).
b. Weaknesses
   Weaknesses are various deficiencies that are unique to an organization which, if successfully overcome, will play a major role not only in facilitating multiple activities to be carried out by the organization but also in achieving the goals that the organization has (Sony et al., 2020).
c. Opportunity
   Opportunity is a positive opportunity an organization faces, which, if exploited, will play a large role in achieving organizational goals. Opportunity is an opportunity for the organization to improve its quality (De Silva et al., 2021).
d. Threats
   Obstacles are negative obstacles an organization faces, which, if successfully overcome, will play a major role in achieving organizational goals. A threat is a threat to the organization from outside and within (Provan et al., 2020).

Climate Change

During the last century, the temperature of the earth's surface has continued to increase ± 0.8°C, and many changes have been observed that had never happened before, even thousands of years ago. The atmosphere and oceans are getting warmer, snow and ice cover are decreasing, sea levels have been rising, and extreme events are signs the climate is changing (Von Schuckmann et al., 2020).

In a different use of the United Nations Convention on Climate Change (UNFCCC), it states that climate change refers to changes in climate that are linked directly or indirectly to human activities that change the composition of the global atmosphere. Meanwhile, according to Law 32/2009 concerning Protection and Management of the Environment, climate change is a change in climate caused directly or indirectly by human activities resulting in a change in the composition of the global atmosphere; besides that, in the

form of changes in natural climate variability observed in comparable periods (Cianconi et al., 2020). Climate change can be identified from several changes in climate elements, such as rising air temperatures, melting ice caps, changes in rainfall, and rising sea levels. According to the IPCC, the impacts of the current extreme climate include fast on-set events in the form of increased excessive rain, storm surges, tropical cyclones, and slow on-set events such as sea level rise; rising temperatures, ocean acidification, salinization, forest and land degradation, loss of biodiversity (Friess et al., 2022).

According to the World Geometerological Organization (WGO), the impact of climate change has been consistently seen on a global scale since the 1980s with increasing global air temperatures, both above ground and at sea level, rising sea levels, and melting ice. This has increased the risk of extreme events such as heatwaves, droughts, heavy rainfall and devastating floods (Rozzi et al., 2023).

2. METHOD

The research approach used in this study is a qualitative descriptive approach. Qualitative descriptive research aims to gain a general understanding of social reality, which is the research focus. This broad understanding comes from the participant's perspective, not predetermined by the researcher. Then, an analysis and deepening of these social realities is carried out, and a conclusion is drawn in the form of a general understanding of these realities. Collecting data from library research activities is to review the results of previous research in the form of scientific publications.

3. RESULT AND DISCUSSION

Mangrove Potential in Climate Change Adaptation and Mitigation

The increase in the temperature of the earth's surface, which is the result of the greenhouse gas effect, directly impacts the lives of all living things. Global warming is due to an increase in the average temperature of the earth's surface due to the effects of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or deforestation. Carbon dioxide produced from various human activities has the property of absorbing infrared radiation. The continuous increase makes the radiation emitted cannot be released into space and trapped on earth. This trapped radiation is known as the greenhouse effect and increases the earth's surface temperature, which triggers climate change. The threat of natural disasters is an important thing that must be anticipated as a real result of climate change.

Climate change also causes extreme weather and causes natural disasters. For example, severe weather during the rainy season causes continuous rain accompanied by strong winds and causes flooding. Meanwhile, other areas experienced a prolonged dry season that dried up rice fields, fields and community water sources. This shows that global warming, which triggers climate change on earth, will also change the rainy season interval, which is longer than the dry season and vice versa. In addition, the change of seasons is also difficult to predict because it can occur more than once a year. The short-term potential due to climate change is catastrophic, threatening the continuity and prosperity of all countries and the entire world's population. Meanwhile, the long-term potential due to climate change is a change in ecosystems, including an increase in sea surface volume, thereby affecting life in coastal areas and melting ice in the Northern Hemisphere, causing some flora and fauna populations to decrease.

Some of the serious problems that will be faced by humans from climate change are constraints on sea, land and air

transportation due to bad weather, disruption of planting and harvesting processes in agriculture due to climate imbalances, the threat of natural disasters such as floods, landslides and storms, the increase in the number of refugees due to natural disasters which has an impact on dividing a person with their socio-cultural roots, and triggering conflicts between parties due to food and resource crises.

