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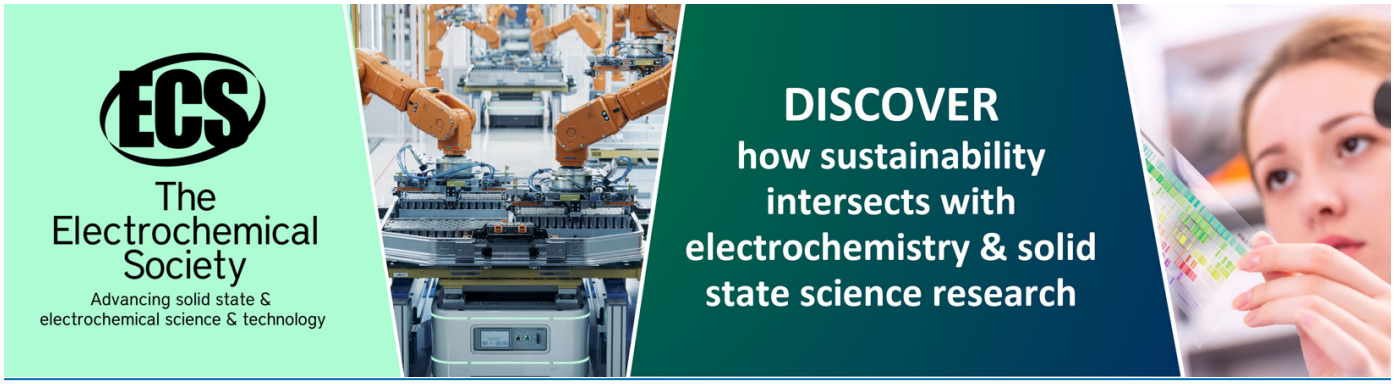

Potential tourism development for whale shark (*Rhincodon typus*) watching in eastern Indonesia

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Abstract. This study aimed to investigate the potential of whale shark watching as a form of marine wildlife tourism development in eastern Indonesia. By examining the existing operations in Gorontalo, Cendrawasih Bay, Kaimana and Teluk Saleh as sample sites, it was expected that an applicable design could be produced. Data were collected utilizing questionnaires administered to local communities and visitors to understand their perceptions and how they value this opportunity. Secondary data were utilised to explore and understand other aspects including the current situation of this type of tourism. Preliminary findings revealed that at three study sites (Botubarani, Gorontalo was the exception), whale sharks commonly emerge near *bagan* lift nets, as a response to the presence of their favourite prey, anchovies. Generally, anchovies visit *bagan* predominantly in the morning and stay for couple of hours before swimming away to deeper waters. From 220 community respondents in Labuhan Jambu village (Teluk Saleh), Kaimana (Selat Bitjari) and Botubarani, it was revealed that 89.1% know about the occurrence of whale sharks in their locality. Related to chlorophyll-a, the study results suggest that there is a correlation between chlorophyll-a, anchovies and whale sharks. Regarding management approach to this type of tourism, a local community-based management model is a strongly recommended option, with 69.5% of respondents showing an interest in this approach. Local government roles and responsibility in developing such tourism is extremely significant, especially to prepare community competency through training and education, as was suggested by nearly 30% of respondents.

1. Introduction

Whale shark tourism is a growing global industry that offers great opportunities for people to interact with whale sharks; it could also possibly provide an alternative income generation option to local communities in destination areas. For example, in Teluk Cendrawasih the total economic value of whale shark tourism in Cendrawasih Bay National Park (CBNP) reached IDR 142.35 billion per year [1]. Meanwhile, in Australia alone, over 100 wildlife tour operators collectively generate several billion dollars annually in revenue [2]. There is anecdotal evidence that the average income from whale shark watching in Botubarani is approximately IDR 250 billion per year (pers.com., 2018).

Whale sharks have been sighted in many places in Indonesia, including Probolinggo, Gorontalo, Teluk Saleh, Kaimana and Teluk Cendrawasih. These sightings mostly occurred close to floating lift nets called *bagan,* where the whalesharks can feed on anchovies which are one of their preferred prey. However, the conditions are different in Botubarani. At this site, the whale sharks do not aggregate

around *bagan*; instead, they appear at the sea surface in their search for seasonal schools of migratory fish larvae locally called "*nike*". In addition, some researchers have suggested that chlorophyll concentrations in the sea surface layer can be used to indicate the spatial distribution and help predict the presence of whale sharks [3,4].

