Article

Development Model of Synergistic Sustainable Marine Ecotourism (Case Study in Pangandaran Region, West Java Province, Indonesia)

Atikah Nurhayati [1], Isah Aisah [2] and Asep K Supriatna[3]

[1] Faculty of Fisheries and Marine Science, Padjadjaran University; e-mail: atikah.nurhayati@unpad.ac.id; nurhayati_atikah@yahoo.com @e-mail.com
[2,3] Faculty of Mathematics and Natural Sciences, Padjadajaran University; e-mail: isah.aisah@unpad.ac.id; aksupriatna@gmail.com
* Correspondence: nurhayati_atikah@yahoo.com: Tel.: +08122031417

Abstract: Coastal areas in the South Coast of West Java Province have the potential to develop marine ecotourism, one of which is the Pangandaran area which must be transferred into economic value by not damaging natural resources. Marine ecotourism development is not only intended to raise foreign exchange for local governments, but are also expected to play a role in maintaining natural resources sustainably. This research aims to analyze the sustainable synergistic marine ecotourism development model. The method used in this research using quantitative descriptive method. The Quantitative descriptive method is used to describe the general condition of the research area, using primary and secondary data. The technique of taking respondents using accidental sampling as many as 50 respondents consisting of tourists, public figures, fishermen who have side jobs as a provider of marine ecotourism services. The analysis tool used is through a Rapfish model approach to measuring the synergistic model of sustainable development of marine ecotourism. Based on the results of a research on a sustainable synergistic marine ecotourism development model by measuring the ecological dimensions of environmental services in high conditions, the economic dimension of marine ecotourism is in moderate condition. Marine ecotourism technology in low conditions and social dimensions of marine ecotourism in low conditions. Model development of sustainable marine ecotourism synergistic with regard to the dimension of environmental, economic and social institutions should be able to form integrated from infrastructure to support marine ecotourism up to raise the level of income of fishermen who have a second job as a marine ecotourism providers. The infrastructure and regulatory dimensions are recommended to use the technology information to promote marine ecotourism optimally and regulations need to make marine ecotourism zoning rules and infrastructure improvements.

Keywords:

Keyword 1; marine ecotourism, coastal areas, fishermen, development models, sustainable

1. Introduction

Unsustainable natural resource management practices are an increasing problem in Pangandaran As overfishing and deforestation continues to degrade the environment, some community or fisherman members are looking towards marine ecotourism as a sustainable livelihood alternative. Tourism is a sector made up of many subcategories, such as nature

tourism, agrotourism, marine ecotourism and more. Ecotourism was first defined by Hector Ceballos-Lascurain in the early 1980's [1]. Tourism that involves travelling to relatively undisturbed natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects found in these areas. Ecotourism implies a scientific, aesthetic or philosophical approach, although the 'ecotourist' is not required to be a professional scientist, artist or philosopher. The main point is that the person who practices ecotourism has the opportunity of immersing him or herself in nature in a way that most people cannot enjoy in their routine, urban existences." [2].

Some considerations are the focus of marine ecotourism in coastal areas, because the coastal area is a huge marine tourism asset which is supported by geological potential and characteristics that are very closely related to coral reefs, especially hard corals, so it is very interesting to be developed as marine ecotourism such as diving and snorkeling. Ecotourism can contribute to maintaining biodiversity and ecosystem functions. [3,4]. Maritime tourism potential through natural resources that can be seen, such as coral reef ecosystems, reef fish, ornamental fish, seagrass and fishing.

The environment will be greatly influenced by human activities. The pressure of human activities on natural resources in coastal areas and small island islands will have an impact on ecological sustainability. [5,6]. The implications of developing maritime tourism activities as well as providing tourism support in coastal areas will have an impact on the physical, social, cultural and economic environment. Therefore, special considerations are needed in the development of marine ecotourism activities.

Marine ecotourism has the potential to cause changes in community behavior, waning social values and norms, loss of identity, as well as social conflict, shifting livelihoods and environmental pollution. Coastal areas in the South Coast of West Java Province have the potential to develop marine ecotourism, one of which is the Pangandaran area which must be transferred into economic value by not damaging natural resources. Marine Ecotourism is one of the two legal income activities in Pangandaran, the other being regulated fishing. Marine Ecotourism is a growing sector in Pangandaran and globally. The development of marine ecotourism in the coastal areas of the Pangandaran area directly or indirectly will have an effect on people's lives, especially for fishermen in the Pangandaran region [7].

The development of marine ecotourism in coastal areas will directly involve coastal communities, most of whom work as fishermen. The social characteristics possessed by fishing communities differ from other communities in general. This is caused by differences in the characteristics of the resources faced [8]. The development of maritime ecotourism is not only intended to increase foreign exchange for local governments, but is expected to play a role as a national scale development building, so that research on development models of Synergistic Sustainable Marine Ecotourism.

The maritime ecotourism development has several advantages, namely diversification of work for fishermen, increasing employment opportunities for fishing families, increasing local tax revenues, accelerating the process of income distribution, increasing the added value of ecotourism products, expanding domestic product markets, and providing multiplier effect on regional economy.[9]. Marine ecotourism development is not only intended to raise foreign exchange for local governments, but are also expected to play a role in maintaining natural resources sustainably.

 doi:10.20944/preprints201811.0346.v1

This research aims to analysis development model of synergistic sustainable marine ecotourism (Case Study in Pangandaran Region, West Java Province)

2. Materials and Methods

This research was conducted from February 2017 to March 2018. The research location in Pangandaran Region. The quantitative descriptive method is used to describe the general condition of the research area, using primary and secondary data. The technique of taking respondents using accidental sampling as many as 50 respondents consisting of tourists, public figures, fishermen who have side jobs as a provider of marine ecotourism services. The analysis tool used is through a Rapfish model approach to measuring the synergistic model of sustainable development of marine ecotourism.

Rapfish technique (a rapid appraisal tehnique for fisheries). This technique applies the multidimensional scaling (MDS) principles to assess the sustainability level of various dimensions of fishery resources. This technique is basically a statistical technique that performs a multidimensional transformation into is more simple dimensions[10].