Climate change does not only affect human life but also affects other living things, such as animals and plants. These impacts can take the form of extreme droughts that cause plants to lack water and wither, the extinction of several species of plants and animals, and fragmentation of ecosystems, such as the loss of color of coral reefs due to exposure to too hot sunlight. This is an important concern considering the various impacts arising from climate change will have a domino effect on the survival of living things on earth.

Mangrove ecosystems can be the main key to reducing climate change risk. Mangrove ecosystems have enormous mitigation potential to address disasters caused by climate change. Judging from various ecological, economic, and social aspects, mangrove ecosystems have great potential in adaptation and mitigation of climate change not only as a barrier to coastal abrasion. Mangrove forests are ecosystems with extreme physical factors, such as waterlogged habitats with high salinity on beaches and rivers with muddy soil conditions. This ecosystem is physically responsible for maintaining coastal stability, absorbing pollutants, and bird habitats. The mangrove ecosystem area is also a place where there is a combination of types of muddy soil and land formed by vegetation which slowly turns into a semi-land area. In addition, the biological function of mangroves is as a habitat for marine biota, which has economic value.

As with other forest ecosystems, mangrove ecosystems absorb carbon dioxide and air pollution. Referring to the results of the sixth assessment report from the IPCC working group I, the current state of world temperature can exceed 1.5 degrees C within two decades. The climate science agency said the current disaster would likely worsen over time, supported by the current development of fossil fuel industries, such as the increasingly uncontrolled use of oil and coal. Apart from that, various forest land conversion activities and forest burning are the main factors contributing to carbon and air pollution. Mangrove ecosystems can minimize the effects of natural disasters that result from extreme climate change. The key role of mangroves is as the world's lungs through their ability to absorb and store carbon.

Strength Analysis

Mangrove forest ecosystems are natural resources that provide many benefits for humans due to their high productivity and their ability to protect the land from abrasion and seawater intrusion, produce nutrients that can fertilize seawater, assist in the circulation of carbon, nitrogen and sulfur, and waters rich in nutrients, both organic and inorganic nutrients. In addition, the ability of mangrove forests to capture (store and release) carbon makes mangroves very useful for the global community in climate change mitigation efforts. Kubu Raya has tremendous potential in mangrove development, so it can be a consideration and reference for the future in determining the direction of policy to be taken (Turisno et al., 2021).

Based on information obtained through the Regional Development Planning Agency of Kubu Raya Regency, the Kubu Raya area has a very wide mangrove landscape, and there is also the potential for complete mangrove species, including rare mangroves. In addition, this area also has easy accessibility to reach. The condition of the Kubu Raya

community itself is considered a conducive and minimal conflict. Currently, electricity is also available in the Batu Ampar area, which has a large mangrove potential. Based on an interview with Mr Fairus Mulia, a mangrove expert from West Kalimantan, he stated that the condition of mangroves in Kubu Raya Regency is very good and has various types of mangroves. What's more, in the village of Tanjung Harapan (Padang Tikar), a Berus Mata Buaya mangrove (a kind of Bruguiera mangrove) is found, where this type of mangrove is very rare, and there are only 300 trees worldwide. Of course, this type of mangrove with crocodile eyes is an advantage of mangroves in Kubu Raya Regency. He also added that the mangroves in West Kalimantan Province grew twice as fast as in the Provinces of Bali, NTT and NTB. This is because the Provinces of Bali, NTT and NTB have a lot of sand, while the Province of West Kalimantan has a lot of mud.

In addition, based on interviews conducted with the Kubu Raya KPH as the implementing party for operational, technical activities and activities in the field of forest management in the Kubu Raya area, the area of mangrove forests in West Kalimantan is approximately 177,023.738 ha; 73.21% of the area (129,604.125 ha) is in Kab. Kubu Raya. The most common type of mangrove in Kab. Kubu Raya is Rhizopora sp, Sonneratia spp, Avicennia sp, Ceriops spp, and Bruguiera spp (the most numerous species). The Batu Ampar area also has several rare mangroves, such as Crocodile Eye Berus, Gedabu, Terumtum, and Dungun.

The government has also supported mangrove conservation in both regional and central Kubu Raya Regency, which focuses on mangrove conservation. In addition, the community around the mangrove area is also given space to be directly involved through the Village Forest Management Institution (LPHD). One of them is the LPHD in Tanjung Harapan Village, Padang Tikar, Kab. Kubu Raya, the community protects the area's mangrove forest so that there is little possibility of damage due to community activities. Mangroves in the Padang Tikar Coastal Range, Regency store ±8,707,155.64 tons of C carbon (169.54 tons C/hectare). Also, the ability of the Padang Tikar Coastal Landscape mangrove forest to absorb CO2 in the atmosphere is 31,955,261 tons CO2 ha-1 eq.