As highly migratory species, whale sharks are exposed to many anthropogenic activities including illegal, unreported and unregulated (IUU) fishing [5]. The International for the Conservation of Nature (IUCN) has placed this species in its Red List with the status of vulnerable [6] because of an estimated population decline between 20 - 25% over the past 10 years. This fish is also listed in Appendix II of the Convention on International Trade in Endangered Species (CITES) which requires regulations on the trade in this species and any products thereof, in order to minimize population decline [1].

Recognising the threats facing this fish, several strategies has been proposed to protect this animal. One of these strategies is to establish a Marine Protected Areas and to develop whale shark watching tourism as an alternative livelihood opportunity for coastal communities in eastern Indonesia.

This study aimed to investigate the potential of whale shark watching as a part of wildlife marine tourism development in eastern Indonesia. By examining existing operations in Gorontalo, Cendrawasih Bay, Kaimana and Teluk Saleh as sample sites, it was expected that applicable designs could be developed. In addition, information on chlorophyll-a distribution was also collected to attempt to improve understanding of the factors affecting the occurrence of whale sharks in the study area.

2. Methods

This study was undertaken at four sites with whale shark watching operations: Teluk Saleh in Sumbawa, Selat Bitjari in Kaimana, Botubarani in Gorontalo and Kwatisore in Cendrawasih Bay National Park (CBNP) (Figure 1). Questionnaires were distributed to residents at three sites (Labuan Jambu in Teluk Saleh, Botubarani in Gorontalo and Kota Kaimana in Kaimana), while at two sites (Botubarani and Kwatisore) questionnaires were distributed to visitors. These questionnaires were deployed on-site by four trained enumerators from 15 May to 10 July 2018, and completed questionnaires were returned by 220 community respondents and 100 visitor respondents.

In order to gain a more holistic understanding of the operation of existing whale shark watching tourism in the study areas, several key informant interviews and focus group discussions were also held. Direct observation methods were also used during the study period with visits to *bagan* to watch whale sharks while swimming and diving.

Secondary data were collected on tourism infrastructure, facilities, visitor numbers, *bagan* and the anchovy fishery, the seasonal movements of whale sharks, etc. These data were collected through internet searches, from the scientific literature, grey literature (e.g. reports and unpublished studies), and contact with government agencies, non-governmental organizations and tour operators.

Statistical analysis was performed in SPSSv23 IBM. By coding the data, all qualitative information was converted to quantitative data. Prior to data processing, data validation was performed and data were checked for reliability, in order to ensure the data could be utilized for further tests. Analysis of Variance (ANOVA) was used to evaluate relationships between two variables in this study. In addition, all multiple answers were analysed by means of a multiple response test. Processed data and results from the analyses were tabulated and analysed graphically. Information collected from focus group discussion and key informant interviews was used to re-confirm (cross-check) the results of the statistical analysis.

