



# Sustainable Mangrove Ecotourism Management Strategy in the Penta Helix Model (Literature Study) in Sorong City, West Papua Province

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**Abstract.** The Mangrove tourism area management strategy starts from environmental degradation and land use in the mangrove conservation forest of Sorong City which is closely related to irresponsible parties in responding to growing issues. The expected objectives are to analyze the role of stakeholders and community participation using the idea of Penta Helix with a literature study approach. The findings of this study show the mapping of stakeholder roles based on the Penta Helix Idea. Actors consisting of academics, researchers, government, media and communities have an important role to play in enforcing sustainable mangrove ecotourism management. State rules have shown inconsistency in their implementation, resulting in poor policy consequences and the private sector has only prepared more travel package offerings and has not been directly involved in the preservation of coastal areas. The research study advises the government to review binding rules and increase public participation in policies that have been made with the penta helix model. All made for the common good and the future.

**Keywords:** Penta helix model · sustainable ecotourism · mangrove tourism area in Sorong City · West Papua

## 1 Introduction

Indonesia is a country that holds the attraction of its natural beauty which makes Indonesia this condition very suitable for developing the tourism sector. One of the foundations of the Indonesian economy is that tourism is most ready to rise if the country is in a crisis phase. “This is what makes tourism can be said to be superior” [1].

Regional autonomy regulations provide freedom for each region to manage existing resources in the area, for example the development of natural resources and human resources [2]. Development planning can be started by identifying areas that will be used as tourism development sites. This is intended to improve the role and welfare of the wider community as well as the preparation of human resources who have competence in the field of tourism services.

Supporting continuous development plans and increasing understanding of global awareness of environmental importance, Indonesian tourism has also experienced a shift from mass-tourism oriented to environmental- and community-oriented. This is shown

by the increasing number of tourists visiting nature-based and cultural objects of the local population due to the saturation of tourists visiting artificial attractions. Based on the census of the Central Statistics Agency, Indonesia has 1,128 ethnic groups spread across a maritime country consisting of a series of about 17,000 islands. Indonesia's natural wealth, culture, and unique biodiversity have become a huge ecotourism capital. The shift in the concept of world tourism to ecotourism is a great opportunity for the State of Indonesia which has extraordinary potential [3].

The tourism sector is one of the most promising potentials to be managed and developed which is closely related to increasing funding related to a country's finances or economy, opening new jobs, and encouraging the development of an area [4].

In spurring economic growth in an area, one of the promising sectors to be developed is tourism as a strategic asset of an area that has natural resource potential. What makes tourism can be said to be influential if it is related to the opening of job opportunities for the community and concerns increasing local income and taxes. [5] Tourism development in each region is able to open up new opportunities, both in terms of employment, community economic activities through local community efforts to improve the community's economy. Areas that have tourism potential can revive the economic activities of their communities terms of employment, community economic activities through local community efforts to improve the community's economy. Areas that have tourism potential can revive the economic activities of their communities with the emergence of small and medium-sized enterprises that if developed can provide significant benefits for income [6].

The important role of policymakers in local governments must certainly support success in carrying out national tourism governance. Tourism progress needs to predict growth and development and its track record accompanied by it carrying capacity.

Good management can contribute to tourism development, considering that donations to the local area will spur growth with the existence of the tourist area.

The progress and development of tourism in the regions lie in the emphasis on development policies based on regional characteristics related to the utilization of the potential of human resources, institutions and physical resources locally.

One of the developments of tourist parks such as the Klawaru Mangrove Forest, East Sorong Regency, Sorong City really needs to get greater attention from the government by getting closer to the local community and involving them in managing mangrove forest tourism. The government needs to think about how this mangrove forest can attract local and foreign tourists while maintaining the sustainability of mangrove forests by conducting various trainings and guidance in developing the creativity of residents in managing mangrove forest tourism sites and maintaining their sustainability, such as providing directions for limiting mangrove logging, as well as understanding the importance of ecotourism for life (Fig. 1).

However, it can be said that the tourism object has not developed optimally, both related to development of mangrove tourism parks, namely the community there is less involved in its development because the government as a dynamic still needs to build cooperation with the community. The relationship of integrity of facilitators and motivators related to society is not well established.