The mangrove area is being preserved in Dabong Village, Kubu Raya Regency, with an area of mangroves in this village of approximately 2,522 Ha. The condition of the mangroves in this area is quite good, so they have succeeded in reducing the impact of high waves, namely as a barrier to waves and protection so they don't come ashore. Many mangroves in Kubu Raya Regency have mangrove forests that are still natural and very good so that when they receive more attention, the mangroves can survive, and their planting area and species are increased.

Thus, Kubu Raya Regency has great potential to become the world's center of mangroves and spearhead climate change mitigation. In addition, both the local government and the central government have implemented programs that are not only in the form of preservation but also support the economy of the residents around the mangrove area.

Weakness Analysis

The weakness referred to in this study is the obstacles in the Kubu Raya area in managing and preserving its mangrove ecosystem. Based on information obtained from interviews with KPH Kubu Raya, several areas still need rehabilitation due to community activities, especially in the Batu Ampar area, which uses mangroves as charcoal wood. Mangrove charcoal is still the main challenge for FMUs to empower local communities. Many people cutting down mangroves illegally will threaten mangrove plants.

Apart from that, another weakness that is still an obstacle for KPH Kubu Raya is related to the budget and lack of personnel, so it is necessary to collaborate with other parties. Another drawback is that there is no clear and inappropriate zoning, which often hinders program implementation. Therefore, there is a need for education related to mangrove zoning. It is necessary to carry out an initial identification which includes identifying the location, identifying the types of plants that grow in the vicinity, and identifying the planting site, which will increase the success rate.

Regarding the conditions in several mangrove areas in several mangrove areas in the Kubu Raya Regency, there is still damage due to abrasion and other factors, such as the condition of the mangroves, which is influenced by the age of the mangroves and natural conditions such as waves. Meanwhile, the authority of the LPHD is still very limited, so support from the government is needed to protect mangroves in the area and coastal areas, which are still experiencing abrasion due to high waves.

Efforts to improve the people's economy around mangroves are also weak due to limited capital and not yet-established business management. Several training programs from the government have been implemented, but their sustainability is still experiencing problems. For example, residents around the Kupah River have started several businesses, such as marketing for crabs, kepah, and others, constrained by marketing. In addition, limited capital and marketing constrains most food processing, such as shrimp to be used as nuggets, crackers, etc. Therefore, it is hoped that the government can open cooperation with other regional governments for product marketing (Putri et al., 2020).

Opportunity Analysis

In this case, the opportunities in question are the factors that support the Kubu Raya area becoming the world's center of mangroves. Based on interviews conducted with Bappeda Kubu Raya, mangrove management has been carried out in collaboration with various NGOs with the same concern for mangrove conservation, namely Bentang Kalimantan, Hutan Biru Foundation, Pamsimas, Generasi Pesona Indonesia Kubu Raya, and ICRAF. Partnerships established with related NGOs have also impacted the distribution of deforestation and reduced poverty. The mangrove area also has a great opportunity to be developed as a tourist spot that can attract foreign and local tourists. In addition, to support community understanding of the importance of mangroves, a policy has been implemented where learning related to mangroves and peat is part of the Local Content curriculum.

Regarding the potential of mangrove species, which should be manageable and have economic value, they have not received attention and support from the village office and government. The Manager of the Kupah River Mangrove said that Kubu Raya could create a special arboretum for mangroves in the Kubu Raya and West Kalimantan areas which do not exist in other areas. Thus, through conservation efforts, the mangroves can become jobs with nurseries and be sold to outsiders, especially West Kalimantan's geographical proximity to other countries.

The development of mangrove tourism is also a potential for Kubu Raya if it can maintain the existing mangrove ecosystem. There have been several visits from the European government to the mangrove area in Kubu Raya and expressed their admiration for the extent of the mangrove area and its natural habitat that is still preserved, such as the probosci's monkeys, monkeys and langurs in the mangrove area.

The application of sustainable tourism must also support the development of mangrove areas into tourism objects. With this application, tourists also get the education to protect the environment. One way is to minimize the use of plastic waste during visits. If this can be done seriously and continuously, sustainable tourism can also promote the welfare of the people of Kubu Raya (Purwoko et al., 2022).