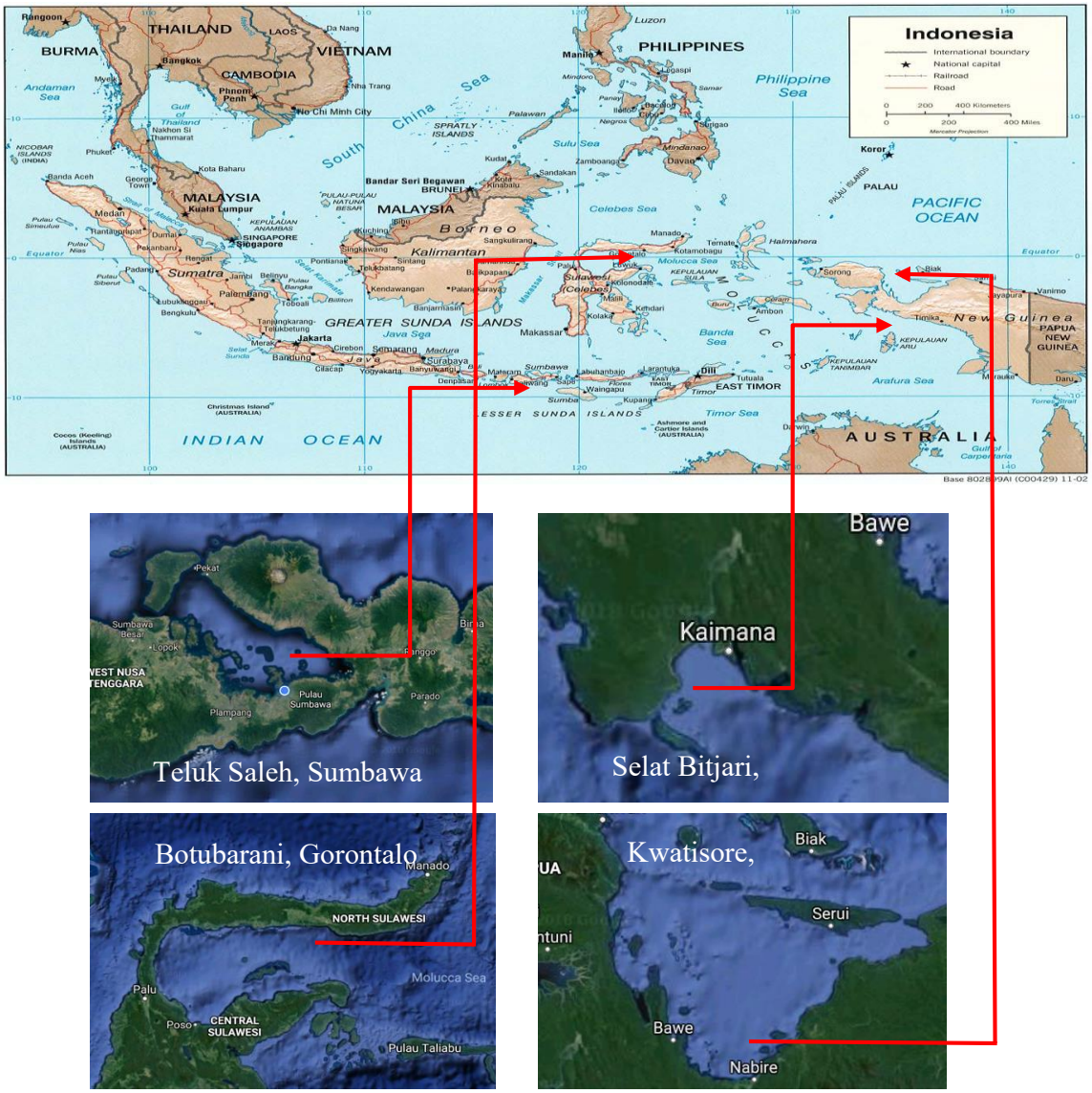

Figure 1: Maps showing the research site locations

3. Results

3.1. Whale shark presence

The whale shark, *Rhincodon typus*, is a large (up to 18 m in length) migratory species and filter-feeder that inhabits tropical and warm-temperate waters worldwide [5,6]. Although they are principally oceanic, seasonal whale shark aggregations occur in the shallow coastal waters of many countries. These aggregations take place for a few months of the year and because of their predictability, have become a focus of substantial ecotourism industries.

The distribution of whale sharks in Indonesia has not been well documented as yet; however efforts to improve knowledge are being continued. Various organizations have been collecting data and information on whale shark occurrences through direct observation and by collecting information from fishers. Table 1 shows a summary of places where the whale sharks are known to be commonly sighted. Data collected from various sources were compiled to produce this table.

Table 1: Indonesian sites where whale shark sightings are common (compiled from various sources)

No	Location	Reported sightings	Length (m)	Number of individuals	Remarks
1	Anambas, Riau	July, 2006	3-4	1	Reported by fishers
2	Pesisir Selatan, West Sumatera	April, 2007	5	1	Reported by fishers
3	Pangandaran, West Java	Sep, 2010	4	1	Reported by fishers
4	Kendal, Central Java	Feb, 2009	7	2	Reported by fishers
5	Jepara, Central Java	Dec, 2007	3	1	Reported by fishers
6	Karimun Jawa, Central Java	Dec, 2010	12	1	Reported by fishers
7	Surabaya, East Java	Oct, 2009	7	1	Reported by fishers
8	Banggai Kepulauan	May, 2009	5	1	Photo-ID
9	Probolinggo, East Java	Jan, 2009	5	26	Photo-ID
10	Botubarani, Gorontalo	June, 2018	4-12	30	Photo-ID
11	Teluk Saleh	All year round	4–12	42	Photo-ID
12	Teluk Cendrawasih		4–12	126	Photo-ID

Cendrawasih Bay National Park (CBNP) is a site where there is considerable information on whale shark occurrence throughout the period 2012 to 2015 [3]. This compilation shows that whale sharks are present in CBNP nearly throughout the year (Table 2), however there appeared to be peaks in sightings in the early months of the year (January to March) with inter-annual variations.