In the MDS, two points of the same object are mapped in far-flung points. These points are very useful in regression analysis to calculate the "stress" that is a part of the MDS method [10,11]. Score on each attribute will form a matrix X, where x is the number of areas and p is the number of attributes used. A good model is indicated by the S-stress value smaller than 0.25 or $S < 0.25$ and R^2 close to 1. Index scales that assess the sustainability of the system have the interval of 0%-100%. In this research, there are four categories of status of sustainability, as seen in Table 1. In the MDS, two points of the same object are mapped in far-flung points. These points are very useful in regression analysis to calculate the "stress" that is a part of the MDS method [110,11,12]. Score on each attribute will form a matrix X, where x is the number of areas and p is the number of attributes used. A good model is indicated by the S-stress value smaller than 0.25 or $S < 0.25$ and R2 close to 1. Index scales that assess the sustainability of the system have the interval of 0%-100%. In this study, there are four categories of status of sustainability, as seen in Table 1.

Table 1 Category index and status of sustainability for marine ecoturism

No	Index value	Category
1.	0.0-25.00	Bad: not sustainable
2	25.01-50.00	Low: almost unsustainable
3.	50.01-75.00	Sufficient: simply sustainable
4.	75.01-100.00	Good: very sustainable

3. Results

Pangandaran districts are bordered by Ciamis in the North, Tasikmalaya in the West, Cilacap in the East and the Indian Ocean in the South. The coastal area surrounding this district belongs to six sub-districts. Utilizing marine ecotourism by enjoying coral reef ecosystems as objects in diving and snorkeling activities. The purpose of visitors in diving is not only limited to enjoying the hard coral, but soft coral is also an object in diving and snorkeling tours.[7,8,9].

Based on the research ecological dimensions used to determine the suitability of marine ecotourism diving tourism categories, namely the brightness of the waters, coral community cover, type of life form, types of reef fish, current velocity and depth of coral reefs. The activity of utilizing

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natural resources for the fulfillment of social and economic systems will affect the environmental processes and ecological systems The activity of utilizing natural resources for the fulfillment of social and economic systems will affect the environmental processes and ecological systems.

One of the efforts to balance natural resources as an object of marine ecotourism in Pangandaran needs to take into account the regional carrying capacity [13]. Carrying capacity as a concept based on environmental approaches and an important part in the study of natural resource management. Carrying capacity is defined as the ability of nature to tolerate human activities. Calculation of the carrying capacity of the marine ecotourism area based on the characteristics of the resource and its designation. Carrying capacity as a level of sustainable use of natural resources or ecosystems without causing damage to natural resources and the environment. Analysis to measure the development of synergistic model of sustainable marine ecotourism (Case Study in Region Pangandaran, West Java Province) approach some dimensions, that is : (1) environmental, (2) culture, (3) social, (4) economic,and (5) infrastructure for more details, as follows:

3.1. Environmental Dimension

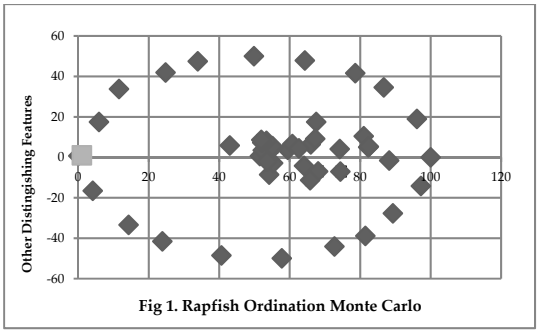

Fig 1. Rapfish Ordination Monte Carlo

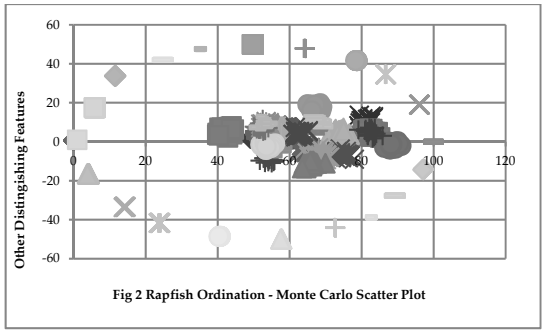

Fig 2 Rapfish Ordination - Monte Carlo Scatter Plot

The Fig 1 and 2 horizontal axis shows the difference in type of marine ecoturism in bad ordination (0%) to good (100%) for each dimension analyzed, while the vertical axis shows the difference from the attribute mix score between the type of marine ecoturism evaluated. The ordination analysis shows that the sustainability of marine ecoturism in the Pangandaran region varies between type of marine ecoturism, in terms of the sustainability of enviromental is between good and bad. Ordinance analysis in the enviromental dimension with the number of iterations is 2 (two) times, resulting in a quadratic value of correlation (R^2) of 93.73% and stress value (S) of 17.18%. From this stability indicator, it can be seen how far the results of the analysis are reliable.

Based on ordinance analysis, with Monte-Carlo simulation this is done to see the level of stability of results, can be seen in Figure 1 and 2. This Monte-Carlo simulation is essentially intended to see the level of disturbance (perturbation) to the value of the ordinance [14] and carried out by iteration 25 times. The results of Monte-Carlo analysis through scatter plots in the environmental dimension have experienced disturbance that will threaten the sustainability of marine ecotourism in Pangandaran region.