Other opportunities besides sustainable tourism are silvofishery, environmental services, empowering non-timber forests, increasing community empowerment, and improving the community's economy. In addition, it will divert previously exploitative activities to switch to activities that care about the environment. Maintaining the preservation of mangroves has a positive impact on improving the local community's economy, such as increasing fishermen's catches, such as crabs. One of the parties involved in preserving mangroves is the LPHD in Tanjung Harapan Village. So far, there have been several village forest programs for mangroves in the Tanjung Harapan area, such as cultivating crabs, crabs and honey bees.

According to Mr M. Ismail, the head of the LPHD in Tanjung Harapan Village, various programs have been carried out to rehabilitate critical areas through planting and site analysis that will be developed for economic development, such as crab ponds, kelulut honey, mangrove honey, nipa flour, and mangrove syrup. Another opportunity is that in 2018 the Indonesian mangrove Mega Biodiversity was launched. The mangrove area of Tanjung Harapan Village contains 64 mangrove species, 30 association species and 34 true mangrove species.

The opportunity for preserving mangroves is to increase the community's economy. Coincidentally, there has been an enlargement of mangrove crab cultivation and ecotourism which indirectly impacts the community around the forest. Interviews conducted with KPH Kubu Raya said that the opportunity that Kubu Raya could obtain if it became the world's mangrove center was the development of tourist objects. One example of an area that has succeeded in taking advantage of opportunities from mangroves is the Kupah River area which has taken advantage of the existence of mangroves to improve the community's economy. Currently, the product that is already running is shrimp sticks and has been marketed up to 1000 pcs per month. In addition, ongoing ecotourism has successfully attracted up to 1,000 visitors to the area per month. Tourism is now being developed based on attractions, including community activities.

Carbon trading can also be a big potential in preserving mangroves. In this agenda, mangrove conservation which requires money and time, can be overcome by cooperation with developed countries in selling carbon. So, in addition to getting benefits by preserving and protecting the mangrove's original habitat, it will also directly benefit economically.

Threats Analysis

In this case, the threat in question inhibits the Kubu Raya area from becoming the world's center of mangroves. Based on information obtained from interviews with Bappeda Kubu Raya, the current threat is damage to mangroves in several areas due to the conversion of these areas into ponds, thus affecting the sustainability of these mangroves.

Meanwhile, the condition of the mangroves in the Kupah River is threatened by garbage that is carried away by the river so that it enters the conservation area. What's more, garbage such as logs that damage and inhibit the growth of mangroves, especially for mangrove species, can even damage existing mangroves.

According to him, the main threat from mangroves in Dabong Village is an abrasion in the coastal areas, which will

impact the growth of mangroves in the area. Local people use mangroves as protection from wind and big waves, so if the mangroves are damaged, they will endanger the lives of coastal communities.

Other threats, such as on the beach, when the rising sand piles up on mangrove roots, cause mangroves to die because they are dry and do not absorb from the soil. This can become a threat in the next few years because it can kill the mangrove ecosystem, which protects from the threat of climate change. The same threat is also experienced by mangroves in the Tanjung Harapan area, namely abrasion on the coast. An overview of abrasion in Kubu Raya, for example, in 1 year, the beach width is 5 meters, when it recedes ashore, it can reach 6– 7 meters due to the waves. Mangroves can protect the waves so that big waves from the sea do not reach the mainland. Meanwhile, according to KPH Kubu Raya, the threats still being experienced are community activities that use mangroves as charcoal wood, so this is a challenge for KPH Kubu Raya to empower these communities. In addition, several mangrove species are threatened with extinction if they are not treated immediately, such as Crocodile Eye Brush, Gedabu, Terumtum, and Dungun. These types are located in the Batu Ampar area (Tanjung Harapan) (Sarker et al., 2021).

Strategy Formulation

The strategy for establishing a world mangrove center in Kubu Raya Regency was formulated using SWOT. The internal and external factors used as the main reference in formulating the strategy are their strengths and opportunities. This is based on the strategic position analysis that has been carried out.

Based on the SWOT analysis, the alternative strategy obtained is an alternative S-O strategy that maximizes strength to get opportunities. The alternative strategies are as follows:

a. Maintaining and increasing the sustainability of mangrove ecosystems throughout the Kubu Raya Regency.
b. Improving coordination with Stakeholders;
c. Conduct consultations and cooperation with competent parties in the field of sustainable mangrove ecotourism;
d. Conduct comparative studies to mangrove conservation/rehabilitation areas in other regions to become world mangrove centers;
e. Collaborating with competent parties in the field of production and marketing of processed mangrove products.