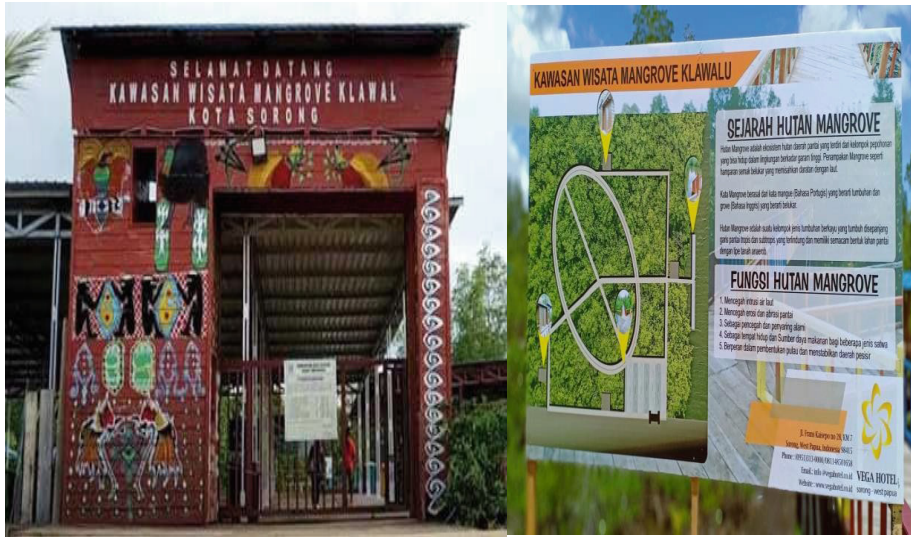


Fig. 1. The Klawalu Mangrove Tourism Area, Sorong City.

Synergy between the government and the community is needed as the holder of government power has a role as a facilitator and as mandate to develop facilities so that tourist can travel comfortably so as to create a good impression in tourism, by cooperating with the surrounding community and the community related to the development of the Klawaru Mangrove Forest tourist park destination, as well as being able to increase Regional Native Income (PAD).

This Research is follow-up research that has been written by Rahel Yuliana Yawan “with the title development of Mangrove Tourism Parks in Klawaru Village, East Sorong Regency, Sorong City, West Papua Province” [7]. The author tries to complement the research with different by using Penta Helix Model Literature Study in assessing community participation in developing Mangrove Tourism Parks in Sorong City.

## 1.1 Literature Review

**Cooperation and Collaboration at Penta Helix**, Collaborative governance, according to [8] “a collaboration process that is an element of dynamic interaction consisting of: first, principal attachment, that is, the process of some things such as face-to-face dialogue, or through technology. Interrelationships that form the unity of general principles in an achievement; second, shared motivation, namely uniformity of commitment in a process such as feeling interested and caring for the group and seeing the collaboration process as a process of legitimacy; and third, the capacity to take on shared roles that require planning and the resources necessary to support actions such as facilities, leadership”, Another opinion was expressed according to [9] “Collaborative governance has four main variables consisting of initial conditions, institutional design, leadership, and collaborative processes”. According to [10] “Most collaborative leadership emerges



**Fig. 2.** Penta Helix Scheme

from business groups and the public to address regulatory uncertainty. This is the result of a cultural mindset rather than a legalistic approach to doing business”.

In the study [11] “states in its study that collaborative governance is used to create concepts that occur during adaptation interactions and how collective thinking can be channeled to be applied to organizational or group participation” (Fig. 2).

**Sustainable Coastal Mangrove Forest Management Based on Penta Helix,** The development of coastal areas of mangrove forest in a practical sustainable perspective can refer to a combination of principles of sustainable development in an area [12]. Argues that sustainable development has three main pillars/dimensions: economic, ecological, and social pillar. The foundations of the economy emphasize on increasing income based on the efficient use of resources. In the ecological proximity emphasizes the importance of protecting biodiversity that will contribute to the balance of the world’s ecosystems. Meanwhile, the social approach emphasizes maintaining the stability of the socio-cultural system, including handling conflicts between generations and within a generation. Serageldin also explained that the sustainability of economic aspects includes economic growth, capital maintenance and efficient use of resources and capital. Ecological sustainability includes ecosystem integrity, carrying capacity, and protection of species diversity and natural resources. Meanwhile, the aspects of social sustainability include aspects of equity, empowerment, participation and institutions.