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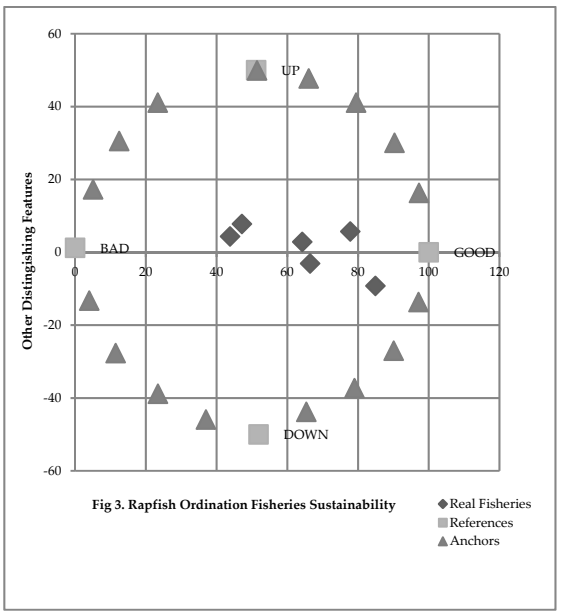

Fig 3. Rapfish Ordination Fisheries Sustainability

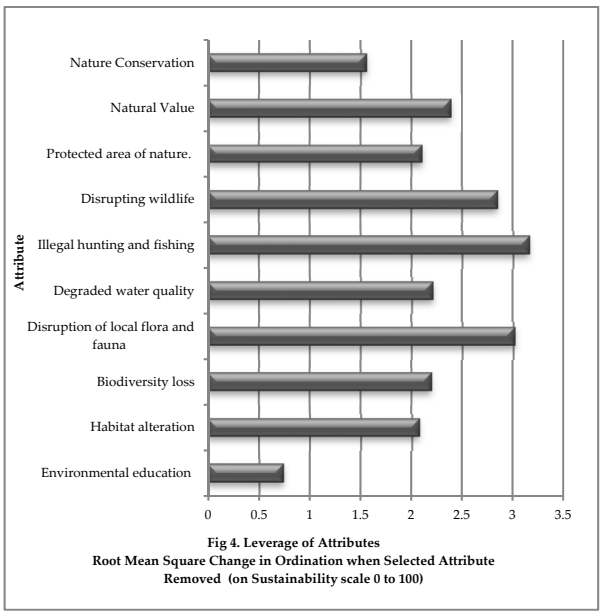

Fig 4. Leverage of Attributes
Root Mean Square Change in Ordination when Selected Attribute Removed (on Sustainability scale 0 to 100)

The stress value reflects the goodness of fit in multi-dimensional scaling (MDS), which shows the size of how precisely the configuration of a point can reflect the original data. Low stress values indicate good fit, while high stress values indicate the opposite condition. In the Rapfish model, the desired stress value is 25% smaller. Thus, the analysis of the enviromental dimension in this study shows the condition of goodnes of fit, considering the stress value obtained is 17.18%. (<25%).

The ordinance analysis of the results is shown in Figure 1,2,3 and 4, where the horizontal axis shows the difference in fisheries activities in bad ordinances (0%) to good (100%) for each dimension analyzed. While the veritical axis shows the difference from the score of attributes or indicators among the type of marine ecotourism activities that are evaluated. Then we divide the scale of the ordinance into four groups with different levels of sustainability, namely 0-25 is bad; 26-50 is low; 51 - 75 is sufficient and 76 - 100 is good, can be seen in the table 1 as follows:

Table 1 Sustainability Level type of Marine Ecotourism Environmental Dimensions in Pangandaran Region

No	Type of Marine Ecotourism	Dimension Enviromental	Status of Sustainability
1.	Business Ecotourism	47.119	Low
2.	Seasides Ecotourism	64.306	Sufficient
3.	Cultural Ecotourism	66.298	Sufficient
4.	Fishing Ecotourism	77.999	Good
5.	Cruise Ecotourism	43.796	Less
6.	Sport Ecotourism	85.186	Good

Environmental dimensions include: (1) nature conservation, (2) natural value, (3) protected are of nature, (4) disrupting wildlife, (5) illegal hunting and fishing, (6) degradation water quality, (7) disruption of local flora and fauna, (8) bidiversity loss, (9) habitat alteration and (10) environmental education. In Figure 4 it can be seen that the highest value of 3.171 illegal hunting and fishing has a high sensitivity value to the level of marine ecotourism sustainability. The environmental education attribute has the lowest value of 0.808, meaning that it has little sensitivity to the level of sustainability of marine tourism.

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3.2. Cultural Dimension

The culture of coastal communities is different from other communitiesHumans are cultural beings, and culture is the result of creativity, work, and joint initiatives. One of the factors that influence the formation of culture is the physical, natural environment; such situations and conditions will indirectly shape the character of the personality and culture of the people who live in that environment. The dependence of the community on the marine sector provides its own identity as a coastal community with a lifestyle known as coastal culture [15].

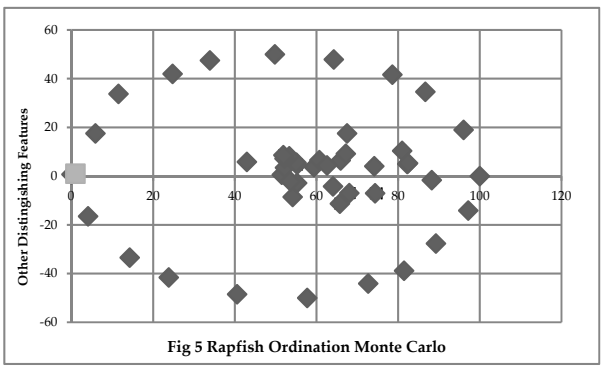

Fig 5 Rapfish Ordination Monte Carlo

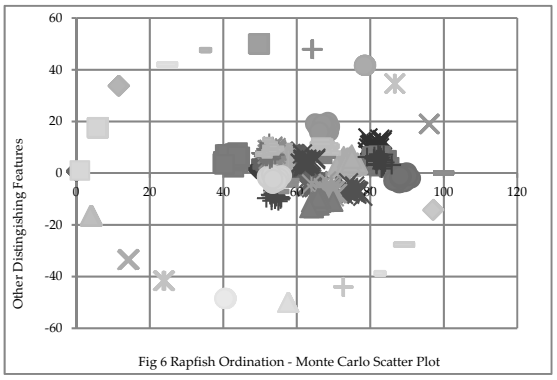

Fig 6 Rapfish Ordination - Monte Carlo Scatter Plot

The fig 5 and 6 horizontal axis shows the difference in type of marine ecoturism in bad ordination (0%) to good (100%) for each dimension analyzed, while the vertical axis shows the difference from the attribute mix score between the type of marine ecoturism evaluated. The ordination analysis shows that the sustainability of marine ecoturism in the Pangandaran Region varies between the type of marine ecoturism, in terms of cultural sustainability between good and bad. Ordinance analysis in the ecological dimension with the number of iterations 2 (two) times, resulted in a quadratic value of correlation (R^2) of 93.50% and stress value (S) of 18.68%. From this stability indicator, it can be seen how far the results of the analysis are reliable.