The alternative strategies obtained are used to determine strategic priorities for establishing a world mangrove center in Kubu Raya Regency:

a. Maintaining and Improving the Sustainability of Mangrove Ecosystems

The sustainability of mangrove conservation areas must be maintained and managed properly. Mangroves as managers and the community must work together to maintain the sustainability of mangrove conservation areas because mangrove forests have various benefits, especially in protecting villages from abrasion. According to Rusdianti, mangroves are an ecosystem that has an important function as a protector of natural phenomena caused by waters, such as abrasion, waves and storms. This is supported by Khaery, the mangrove root system can dampen tidal waves and strong winds, retain mud and protect the coast from erosion, and control floods.

In addition, the preservation of mangrove conservation areas will have social and economic impacts on the community, especially fishermen. A sustainable mangrove ecosystem will attract many biotas, such as fish, crabs and shrimp, to inhabit the area so that the mangrove conservation area can be used by fishermen as a fishing ground (Fitrianto & Samsuri, 2021). According to Madiama, the mangrove area deserves attention and is prioritized as a source of foreign exchange for the community and the country because ecologically, the mangrove forest functions

as a spawning ground (spawning ground) and rearing area (nursery ground) for various types of fish, shrimp, shellfish, and others.

Thus, the supervision of mangrove conservation areas should be improved to prevent damage to the mangrove ecosystem. The division of utilization areas also needs to be done so that the mangrove conservation areas remain sustainable and the community can still enjoy the various benefits of the ecosystem. According to Miswadi, mangrove areas can be developed through Agroforestry by combining forestry and agricultural activities on the same land. Therefore, managing mangrove ecosystems must be directed to balance exploitation, economic and ecological activities.

b. Improve coordination with Stakeholders

The establishment of a world mangrove center requires collaboration between various parties who have an interest in it. Currently, the Government of Kubu Raya Regency has determined the mangrove area in the regional spatial plan (RT/RW) as a strategic area for environmental functions and carrying capacity, covering mangrove protected areas (mangrove) in the Districts of Batu Ampar, Kubu, Teluk Pakedai, and Sungai Kakap.

The Kubu Raya Regency Government, in partnership (with Kubu Raya KPH, NGO/CSO), continues to facilitate the issuance of Village Forest permits and increase the capacity of the LPHD (Village Forest Management Institution) to provide access to the community in utilizing and managing forest resources and at the same time implementing the mandatory SDGs.

The Kubu Raya Regency Government has also carried out the Kepong Bakol Strategy (gotong royong), which will work and become a catalyst in achieving the targets for developing Environmental Governance and a sustainable economy in Kubu Raya Regency. The kepong bakol effort is carried out through a selection of development partners and authority holders to strengthen assistance to communities in and around forest areas.

Good planning involving all parties is expected to positively impact, making Kubu Raya the world's center for mangroves. Collaboration between stakeholders is also intended to avoid conflicts of interest related to using mangrove conservation areas.

The concept of integrated management between Stakeholders is an alternative that requires joint action through good and mature coordination so that the functions and duties of each Stakeholder are clear (Niedlich et al., 2020). According to Kustanti, the role of stakeholders in managing mangrove forests should be following their respective main tasks and functions to build trust and togetherness and develop cooperative networks.

c. Conduct Consultation with Competent Parties in the Field of Sustainable Mangrove Ecotourism

Developing a mangrove conservation area into a mangrove ecotourism area requires a plan and strategy, which is not easy. To develop a mangrove ecotourism object, managers need advice and guidance from parties who have competence in developing mangrove ecotourism. Consultations can be made with the tourism office, related institutions, community groups or individuals competent in mangrove ecotourism. This is useful so the mangrove ecotourism development plan goes well (Mursyid et al., 2021). According to Ziku, the community needs to consult and conduct hearings with outsiders to obtain solutions for developing ecotourism areas.