The penta helix model has become an important aspect needed to support sustainable development where the concept was originally developed from triple helix and quadruple helix. This theory is a refinement of many previous theories. Stakeholders in the management of coastal mangrove forest areas in Sorong City have collaboration as a joint action. This is in accordance with John-want to (2008) [13] theory which states

that collaborative processes involve various actors, individuals, and stakeholders working together to achieve their goals. The concept of penta helix involves a new actor, namely the mass media. Thus, these actors include the government, the business world, academia, non-governmental organizations, and the mass media.

To meet the challenges of multi-stakeholder needs, in accordance with [14], it is necessary to focus on addressing complex interparty problems through experimental research, and alternative policies in cities or regions. The Penta helix model is very suitable for answering multi-actor problems where stakeholders represent various interests in one location [8]. There are five stakeholder elements involved: Government, Private Sector, Academia, NGOs, and the Media, which can directly influence policy planning so that they can interact with each other. Sustainable coastal area management in the perspective of multi-stakeholder collaboration is shown by implementing integrated coastal area management policies that support three dimensions of sustainability, namely the economic, social, and ecological dimensions [15]. To answer the problems caused, a strategy is needed to produce sustainable use of mangrove ecosystems [16]. The strategy made must have a program that will be implemented with the aim of answering problems that occur in the mangrove ecosystem. The strategy can be seen in Table 1.

## 2 Method

The research approach used is qualitative. If you look at the type, this research is categorized into types of literature research. The data in this study is secondary to sources from national scientific journals and international journals accessed both through crossref, scopus, googel cholar, books, magazines and various sources that support this research. Especially for previous research data, the publication year is limited, namely the last 10 years or publications in 2010–2021. Data derived from textbooks or literary books is not subject to restrictions on the year of publication. The data collection technique used is the documentation technique. In literacy studies and previous research, the main topic is the development of sustainable ecotourism based on community participation by collaborating penta helix. The method of analysis used is descriptive qualitative which is felt to be appropriate in making analogies and exploring the sustainability of the mangrove ecosystem in Sorong City, West Papua Province.

## 3 Result

Referring to the regulation of the regional government of West Papua Province [17] “About the Regional Spatial Plan of West Papua Province 2013–2033 and the Zoning Plan for the Regions and Small Islands of West Papua Province 2019–2039”, becomes the basis for guidelines in management in realizing community welfare, with the issuance of local government regulations in [18] implementation of emphasis on city and district areas in carrying out coastal area governance, this is a confusion in the management system of coastal area management.

This situation affects the governance of coastal areas will have a direct impact on cities and districts as a basis for law enforcement in their respective regional areas.

**Table 1.** Mangrove Ecosystem Management Strategy

No.	Dimension	Attribute	Problem	Actor
1	Ecology	Mangrove forest	The destruction of mangrove land is caused by the high level of exploitation of mangrove wood.	Government
			Abrasion and changes in physical function	Community Government
2	Socio- economic	Education	The low level of education causes public knowledge about the function of the mangrove ecosystem to decrease	Government NGO
		Work	Limited job opportunities	Government NGO
		Community Understanding	Participation of local communities in rehabilitation activities is not optimal	Government NGO Community
		Economic Condition	Most of the conditions of the community around the mangrove ecosystem are still poor	Government
		Population growth	Population and economic growth trigger land conversion and damage to mangrove ecosystems	Government
3	Institutional	Land	Recognition of ownership of mangrove land	Government
		Rule	There is no PERDA that regulates the use of mangrove forests	Government
		Correlation	Coordination between relevant agencies in mangrove ecosystem governance has not been connected to one another.	Government NGO Community
		Data	Mangrove ecosystem data is not yet integrated	Government NGO Community

This condition can illustrate sectoral egos in stakeholders in making decisions in sustainable ecotourism environmental governance, this will cause confusion in community participation in ecotourism areas in mangrove forest areas.

It is hoped that in the implementation of penta helix collaboration in five elements as actors will be able to play a role in developing mangrove ecotourism.

### **3.1 Cooperation and Collaborative Governance to Create Ecotourism Fo Sustainable Mangrove Forest Areas**

Governance in sustainable mangrove ecosystems when viewed from the point of view of simultaneous cooperation and collaboration is characterized by integrated implications seen in the social, economic and ecological dimensions, which are characterized in governance policies in coastal areas in an integrated and sustainable manner.