Based on ordinance analysis, with Monte-Carlo simulation this is done to see the level of stability of results, can be seen in fig. 6 this Monte-Carlo simulation is essentially intended to see the level of disturbance (pertubation) to the value of the ordinance [14], and carried out by iteration 25 times. The results of Monte-Carlo analysis through scatter plots in the environmental dimension have experienced disturbance that will threaten the sustainability of marine ecotourism in Pangandaran Region.

The fig 7 showed stress value reflects the goodness of fit in multi-dimensional scaling (MDS), which shows the size of how precisely the configuration of a point can reflect the original data. Low stress values indicate good fit, while high stress values indicate the opposite condition. In the Rapfish model, the desired stress value is 25% smaller[14]. Thus, the analysis of cultural dimensions in this research shows the condition of goodnes of fit, considering the value of stress obtained is equal to 18. 68%. (<25%).

The ordinance analysis of the results is shown in Fig 7 where the horizontal axis shows the difference in type of marine ecotourism activities in bad ordinances (0%) to good (100%) for each dimension analyzed. While the veritical axis shows the difference from the score of attributes or indicators among the capture fisheries activities that are evaluated

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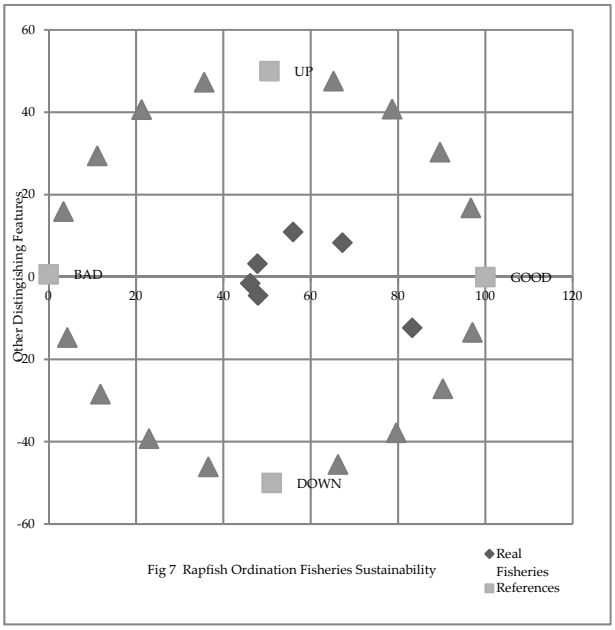

Fig 7 Rapfish Ordination Fisheries Sustainability

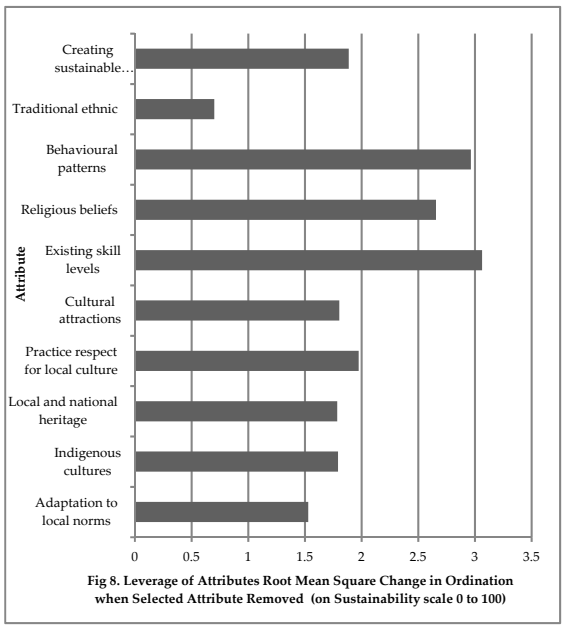

Fig 8. Leverage of Attributes Root Mean Square Change in Ordination when Selected Attribute Removed (on Sustainability scale 0 to 100)

Then we divide the scale of the ordinance into four groups with different levels of sustainability, namely 0-25 is bad; 26-50 is lacking; 51 - 75 is enough and 76 - 100 is good, can be seen in the table as follows:

Table 2 Sustainability Level type of Marine Ecotourism Cultural Dimension in Pangandaran Region

No	Type of Marine Ecotourism	Dimension Cultural	Status of Sustainability
1.	Business Ecotourism	67.259	Sufficent
2.	Seasides Ecotourism	47.820	Less
3.	Cultural Ecotourism	83.253	Good
4.	Fishing Ecotourism	55.973	Sufficent
5.	Cruise Ecotourism	47.971	Less
6.	Sport Ecotourism	46.158	Less

Cultural dimensions include: (1) creating sustainable livehoods; (2) traditional etnic; (3) behavioural patterns; (4) religious beliefs; (5) existing skill levels; (5) cultural attactions; (6) parctise respect for local culture; (7) local and national heritage; (8) indegenous culture; (9) adaptation to local norms. In the fig. 8 it can be seen that the highest value of 3.068 existing skill the level has a high sensitivity value for the level of marine ecotourism sustainability. The traditional ethnic attribute has the lowest value of 0.701, meaning that it has little sensitivity to the level of sustainability of marine tourism.

3.3.Social Dimension

Social dimension is a person's actions in certain ways in an effort to exercise the rights and obligations in accordance with status they have. A person can be said to play a role if he has carried out their rights and obligations in accordance with their social status within society. The World Tourism Organization (WTO), that: "Tourism comprises the activities of persons, traveling to and staying in place outside their usual environment for not more than one consecutive year for leisure, business and other purposes"[16].