In addition, to develop mangrove ecotourism, community participation is needed in assisting the management and supervision of ecotourism areas. There needs to be supporting infrastructure, such as the mode of water transportation needed to surround the mangrove area. The addition of ecotourism support facilities, such as tracks for pedestrians without damaging the mangrove area, is needed so

that visitors can enjoy the beauty of the mangrove conservation area. Road access to ecotourism locations also needs to be improved to make it easier for visitors to reach ecotourism object locations. This is in accordance with Muttaqin's opinion that as a tourism product, ecotourism must cover three aspects like other tourism activities: Attractions, Amenities and Accessibility.

d. Conducting Comparative Studies to Mangrove Conservation/Rehabilitation Areas in Other Regions

To develop the quality of human resources and institutional mangrove ecotourism businesses, comparative studies are needed to mangrove ecotourism areas that have developed in other areas. This is an effort that mangrove ecotourism managers can make to obtain information about management models and ways to develop mangrove ecotourism areas. This information can be adapted and developed according to the situation and conditions in the mangrove conservation area (Putri et al., 2020). Comparative study activities will provide learning and real experience on the results of activities carried out by Mengrove ecotourism in other regions. This experience will be an asset in raising public awareness of the concept of ecotourism that will be developed. The participation of stakeholders and the community is needed to support the successful development and management of mangrove ecotourism areas. According to Meilani and Muntasib, ecotourism development will not run well if it is only carried out by one party without the support of other related parties. According to Ziku, community participation in the development of ecotourism areas can be in the form of labour, money, goods, ideas or ideas, transportation service providers, selling souvenirs and as tour guides.

e. Collaborating with Competent Parties in the Field of Production and Marketing of Mangrove Processed Products

The implementation of Green Growth in Kubu Raya Regency focuses on developing a productive and low-emissions economy through sustainable commodity production, increasing commodity productivity in concession areas and communities, capacity building based on sustainability standards, best management practices, natural resource protection, and community empowerment for natural resource protection in Kubu Raya District through the Protection, Production and Inclusion (PPI Compact) approach.

Economic development in the mangrove area is directed at non-timber products, and this is done to reduce the logging of mangroves to be sold as mangrove charcoal. The products of mangrove forest production include kelulut honey, mangrove honey, nipa flour, and mangrove syrup (Andrews & Mulder, 2022). The fruit and leaves of the mangroves, usually processed by the community, come from the mangrove Avicennia sp. Therefore, it is necessary to form a Joint Business Group (KUB), which is managed by the community and the village, so that the community can establish partnerships with cooperative institutions and MSMEs so that the production and marketing of processed mangrove products can be increased. According to Widyorini, several factors contributed to the underdevelopment of the mangrove product processing business, namely the lack of capital and the weak competitiveness of the products produced by several other food product manufacturers. According to Theodora, effective and targeted product promotion is needed to expand the market, one of which is by making attractive packaging.

4. CONCLUSION

Mangroves are coastal ecosystems important in controlling climate change and increasing people's welfare. By carrying out efforts to strengthen blue carbon ecosystems, it is also a commitment from the Government of Indonesia and Kubu Raya Regency, particularly to protect

marine and coastal ecosystems. Based on this, it is hoped that it can contribute to tackling climate change because it can become a world blue carbon reserve. The ability of this blue carbon is often said to be greater than the same ability of land vegetation or green carbon. The alternative strategy chosen is to maintain and improve the sustainability of the mangrove ecosystem, improve coordination with stakeholders, carry out consultations with competent parties in the field of sustainable mangrove ecotourism, conduct comparative studies to mangrove conservation/rehabilitation areas in other areas, and collaborating with qualified parties in the field of production and marketing of processed mangrove products.

5. REFERENCES

Adalina, Y., & Heryati, Y. (2019). Characteristics of mangrove honey from the Komodo National Park Area and Kubu Raya Protected Forest. EurAsian Journal of Biosciences, 13(2).

Addae-Korankye, A., & Aryee, B. A. (2021). The relationship between strategic management practices and the growth of Small and Medium Enterprises (SMEs) in Ghana. Business: Theory and Practice, 22(1), 222-230.

Andrews, J., & Mulder, M. B. (2022). Forest income and livelihoods on Pemba: A quantitative ethnography. World Development, 153, 105817.

Bakır, H., Ağbulut, Ü., Gürel, A. E., Yıldız, G., Güvenç, U., Soudagar, M. E. M., ... & Afzal, A. (2022). Forecasting of future greenhouse gas emission trajectory for India using energy and economic indexes with various metaheuristic algorithms. Journal of Cleaner Production, 360, 131946.

Barriopedro, D., García–Herrera, R., Ordóñez, C., Miralles, D. G., & Salcedo–Sanz, S. (2023). Heat waves: Physical understanding and scientific challenges. Reviews of Geophysics, e2022RG000780.