### **3.2 Government**

In the book implementation of Regional Autonomy [19]. “the Republic of Indonesia as a unitary state adheres to the principle of decentralization in the implementation of government, by providing opportunities and flexibility to regions to implement regional autonomy”. Decentralization is delegation of authority from the central government to regional heads whose implementation is limited to cities and districts, limited authority which includes powers that are not or have not been exercised by the city/regency area. The stakeholders who are charged are the government, namely the regional head of west papua province is the governor, and the ranks include the community tourism office, the industry and trade office, the planning and development agency, the health office, the social and manpower office, the central statistical agency.

The government’s function is to overcome in ecological measure the government’s task in overcoming the damage to mangrove land due to the high level of exploitation of mangrove wood. According to the studies conducted. In research [20], Research shows that the mangrove forest area in Desa Gamlamo experienced significant changes in 2012 the mangrove forest area has an area of about 40 ha, but there was a change until 2019 the area of mangrove forest left 13.67 ha of which 26.33 ha was lost. This is due to the opening of shrimp ponds in the mangrove area, the expansion of settlements, excessive taking of firewood and the creation of household waste disposal by residents around the mangrove area. Management strategies carried out (1) Empowering coastal communities, both directly and indirectly involved in mangrove ecosystem management. (2) Development of alternative livelihoods. (3) Increase awareness and responsibility of coastal area communities and officials in the management of mangrove ecosystem resources.

The function of the government in overcoming abrasion and changes in the physical function of mangrove land studies conducted by [21], “the results of his research The effectiveness of BPBD’s performance in tackling abrasion on the coast of the Talud Islands Regency has been running well so that BPBD’s performance is considered quite effective, this situation can be seen from the achievement of the abrasion prevention program by building a communication network from BPBD with the District/Kelurahan as well as with the community”. Management policy schemes carried out (1) Restore



the function of mangroves to prevent abrasion by planting mangrove in coastal areas (2) Create wave barriers for critical areas adjacent to residential areas and government infrastructure.

The role of the government is the low level of education, causing public knowledge about the functioning of mangrove ecosystems to decrease. In research [22]. The results showed that mangrove conservation efforts in Timbul Sloko village were well understood by respondents with a score of 3; whose activities include mangrove maintenance, preparation of mangrove management activity plans and willingness to use land for mangrove planting and reforestation. The relationship between participation and conservation efforts is not very close, where the values of  $r$  and  $R^2$  for fishermen are  $-0.310$  and  $9.61\%$ ; for the self-employed by  $-0.247$  and  $6.101\%$ ; and  $0.005$  and  $0.003\%$  for farmers. This is due to the lack of knowledge, low level of education and lack of public awareness in maintaining the natural environment and participating in activities organized by management groups. Government management strategy with NGOs. (1) Socialize to the community about the function of mangrove forests and the impacts that can be caused if the mangrove ecosystem is good or if the mangrove ecosystem is damaged. (2) Create a simple reading house that collects all information about the mangrove ecosystem and photos that contain the impact of damage or goodness produced if the mangrove ecosystem area is managed properly. (3) Increase the number and quality of diverse human resources within the institution through formal and informal recruitment, training, and education.

The function of the government in limited employment opportunities, in research [23], "The results of the study show that in the development and management of mangrove forest tourism, the government prioritizes community involvement in tourism activities by taking advantage of existing opportunities such as the establishment of cooperation between the Tourism Office and the Community in managing Mangrove Forest (Lantebung) tourism objects using a business sector approach, the non- business sector, and the government sector." "This tourism development is an event to improve the community's economy, so as to create a tourism industry that involves the community in managing and developing Mangrove Forest tourism. Government and NGO management strategies carried out Provide training so that communities can make something that can increase income for both individuals and families so that they do not only depend on the use of wood and corals in mangrove ecosystems.

The government's function in understanding the participation of the community and local communities in rehabilitation activities has not been optimal, according to [24]. "The results of the research on the condition of mangrove forests on Panjang Island, Serang Regency are currently in an alarming condition, many of them have died and are in poor condition, this situation has resulted in Panjang Island often being exposed to abrasion and tidal floods that enter residential areas. The cause of this condition is the logging of mangrove forests by the surrounding community. That the lack of community empathy for mangrove forests in the area is due to the need for mangrove wood and the mindset about the benefits of mangroves". The author sees that this problem requires a breakthrough in the community in order to have a sense of belonging to mangroves and want to continue to maintain the preservation of the existence of mangroves in their environment. The breakthrough is in the form of providing incentives for communities



that conserve mangroves. Mangrove conservation provisions have been regulated by positive laws, including in Regional Regulations in Serang Regency, however, Serang Regency has not implemented regulations or provisions regarding the provision of mangrove conservation incentives so that people tend to see that in general mangroves do not provide benefits for them. The management strategy is carried out. (1) Joint mangrove planting activities between the government, the community, NGOs and private agencies. (2) Joint monitoring of mangrove ecosystem areas between the government, communities and NGOs. (3) Increase community participation in activities related to mangrove ecosystem management efforts.