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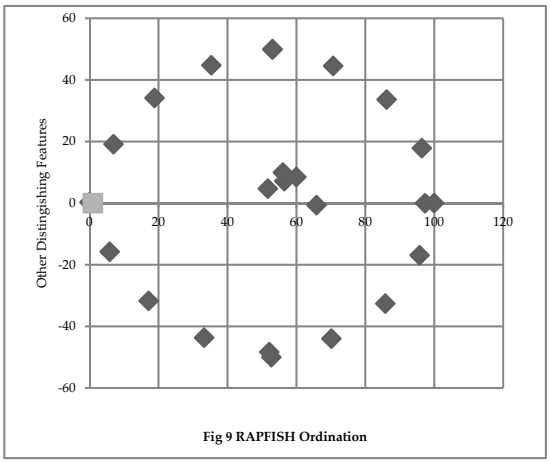

Fig 9 RAPFISH Ordination

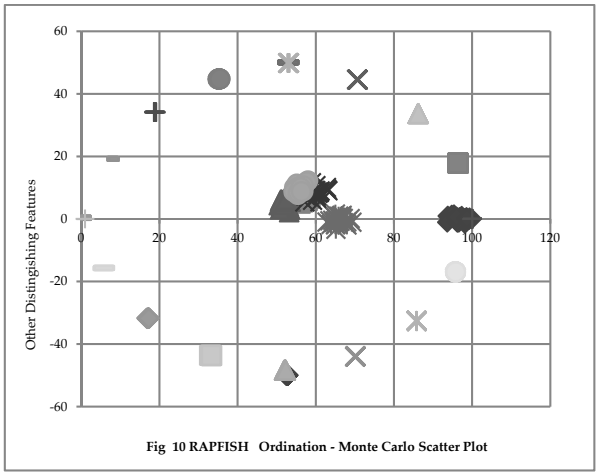

Fig 10 RAPFISH Ordination - Monte Carlo Scatter Plot

The horizontal axis shows the difference in Type of Marine Ecoturism in bad ordination (0%) to good (100%) for each dimension analyzed, while the vertical axis shows the difference from the attribute mix score between the Type of Marine Ecoturism evaluated. The ordination analysis shows that the sustainability of Marine Ecoturism in the Pangandaran Region varies between the Type of Marine Ecoturism, in terms of social sustainability is between good and bad. Ordinance analysis in the ecological dimension with the number of iterations is 2 (two) times, resulting in a quadratic value of correlation (R^2) of 92.62% and stress value (S) of 18.81%.

The stress value reflects the goodness of fit in multi-dimensional scaling (MDS), which shows the size of how precisely the configuration of a point can reflect the original data. Low stress values indicate good fit, while high stress values indicate the opposite condition. In the Rapfish model, the desired stress value is 25% smaller [14]. Thus, the analysis of the cultural dimension in this study shows the condition of goodness of fit, considering the stress value obtained is 18. 81%. (<25%).

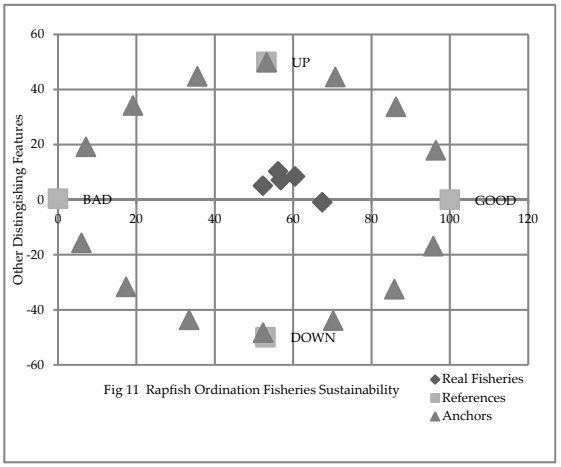

Fig 11 Rapfish Ordination Fisheries Sustainability

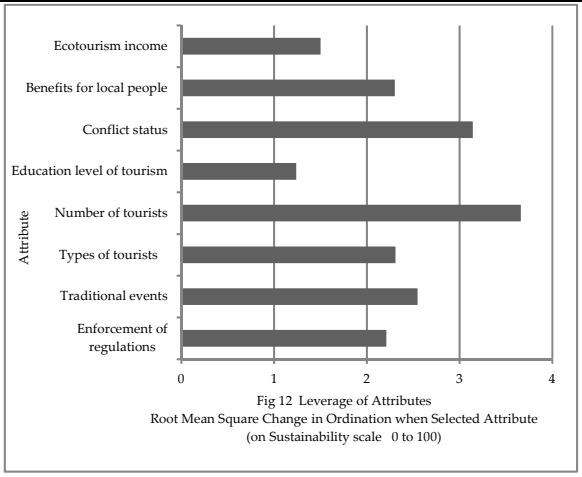

Fig 12 Leverage of Attributes
Root Mean Square Change in Ordination when Selected Attribute
(on Sustainability scale 0 to 100)

The ordinance analysis of the results is shown in Fig.11 where the horizontal axis shows the difference in type of marine ecotourism activities in bad ordinances (0%) to good (100%) for each dimension analyzed. While the vertical axis shows the difference from the score of attributes or indicators among the capture fisheries activities that are evaluated. Then we divide the scale of the ordinance into four groups with different levels of sustainability, namely 0-25 is bad; 26-50 is low; 51 - 75 is sufficient and 76 - 100 is good, can be seen in the table as follows:

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Table 3 Sustainability Level type of Marine Social Dimension Ecotourism in Pangandaran Region

No	Type of Marine Ecotourism	Dimension Cultural	Status of Sustainability
1.	Business Ecotourism	99,903	Good
2.	Seasides Ecotourism	56,861	Sufficient
3.	Cultural Ecotourism	52,295	Sufficient
4.	Fishing Ecotourism	60,510	Sufficient
5.	Cruise Ecotourism	67,461	Sufficient
6.	Sport Ecotourism	56,177	Sufficient

Social dimensions include (1) Ecotourism income; (2) Benefit for local people; (3) Conflict Status; (4) Education level of tourism; (5) Number of tourists; (6) Type of tourists; (7) Traditional events; (8) Enforcement of regulations. In the Fig 12 it can be seen that the highest value of 3.660 Number of tourists has a great sensitivity to the level of marine ecotourism sustainability. Attribute Education level of tourism has the lowest value of 1.239, meaning that it has little sensitivity to the level of sustainability of marine tourism.