Binet, S., Probst, J. L., Batiot, C., Seidel, J. L., Emblanch, C., Peyraube, N., ... & Probst, A. (2020). Global warming and acid atmospheric deposition impacts on carbonate dissolution and CO2 fluxes in French karst hydrosystems: Evidence from hydrochemical monitoring in recent decades. Geochimica et Cosmochimica Acta, 270, 184-200.

Cianconi, P., Betrò, S., & Janiri, L. (2020). The impact of climate change on mental health: a systematic descriptive review. Frontiers in psychiatry, 11, 74.

Crowley, K. (2021). Fighting the future: The politics of climate policy failure in Australia (2015–2020). Wiley Interdisciplinary Reviews: Climate Change, 12(5), e725.

De Silva, M., Al-Tabbaa, O., & Khan, Z. (2021). Business model innovation by international social purpose organizations: The role of dynamic capabilities. Journal of Business Research, 125, 733-749.

Dwivedi, Y. K., Hughes, L., Wang, Y., Alalwan, A. A., Ahn, S. J., Balakrishnan, J., ... & Wirtz, J. (2023). Metaverse marketing: How the metaverse will shape the future of consumer research and practice. Psychology & Marketing, 40(4), 750-776.

Farida, I., & Setiawan, D. (2022). Business Strategies and Competitive Advantage: The Role of Performance and Innovation. Journal of Open Innovation: Technology, Market, and Complexity, 8(3), 163.

Filatotchev, I., Ireland, R. D., & Stahl, G. K. (2022). Contextualizing management research: An open systems perspective. Journal of

Management Studies, 59(4), 1036-1056.

Fitrianto, A. R., & Samsuri, A. (2021). A Rural Community's Livelihood Dynamic in the maintenance of a Mangrove Area as a Tourist Destination. ASEAN Journal of Community Engagement, 5(1), 105-129.

Friess, D. A., Adame, M. F., Adams, J. B., & Lovelock, C. E. (2022). Mangrove forests under climate change in a 2 C world. Wiley Interdisciplinary Reviews: Climate Change, 13(4), e792.

Fuertes, G., Alfaro, M., Vargas, M., Gutierrez, S., Ternero, R., & Sabattin, J. (2020). Conceptual framework for the strategic management: a literature review—descriptive. Journal of Engineering, 2020, 1-21.

Indrajaya, Y., Yuwati, T. W., Lestari, S., Winarno, B., Narendra, B. H., Nugroho, H. Y. S. H., ... & Mendham, D. (2022). Tropical Forest Landscape Restoration in Indonesia: A Review. Land, 11(3), 328.

Kawanishi, M., & Fujikura, R. (2020). Assessment for the implementation of a national greenhouse gas inventory: the case of Japan. Management of Environmental Quality: An International Journal, 32(2), 359-375.

Mafi-Gholami, D., Zenner, E. K., & Jaafari, A. (2020). Mangrove regional feedback to sea level rise and drought intensity at the end of the 21st century. Ecological Indicators, 110, 105972.

Mursyid, H., Daulay, M. H., Pratama, A. A., Laraswati, D., Novita, N., Malik, A., & Maryudi, A. (2021). Governance issues related to the management and conservation of mangrove ecosystems to support climate change mitigation actions in Indonesia. Forest Policy and Economics, 133, 102622.

Niedlich, S., Bauer, M., Doneliene, M., Jaeger, L., Rieckmann, M., & Bormann, I. (2020). Assessment of sustainability governance in higher education institutions—A systemic tool using a governance equalizer. Sustainability, 12(5), 1816.

Paglia, E. (2021). The Swedish initiative and the 1972 Stockholm Conference: the decisive role of science diplomacy in the emergence of global environmental governance. Humanities and Social Sciences Communications, 8(1), 1-10.

Perifanis, N. A., & Kitsios, F. (2023). Investigating the influence of artificial intelligence on business value in the digital era of strategy: A literature review. Information, 14(2), 85.

Provan, D. J., Woods, D. D., Dekker, S. W., & Rae, A. J. (2020). Safety II professionals: How resilience engineering can transform safety practice. Reliability Engineering & System Safety, 195, 106740.

Purwoko, A., Nurrochmat, D. R., Ekayani, M., Rijal, S., & Garura, H. L. (2022). Examining the Economic Value of Tourism and Visitor Preferences: A Portrait of Sustainability Ecotourism in the Tangkahan Protection Area, Gunung Leuser National Park, North Sumatra, Indonesia. Sustainability, 14(14), 8272.