The role of the government in economic conditions Most of the conditions of the communities around the mangrove ecosystem are still poor, according to research Some households living close to mangrove forests in Sidodadi Village (45%) are still classified as poor [25]. Poverty is not affected by age, type of work, health, ethnicity/ethnicity and housing conditions. The characteristics of households that affect poverty in Sidodadi Village are education, income, the number of working family members and housing facilities. Households do not have many alternative sources of income due to the low knowledge of the community about the use of non-timber forest products from mangrove forests. Strategies carried out by managers: Conducting training to the community to make food products that can be produced from raw materials obtained from mangrove forests.

The role of the government in population and economic growth triggers land transformation and damage to mangrove ecosystems, according to research [26] “The findings of this study identify that population growth and the degree of land productivity play an important role in accelerating the transformation of urban land functions in the Marisa City area, Pohuwato Regency”. This effort is made by the manager. (1) Restrict or prohibit the clearing of mangrove land to be used as residential land (2) Guide development carried out without the approval of the relevant government.

The government’s function in the recognition of the institutional ownership of mangrove land has become a conflict in the community, according to the community’s ignorance of [27] “on Basic Regulations on Agrarian Principles” and [28], “on the Management of Coastal Areas and Small Islands”, resulting in consequences for unfounded land ownership and land use that damages the environment”. Research [29]. “The space of the coastal region is the territorial space between the land space and the ocean bordering each other”. Based on the carrying capacity and capacity of renewal (assimilative capacity), as well as the suitability of its use, coastal areas and mangrove forests are targeted for natural resource exploitation and environmental pollution due to development demands that tend to focus more on the economic sector. The more economic benefits/benefits obtained, the heavier the burden of environmental/ecological damage it causes. And vice versa, if there are fewer economic benefits/benefits, the less environmental damage it will cause. Strategy carried out by the manager: Make a map of the mangrove area and its distribution according to its designation.

The role of the government in making regional regulations that regulate the use of mangrove forests. Written research [30]. The support from the manager is highly expected by various interrelated parties to provide expertise and attention so that the sustainability of ecotourism in West Oesapa Village can run according to dreams. The

strategy carried out by the manager is. (1) Make local regulations governing the use of mangrove wood in infrastructure and industrial development. (2) Increase the effectiveness of law enforcement on various activities that result in the degradation of mangrove ecosystems. (3) Disseminate information on laws and regulations related to mangrove ecosystem management efforts.

The role of government in coordination between relevant institutions in the governance of mangrove organic communities has not been synergistic. In research [31] “The research findings show that the sustainability index value of all dimensions of 63.5% is included in the continuation category, meaning that there must be management, care and preservation of mangrove forests, so that these values can survive or even increase. (1) from the ecological dimension by conserving mangrove ecosystems including monitoring, maintaining and increasing mangrove diversity”. (2) from the economic dimension is to optimize and develop the potential of mangrove resources, including utilizing existing natural resources and expanding accessibility to mangrove locations. (3) from the social dimension, namely increasing community participation, including increasing counseling about the benefits of mangroves and actively involving the community in mangrove care. (4) from the economic dimension is to optimize and develop the potential of mangrove resources, including improving coordination between the government, community institutions and the community and establishing a special group of mangrove supervisors”. The efforts made to manage the management strategy are. (1) create community groups in monitoring mangrove ecosystems. (2) The provision of mangrove ecosystem governance budgets in state and local budgets and non-binding funds. (3) Pursue non-binding sources of foreign funds.

The role of government in integrating mangrove ecosystem data, according to research [32]. “Based on the results of the study, the community’s point of view on the implementation of the mangrove ecotourism CSR program is very supportive because from one side mangroves have a variety of benefits, especially areas adjacent to the company are very suitable for mangrove breeding in order to prevent and naturally handle activities business entities. as a protector of beaches and abrasion on the other hand can function as a mangrove ecotourism area, so that the community responds positively in running and managing this mangrove forest area, especially in its implementation to get special assistance from the company through its own CSR program worth 80 million both in physical and non-physical forms. As for community participation, starting from participation in planning, participation in implementation, participation in the utilization of results, and participation in evaluation. Management strategies carried out (1) Provide financial assistance to relevant agencies for the ecological data collection process. (2) Provide financial support to any student or NGO who wants to conduct research on mangrove ecosystem areas.