Table 2: Whale shark occurrence in CBNP (adapted from [3])

Month	2012			2013			2014			2015		
	D	A	D/A	D	A	D/A	D	A	D/A	D	A	D/A
Jan	31	610	20	18	115	8	9	24	3	14	39	3
Feb	29	580	20	28	396	14	16	54	3	11	23	2
Mar	31	853	28	31	248	8	16	27	2	5	17	3
Apr	30	544	18	30	156	5	17	7	0	-	-	-
May	23	258	11	30	156	5	19	48	3	-	-	-
Jun	27	91	3	17	99	6	19	0	0	-	-	-
Jul	18	35	2	19	81	4	21	0	0	-	-	-
Aug	8	14	2	17	55	3	21	0	0	-	-	-
Sep	21	44	2	26	100	4	16	0	0	-	-	-
Oct	19	104	5	10	30	3	10	167	17	-	-	-
Nov	8	15	2	4	27	7	18	57	3	-	-	-
Dec	11	15	1	5	21	4	9	33	4	-	-	-
Total	256	3163		235	1484		191	417		30	79	

D: number of observations (days); A: number of whale sharks sighted; D/A: daily average

The Agency for Coastal and Marine Resources Management (BPSPL Makassar) has reported that 17 individual whale sharks have been identified in Botubarani, Gorontalo Province. The number of whale sharks sighted is normally around 10 individuals per day. In addition, fishers reported that they often sighted groups of between 8 to 10 whale sharks during fishing. One difference with the other sites is that, in addition to the occurrence of their natural prey, whale sharks in Botubarani were also stimulated to congregate by intentional feeding with the head and carapaces of vannamei shrimp (*Litopenaeus vannamei*) to provide a tourism attraction. Furthermore, during the first nine months of

2018 the BPSPL Makassar and Whale Shark Indonesia report the recording of 30 individual whale sharks in Botubarani using photo-ID.

In Teluk Saleh, Sumbawa, whale sharks are commonly sighted around *Bagan* (a lift-net fishing gear). *Bagan* fishermen target anchovies, and the presence of whale sharks is thought to be a response to the presence of their favourable food, anchovies. Conservation International has conducted monitoring of whale sharks in Teluk Saleh, mostly around *bagan,* using the photo-ID method. This program has identified 42 individual whale sharks commonly aggregating in these waters (*unpublished data*).

According to local fisherman in Labuan Jambu village (Teluk Saleh, Sumbawa), the emergence of whale sharks in this area has been observed since 1992 (Bapak Budiamin, personal communication). Furthermore, fishermen actively seek whale sharks, as they believe that many target fish will be found nearby. According to these fishermen,June is the peak season for whale shark sightings. During surveys in Teluk Saleh, we sighted 4 whale sharks in May 2018, and 7 whale sharks in June 2018, both close to *bagan*.

In Selat Bitjari, Kaimana), especially near the village of Mai-Mai, whale sharks were also generally associated with *bagan*. *Bagan* fishermen reported that 2 to 4 whale sharks nearly always visited the *bagan* every morning at 7am and stayed for approximately an hour searching for anchovies.

3.2. The chlorophyll distribution

The information on chlorophyll distribution is significant because many researchers have suggested that the distribution of chlorophyll in the water column and the presence of anchovies can be utilized as an indicator of whale shark distributions. For example, a study in Kwatisore (CBNP) showed that the concentration of chlorophyll-a appears to stimulate the presence of whale sharks [4]. This study showed a positive correlation between the frequency of whale shark appearance in December and March, and the chlorophyll-a concentration (Figure 2).

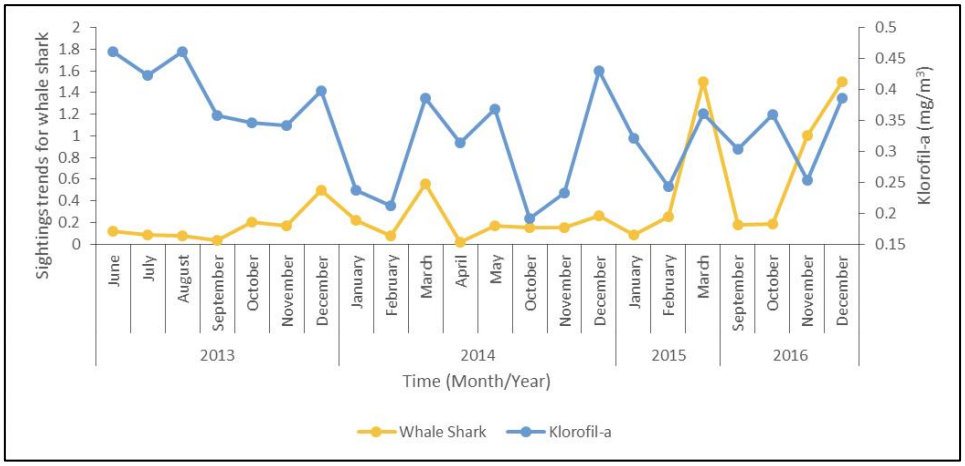

Figure 2: Temporal relationship between whale shark sightings and chlorophyll-a concentration (adapted from [4])