3.4 Economic Dimension

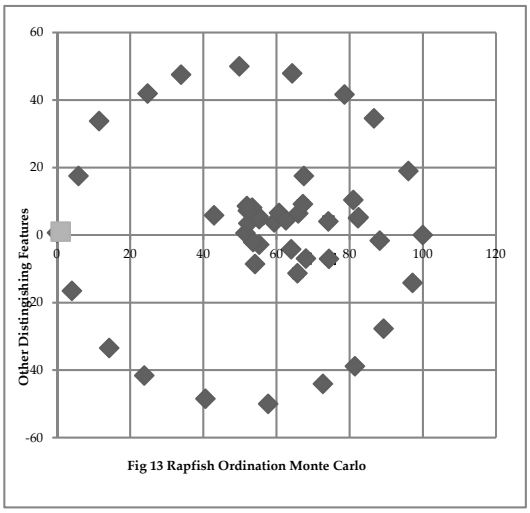

Fig 13 Rapfish Ordination Monte Carlo

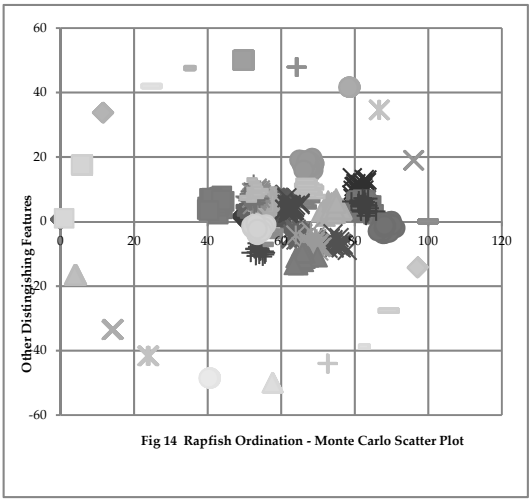

Fig 14 Rapfish Ordination - Monte Carlo Scatter Plot

The Fig 13 and 14 horizontal axis shows the difference in Type of Marine Ecoturism in bad ordination (0%) to good (100%) for each dimension analyzed, while the vertical axis shows the difference from the attribute mix score between the Type of Marine Ecoturism evaluated. The ordination analysis shows that the sustainability of Marine Ecoturism in the Pangandaran Region varies between the Type of Marine Ecoturism, in terms of social sustainability is between good and bad. Ordinance analysis in the ecological dimension with the number of iterations 2 (two) times, resulted in a quadratic value of correlation (R2) of 94.64% and stress value (S) of 17.21%. By looking at this stability indicator, it can be seen how far the results of the analysis can be trusted.

The stress value reflects the goodness of fit in multi-dimensional scaling (MDS), which shows the size of how precisely the configuration of a point can reflect the original data. Low stress values indicate good fit, while high stress values indicate the opposite condition. In the Rapfish model, the desired stress value is 25% smaller. Thus, the cultural dimension analysis in this reserach shows the condition of goodnes of fit, considering the value of stress obtained is 17.21%. (<25%).

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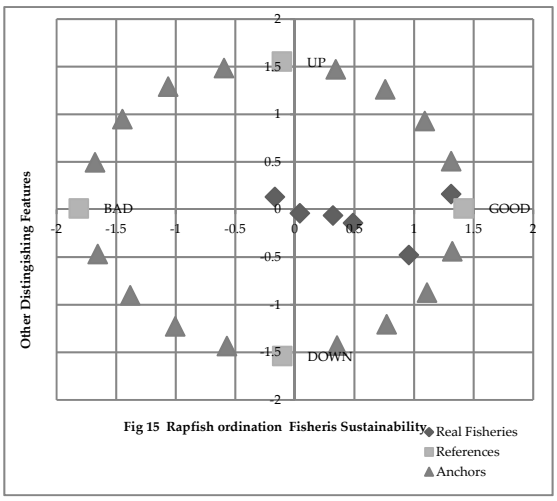

Fig 15 Rapfish ordination Fisheris Sustainability

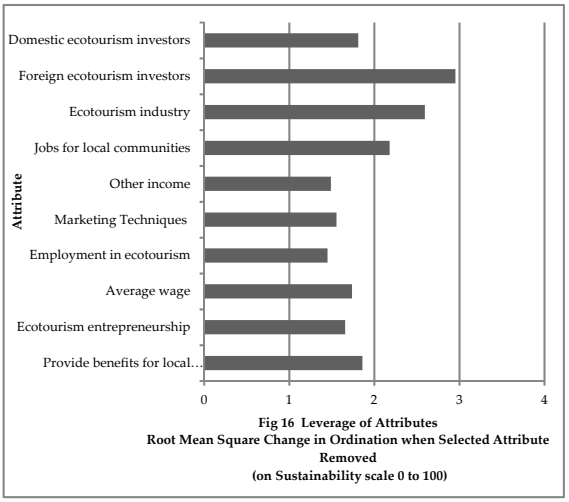

Fig 16 Leverage of Attributes
Root Mean Square Change in Ordination when Selected Attribute Removed
(on Sustainability scale 0 to 100)

The ordinance analysis of the results is shown in Fig.15 where the horizontal axis shows the difference in type of marine ecotourism activities in bad ordinances (0%) to good (100%) for each dimension analyzed. While the vertical axis shows the difference from the score of attributes or indicators among the capture fisheries activities that are evaluated. Then we divide the scale of the ordinance into four groups with different levels of sustainability, namely 0-25 is bad; 26-50 is low; 51 - 75 is sufficient and 76 - 100 is good, can be seen in the table as follows:

Table 4 Sustainability Level type of Marine Economic Dimension Ecotourism in Pangandaran Region

No	Type of Marine Ecotourism	Dimension Economic	Status of Sustainability
1.	Business Ecotourism	96.754	Good
2.	Seasides Ecotourism	50.948	Sufficient
3.	Cultural Ecotourism	85.784	Sufficient
4.	Fishing Ecotourism	71.250	Sufficent
5.	Cruise Ecotourism	66.048	Sufficient
6.	Sport Ecotourism	57.453	Sufficient

Economic dimensions include; (1) domestic ecoturism investor; (2) foreign ecotourism investors; (3) ecotourism industry; (4) jobs for local communities; (5) other income; (6) marketing techniques; (7) employment in ecotourism; (8)average wage; (9) ecotourism entrepreneurship; (10) provide benefits for local communities. In Fig.16 it can be seen that the highest value of 2.953 foreign ecotourism investors foreign ecotourism investors have a great sensitivity to the level of sustainability of marine ecotourism.