### 3.3 Private Sector

According to, page 164 [33] “The actors involved in every domain of government, namely the state, the informal sector involves private business entities involving political institutions as well as public institutions. Social interactions occurs in society both as a group and individually both in organizations and not in economic, social and political environments with formal and informal rules.

According to [34] “The research findings on the role of the community in tourism promotion in Singkawang City can be identified as follows: 1) managing tourist attractions; 2) managing information media; 3) creating and maintaining a conducive social climate; and 4) promoting through social media. To maximize the role of the community, it is hoped that the government will be more proactive in embracing activists and the general public involved in promoting tourism in Singkawang City”.

The tourism business sector is strongly influenced by the role of social media in promoting tourist destinations, this can certainly be felt by local people who do business can benefit. Local products that will be offered from tourist objects from the transportation sector (tour & travel, airline ticket providers, vehicle rental / transportation providers), travel guides can provide job opportunities for the surrounding community, and the community can offer culinary businesses, cendarmata, as well as lodging houses and accommodation desired by tourists. In Sorong City there are businesses related to tourism including Raja Empat, PT Kuwera Jaya Tour & Travel, Farinda Inn & Travel, Anak Papua Tour Raja Ampat, Tour & Travel, People’s Harbor Pier, People’s Harbor Pier, Nadiva Travel Umrah, raja Ampat Conversation and Tourism Center, Oasis Raja Ampat.com.

### 3.4 Civil Society

There is a definition of civil society that emphasizes space, namely the existence of individuals and groups in society who can interact with each other with the spirit of tolerance. Ideally, the interweaving between people as citizens is synergistic, collaborative, and participatory. Based on the principles of freedom, justice and equal rights. In discussing the model of NGO relations with the Government, James V. Ryker in, p:208 [35].

The role of society in assisting the government in overcoming abrasion and changes in physical functioning in research [36]. The research findings show that the interactions that occur in the community are intertwined in the governance of coastal areas that occur in the city of Semarang more effectively and efficiently which are carried out every day by community groups in making nurseries and also planting mangroves and making breakwaters (APO) for the daily needs of the community. Other researchers [37]:The findings of this research plan say that the function of the community and government policies in mangrove conservation in dealing with the prevention of tidal waves and banjir, including providing information, community participation is an effort to maintain mangrove coastal areas in tourist attractions, this is shown by planting mangrove seedlings directly in the ground or they use this collaboration gabion technique is shown directly by community participation in governance. Mangrove ecosystems and improving the welfare of local communities and efforts to prevent natural disasters that occur”.

Research on local community efforts in rehabilitation activities has not been optimal, conducted by [38] “Mangrove planting activities carried out in the planting event received the support of community residents very supportive of this activity seen along the shoreline which occurred abrasion after planting looks good on the coast and in accordance with the plan according to this activity plan”.

In carrying out rehabilitation activities, training and assistance are needed in accordance with [39]. The findings show that efforts to manage production forest areas in Maros Regency in developing the potential of mangrove forest resources that are of economic value and sustainable and of economic value with environmentally friendly aquaculture and fisheries programs. The function and role of NGOs in mangrove governance is to provide an understanding of community awareness and provide knowledge of fishermen and farmer groups on a home industry scale counseling and training made by NGOs is crab cultivation and assistance for women farmers/fishermen in utilizing natural resources from mangrove forests.

The research was conducted by [40]. "The findings obtained that Eat Mayang Village carries out coastal economic empowerment through the use of mangrove crab cultivation by creating ponds in mangrove forest areas by conducting training by the government the use is very appropriate for mud crabs adapted to mangrove crab habitat so that a crab cultivation group is formed as a form of government efforts.

Another study conducted [41]. "Tourism involves the community and local wisdom five governance strategies related to zoning in waste management in reducing pollution and conducting environmental counseling education for the community as well as the carrying capacity and carrying capacity for the community carried out in Bali. For this effort requires funds in the mangrove area".