Putri, A. E., Khadijah, U. L. S., & Novianti, E. (2020). Community empowerment in the development of mangrove tourism in Batu Karas of Pangandaran, West Java. Geo Journal of Tourism and Geosites, 31(3), 972-978.

Putri, A. E., Khadijah, U. L. S., & Novianti, E. (2020). Community empowerment in the development of mangrove tourism in Batu Karas of Pangandaran, West Java. Geo Journal

of Tourism and Geosites, 31(3), 972-978.

Rahman, S., Islam, A. S., Saha, P., Tazkia, A. R., Krien, Y., Durand, F., ... & Bala, S. K. (2019). Projected changes of inundation of cyclonic storms in the Ganges–Brahmaputra–Meghna delta of Bangladesh due to SLR by 2100. Journal of Earth System Science, 128, 1-11.

Rajamani, L., Jeffery, L., Höhne, N., Hans, F., Glass, A., Ganti, G., & Geiges, A. (2021). National 'fair shares' in reducing greenhouse gas emissions within the principled framework of international environmental law. Climate Policy, 21(8), 983-1004.

Reim, W., Yli-Viitala, P., Arrasvuori, J., & Parida, V. (2022). Tackling business model challenges in SME internationalization through digitalization. Journal of Innovation & Knowledge, 7(3), 100199.

Rifai, H., Quevedo, J. M. D., Lukman, K. M., Hernawan, U. E., Alifatri, L. O., Risandi, J., ... & Kohsaka, R. (2023). Understanding community awareness of seagrass ecosystem services for their blue carbon conservation in marine protected areas: A case study of Karimunjawa National Park. Ecological Research.

Rozzi, R., Álvarez, R., Castro, V., Núñez, D., Ojeda, J., Tauro, A., & Massardo, F. (2023). Biocultural calendars across four ethnolinguistic communities in southwestern South America. GeoHealth, 7(4), e2022GH000623.

Sarker, S., Masud-Ul-Alam, M., Hossain, M. S., Rahman Chowdhury, S., & Sharifuzzaman, S. M. (2021). A review of bioturbation and sediment organic geochemistry in mangroves. Geological Journal, 56(5), 2439-2450.

Sasmito, S. D., Basyuni, M., Kridalaksana, A., Saragi-Sasmito, M. F., Lovelock, C. E., & Murdiyarso, D. (2023). Challenges and opportunities for achieving Sustainable Development Goals through restoration of Indonesia's mangroves. Nature Ecology & Evolution, 1-9.

Simpson, L. T., Canty, S. W. J., Cissell, J. R., Steinberg, M. K., Cherry, J. A., & Feller, I. C. (2021). Bird rookery nutrient over-enrichment as a potential accelerant of mangrove cay decline in Belize. Oecologia, 197, 771-784.

Sony, M., Antony, J., & Douglas, J. A. (2020). Essential ingredients for the implementation of Quality 4.0: a narrative review of literature and future directions for research. The TQM Journal.

Turisno, B. E., Dewi, I. G. S., Mahmudah, S., & Soemarmi, A. (2021). Recovery Policy and Proper Management of Mangrove Forests to Preserve Environmental Sustainability and Ecotourism in Bangkalan Indonesia. Journal of Environmental Management & Tourism, 12(8), 2188-2193.

Venkatesh, V. (2022). Adoption and use of AI tools: a research agenda grounded in UTAUT. Annals of Operations Research, 1-12.

Von Schuckmann, K., Cheng, L., Palmer, M. D., Hansen, J., Tassone, C., Aich, V., ... & Wijffels, S. E. (2020). Heat stored in the Earth system: where does the energy go?. Earth System Science Data, 12(3), 2013-2041.

Wang, W., He, L., Wu, Y. J., & Goh, M. (2021). Signaling persuasion in crowdfunding entrepreneurial narratives: the subjectivity vs objectivity debate. Computers in Human Behavior, 114, 106576.

Zhao, X., Ma, X., Chen, B., Shang, Y., & Song, M. (2022). Challenges toward carbon neutrality in China: Strategies and countermeasures. Resources, Conservation and Recycling, 176, 105959.

Zima, K., Plebankiewicz, E., & Wieczorek, D. (2020). A SWOT analysis of the use of BIM technology in the polish construction industry. Buildings, 10(1), 16.