3.5. Infrastructure Dimension

Fig 17 and 18 horizontal axis shows the difference in type of marine ecoturism in bad ordination (0%) to good (100%) for each dimension analyzed, while the vertical axis shows the difference from the attribute mix score between the type of marine ecoturism evaluated. The ordination analysis shows that the sustainability of Marine Ecoturism in the Pangandaran Region varies between the Type of Marine Ecoturism, in terms of infrastructure sustainability is between good and bad.

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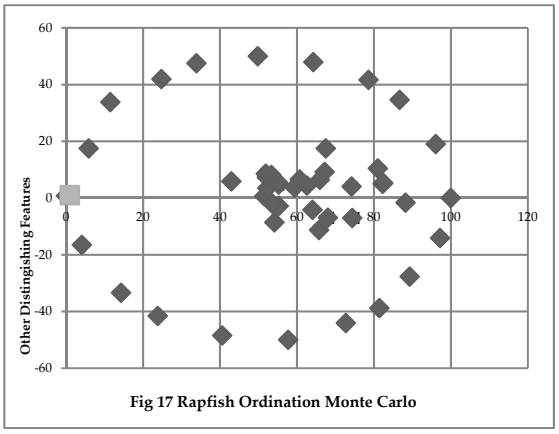

Fig 17 Rapfish Ordination Monte Carlo

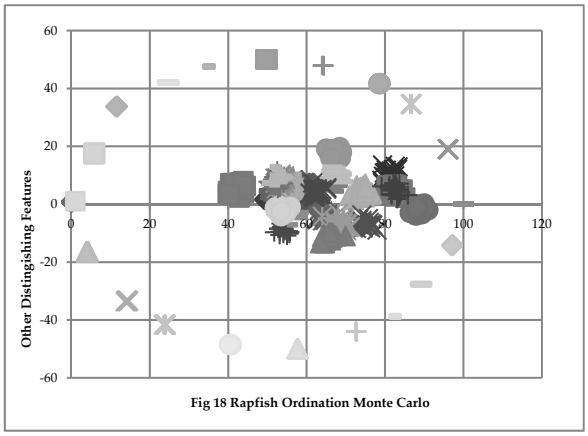

Fig 18 Rapfish Ordination Monte Carlo

293 Ordinance analysis in the ecological dimension with the number of iterations as much as 2
294 (two) times, resulted in a quadratic value of correlation (R^2) of 93.02% and stress value (S) of 17.42%.

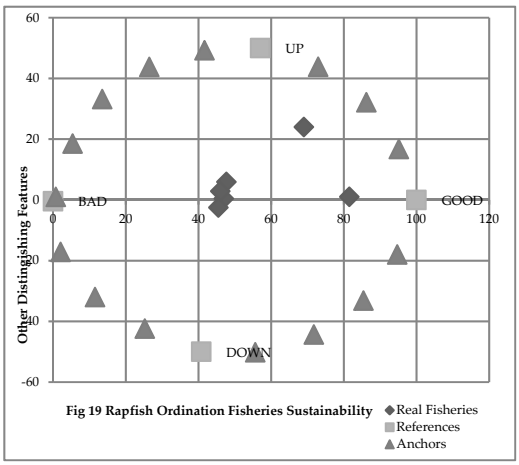

Fig 19 Rapfish Ordination Fisheries Sustainability

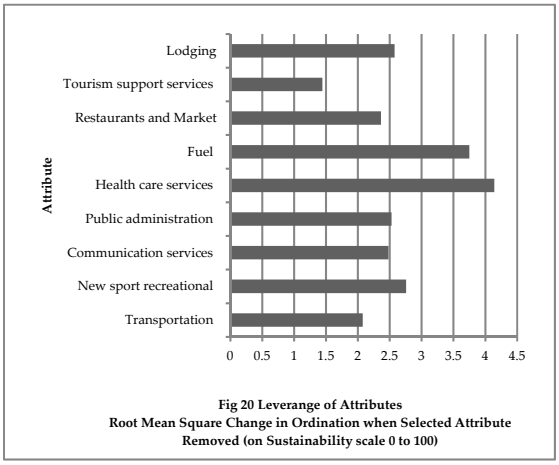

Fig 20 Leverange of Attributes
Root Mean Square Change in Ordination when Selected Attribute Removed (on Sustainability scale 0 to 100)

295 In the fig 20 it can be seen that the highest value of 4.149 health care service has a high
296 sensitivity value to the level of sustainability of marine ecotourism. Attribute Education level of
297 tourism has the lowest value of 1.444, Tourism support service means that it has a small value of
298 sensitivity to the sustainability of marine tourism

299 **4. Discussion**

300 Research location in Pangandaran District, West Java Province, Indonesia. In general,
301 Pangandaran has a tropical climate with 2 seasons, namely the dry season (east season) and the rainy
302 season (west season) with an average rainfall per year of around 1.647 mm, air humidity between
303 85-89% with temperatures of 20-30^{0}C. The east and west seasons will directly affect the number of
304 visitors to domestic and foreign tourists in Pangandaran. The east season occurs from May to
305 October, where during this season the sea is not large and the waters are calm, so that tourists can
306 enjoy the beautiful Pangandaran beach and water sports on Pangandaran beach.The east and west
307 seasons will directly affect the number of visitors to domestic and foreign tourists in Pangandaran.
308 The east season occurs from May to October, where during this season the sea is not large and the
309 waters are calm, so that tourists can enjoy the beautiful Pangandaran beach and water sports on
310 Pangandaran beach. The west season occurs from November to April, where in this season tourist
311 numbers are relatively decreasing due to sea conditions with large waves and relatively high
312 rainfall, making it difficult for tourists to do water sports.[17].