Community efforts in consolidating mangrove ecosystem data have not received community support in research [42]. "Governance findings on mangrove forest resource management and determination of conservation, rehabilitation, cultivation zones so that mangrove forest areas and their resources can be maintained and sustainable. Destruction of coastal mangrove forests. In developing the conversion of mangrove forests into cultivated areas and hit by large waves in Pinrang Regency and Suppa Regency. Communities along the coast will play an active role in the management of mangrove forest areas, starting from the monitoring planning stage, to the stage of maintaining and preserving mangrove forest resources. Mangrove forest resource management has not involved many coastal communities so far, especially at the planning stage and up to the maintenance stage and the community wants to form a farmer/fishermen group.

### **3.5 Non-Governmental Organizations (NGOs)**

Nongovernmental Organizations (NGOs) have an important position in the social life of civil society that is strong and has a function in fighting for the rights of people who have not yet been conveyed. Nongovernmental Organizations (NGOs) are established by individuals or groups on a voluntary basis whose basic purpose is to support and promote the public interest without seeking financial gain. Nongovernmental Organizations (NGOs) are legal institutions and work independently without relying on the government [43].

The function of LSM the lowest level of education causes people's knowledge about the function of mangrove ecosystems to decrease. According to research [44] The results showed that the district government's policies did not work well and effectively, when entrepreneurs were able to turn mangroves into intensive shrimp ponds. NGOs and communities are trying to gather strength to prevent the conversion of the remaining mangroves, but they are not strong enough to confront entrepreneurs' access. Therefore,

it is necessary to develop a wider network through collaboration in order to encourage district government policies that are more in favor of sustainable mangrove management. Management strategies carried out, (1) Socializing to the community about the function of mangrove forests and the impacts that can be caused if the mangrove ecosystem is good or if the mangrove ecosystem is damaged (2) Create a simple reading house that collects all information about the mangrove ecosystem and photos containing the impact of damage or beauty produced if the mangrove ecosystem area is managed properly.

The role of NGOs in the participation of local communities in rehabilitation activities has not been optimal, according to research [45]. Hasil research in carrying out rehabilitation the main actors are sustainable coastal farmer groups in planning as facilitators and key information for stakeholders in connecting roles and individuals and presenting in understandable format so that sustainable community participation is needed and government policies are needed to support mangrove management and rehabilitation to be sustainable. Management strategyefforts made (1). Joint mangrove planting activities between the government, the community, NGOs and private agencies. (2) Joint supervision of mangrove ecosystem areas between the government, communities and NGOs. (3) Increase community participation in activities related to mangrove ecosystem management efforts.

The role of NGOs in coordination between relevant institutions in mangrove ecosystem management has not been synergistic, according to research [46], "Research findings suggest that the role of NGOs and Research Institutions needs to increase their role from Crowd to Context Setter which has a great influence in policy making. In order for mangroves to continue, it is necessary to improve the function of the community which was originally only a subject to become a key actor through community empowerment activities. It is necessary to form a coordination group of key actors, namely parties who have authority in mangrove management have not made an integrated plan for mangrove forest management as a result of the lack of synergy in the activities carried out by the manager. Efforts and strategies for Mangrove Ecosystem Management at the provincial and city/district levels to synchronize mangrove ecosystem management policies and activities. Empowerment activities need to be carried out seriously to encourage changes in the role of mangrove management, the achievement is: looking for non-binding sources of foreign funds.

The function of NGOs in mangrove ecosystem data that are not integrated, research conducted [47]. "The research findings are that there are four non-governmental organizations that are the focus of the fisheries sector, namely the Coastal and Marine Environmental Management NGO (MLPK), the Wahana Lestari NGO, the Main Indian Ocean NGO, and the DPC HNSI Central Tapanuli NGO. Non- Governmental Organizations conduct fisheries training activities specifically for fishermen, fishermen's wives, communities, and educated groups. Non-Governmental Organizations' funding sources come from power agencies, donors, and cooperation or contract ties. The role of Fisheries Non-Governmental Organizations in fisheries activities is as initiators, facilitators, supervisors, mentors and instructors".

### 3.6 Academicians

In research [48]. “Countries are currently strategically pursuing regional development and economic diversification to compete in the world market. Higher Education Institutions (HEIs) are at the heart of this political strategy. The objectives of HEIs can promote regional socio-economic growth and development through research innovation and entrepreneurship”.

The actor actor is the University of Muhammadiyah Sorong is one of the private universities besides that, Victory University and Bukit Olive High School, etc. In realizing the implementation of the tri dharma of university universities and in line with sustainable development, one of them focuses on improving nature and sustainable environmental management. This situation is in line with the Cooperation and collaboration between institutions at the conference in Rio de Janeiro whose achievements galvanized the commitment of higher education institutions to teach and encourage research on sustainable development, greening campuses and supporting local efforts [49].

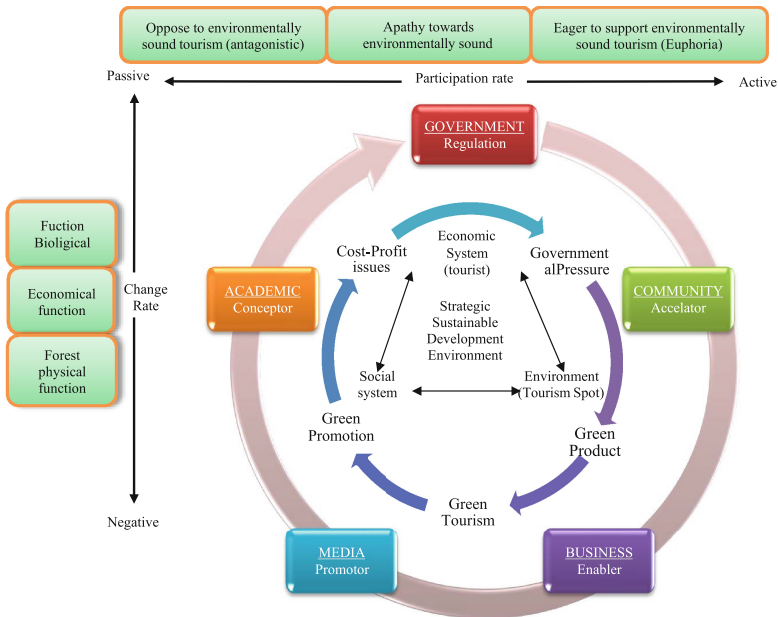
One of the community services [50] “This community service is to provide understanding to coastal communities in the Kbalinain Village area, Aimas District, Sorong Regency who are directly involved in the use of mangrove ecosystems and efforts to conserve mangrove ecosystems through awareness of coastal communities”. Other research, [51] “Applied remote sensing findings, which are used to identify, model, and predict land changes that occur in the Sorong City area, with ArcGIS 10.8 software used for spatial processing and analysis and TERRSET 2020 to predict regional development”. [52] tangible evidence of the existence of academia.

### 3.7 Media

The press is a social institution and a vehicle for mass communication that carries out journalistic activities including seeking, obtaining, possessing, storing processing and conveying information both in the form of writing, sound, images and data and graphics as well as in other forms using print media, electronic media and all types of available channels [53]. Acts as social control and is also the implementation of real meaning in supporting democracy in which elements of social supervision, social support and social responsibility are contained in supporting journalistic activities. Local media that exist and carry out their activities in Sorong City, which always reports on tourism media and its development, for example Radar Sorong, Fajar Papua Publik Daily, Suara Papua, Cendrawasih Pos, Tabloid Jubi, Radio Dian Mandiri, Coastal Radio Station, etc.

In penta helix, pern media is needed as a means of voicing various aspirations with the aim of being a tool for monitoring the policies made by both the central and regional governments in relation to community activities in advancing the mangrove tourism area of Sorong City, cooperation, training, and the formation of tourism management groups. In this perspective, journalism is required to provide accurate and accountable information.

Pentahelix cooperation in tourism development in Sorong City can be described in Fig. 3.



**Fig. 3.** Penta Helix Collaboration in Community-Based Tourism Development

## 4 Discussion

Based on previous research developed by the main author, he found obstacles to the development of this mangrove tourism area where the facilities owned by the government in an effort to develop this tourist area are still relatively few or inadequate so that the development process is also hampered. In addition, the level of awareness possessed by the communities around mangrove forests is very low and is classified as indifferent to environmental conservation, so it has been found several times that mangrove forests are not beautiful or damaged due to people who do not care.

## 5 Conclusion

It can be concluded that cooperation and collaboration can be well established by conducting better and coordinated communication among stakeholders in carrying out mangrove ecotourism governance, by not looking at the differences in contributions and functions in the mangrove forest area or area in Sorong City, West Papua Province. It is hoped that this pentahelix model can unravel the various problems that have occurred so far and provide solutions for stacholders in making wise decisions by looking at various elements of interest with the aim of prospering the community in West Papua Province, especially Sorong City.



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