Fig 17 Pangandaran Map

Ecotourism potentially provides a sustainable approach to development [18]. In this scope, marine ecotourism is a form of natural marine resource-based tourism that is educational, low-impact, non-consumptive, and locally oriented: local people must control the industry and receive the bulk of the benefits to ensure sustainable development [19].Ecotourism to promote responsible travel to natural areas, to make a positive contribution to environmental preservation and to improve the welfare of local communities [20].

Based on this research Rapfish model approach to measuring the synergistic model of sustainable development of marine ecotourism through the approach environment, culture, social, economic and infrastructure dimension. Sustainability level type of marine ecotourism environmental dimensions in pangandaran region : (1) business ecotourism is low; (2) seasides ecotourism is sufficient; (3) cultural ecotourism is sufficient; (4) fishing ecotourism is good; (5) cruise ecotourism is less; (6) sport ecotourism is good. Marine ecotourism business is very complex, requiring entrepreneurial spirit to achieve profitability with no damage to the environment. Start-up ecotourism ventures have a high risk of failure and The marine tourism business faces challenges in conditions of uncertainty in natural resources. Environmental dimensions include: (1) nature conservation, (2) natural value, (3) protected are of nature (4) disrupting wildlife, (5) illegal hunting and fishing, (6) degradation water quality, (7) disruption of local flora and fauna, (8) biodiversity loss, (9) habitat alteration and (10) environmental education.

Maritime ecotourism focuses on local cultures from certain areas including coastal areas as well as natural beauty, geological structures, natural vegetation and fauna [21] and is a type of tourism that covers the subject of conservation of natural areas, education, economic benefits, quality tourism and local community participation [22]. Based on this research sustainability level type of marine ecotourism cultural dimension in Pangandaran Region: 1) business ecotourism is sufficient; (2) seasides ecotourism is less; (3) cultural ecotourism is good ; (4) fishing ecotourism is sufficent; (5) cruise ecotourism is less; (6) sport ecotourism is less. Three main principles in sustainability development [23]; (1) ecological sustainability, namely ensuring that development is carried out in accordance with ecological, biological, and diversity of existing ecological resources; (2) social and cultural sustainability, namely ensuring that the development carried out has a positive impact on the lives of the surrounding community and in accordance with the culture and values that apply to the community; (3) economic sustainability, namely ensuring that development is carried out efficiently economically and that the resources used can survive for future needs. Based on this research, cultural dimensions include: (1) creating sustainable livelihoods; (2) traditional ethnic; (3)

behavioral patterns; (4) religious beliefs; (5) existing skill levels; (5) cultural attractions; (6) parctise respect for local culture; (7) local and national heritage; (8) indegenous culture; (9) adaptation to local norms.

From a sociological perspective, marine ecotourism systems have three types of actors - 1) tourism brokers, 2) local tourism residents, and 3) tourists [24]. Interactions within and between these actors can affect the speed and character of coastal development and increase the income of coastal communities. Based on this research sustainability level type of marine ecotourism social dimension in Pangandaran Region: 1) business ecotourism is good; (2) seasides ecotourism is sufficient ; (3) cultural ecotourism is sufficient ; (4) fishing ecotourism is sufficient; (5) cruise ecotourism is sufficient; (6) sport ecotourism is sufficient. Maritime tourism not only promotes local economic growth, but also promotes social equality rights in the community and preserves the surrounding environment. Social dimensions include (1) ecotourism income; (2) benefit for local people; (3) conflict status; (4) education level of tourism; (5) number of tourists; (6) type of tourists; (7) traditional events; (8) enforcement of regulations.

Tourism is considered as combining time and pleasure, benefiting prospective tourists, the tourism industry and host countries with significant flowing effects at all levels and sectors of the local economy [25]. Based on this research sustainability level type of marine ecotourism economic dimension in Pangandaran Region: 1) business ecotourism is good; (2) seasides ecotourism is sufficient ; (3) cultural ecotourism is sufficient; (4) fishing ecotourism is sufficient; (5) cruise ecotourism is sufficient; (6) sport ecotourism is sufficient. Economic dimensions include; (1) domestic ecoturism investor; (2) foreign ecotourism investors; (3) ecotourism industry; (4) jobs for local communities; (5) other income; (6) marketing techniques; (7) employment in ecotourism; (8) average wage; (9) ecotourism entrepreneurship; (10) provide benefits for local communities.;

Based on this research sustainability level type of marine ecotourism infrastructure dimension in Pangandaran Region: 1) business ecotourism is good; (2) seasides ecotourism is sufficient ; (3) cultural ecotourism is sufficient; (4) fishing ecotourism is sufficient; (5) cruise ecotourism is sufficient; (6) sport ecotourism is sufficient. Infrastructure dimension include: (1) lodging; (2) tourism support services; (3) restaurant and market; (4) fuel; (5) health care service; (6) public administration; (7) communication service; (8)new sport recreational; (9) transportation.

5. Conclusions

This section is not mandatory, but can be added to the manuscript if the discussion is unusually long or complex.

6. Patents

This section is not mandatory, but may be added if there are patents resulting from the work reported in this manuscript.

Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1, Figure S1: title, Table S1: title, Video S1: title.

Author Contributions:

Conceptualization, A.N and A.K.S.; Data curation and formal analysis, A.N, I.A,A.K.S.; Funding acquisition, A.K.S.; Methodology, A.N, I.A and A.K.S.; Resources, A.N.; Software, A.N and A.K.S.; Visualization, A.N.; Writing—original draft, A.N and A.K.S. Writing—review and editing, A.N

Funding: This research was funded by the Academic Leadership Grant (ALG) Universitas Padjadjaran, Bandung, Indonesia.

Acknowledgments: This research was funded by the Academic Leadership Grant (ALG) Universitas Padjadjaran, Bandung, Indonesia.

Conflicts of Interest: The authors declare no conflict of interest

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