In Teluk Saleh, information on the distribution of chlorophyll-a [8] is presented in order to help better understand the movements of whale sharks (Figure 3). Some scholar suggested that high levels of chlorophyll-a are also associated with *Acetes s*p., krill-like small shrimps locally called *udang rebon* or *masin*. According to Budiamin (a fisherman from Labuan Jambu), whenever the small shrimps appear, this triggers the whale sharks to come; this is an obvious case of the food chain principal being applied. Other studies have suggested that the timing of whale shark aggregations often corresponds with local blooms of phytoplankton or with the spawning of fishes or corals [9].

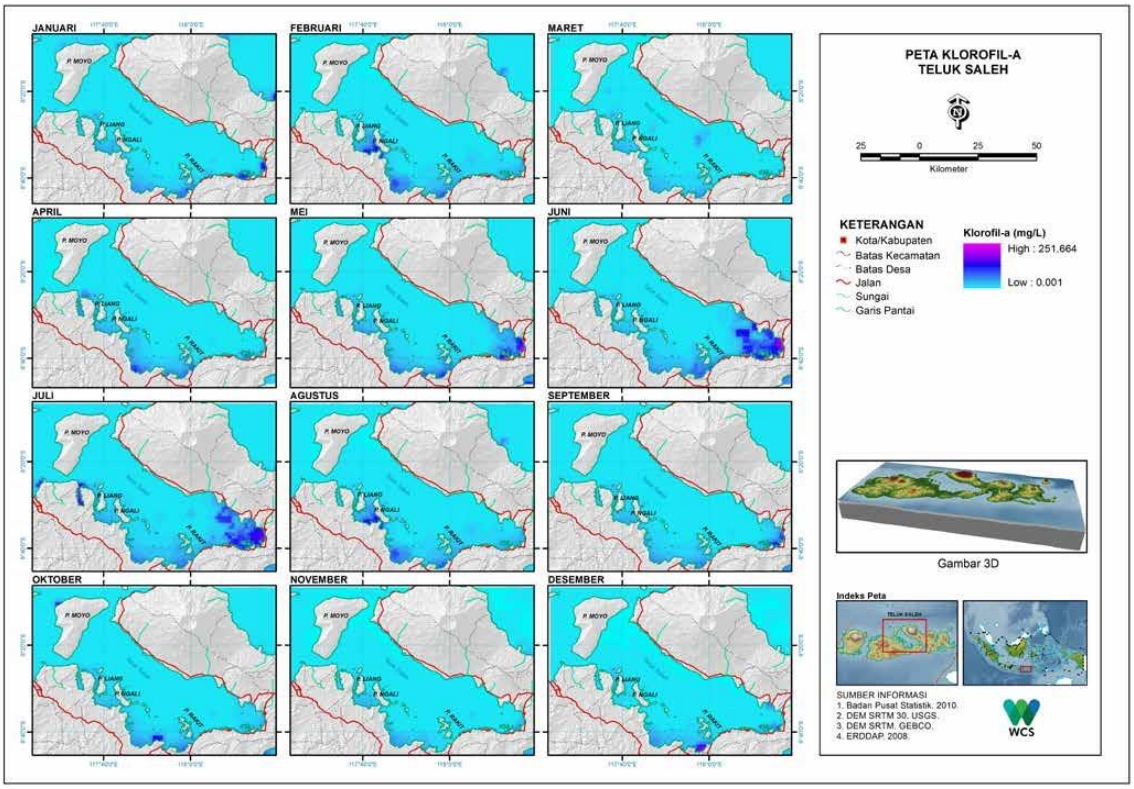

Figure 3: The distribution of chlorophyll-a in Teluk Saleh (Source: WCS report [8])

3.3. The economic value of whale shark tourism

Whale shark tourism activity is now becoming popular in Indonesia, and Botubarani and Cenderawasih Bay National Park (CBNP) are among the destinations for this tourism activity. It is predicted that Teluk Saleh and Selat Bitjari will be soon become whale shark watching destinations. This study attempted to explore the benefits whale shark tourism can provide to local communities. Based on previous research, it is important to understand the economic value of whale sharks, and so various methods were used, in particular collecting information on and calculating tourist willingness to pay and tourist expenditure.

In the CBNP, a study using tourism data for 2015 [1] suggested that local visitors will spend approximately IDR 1.4 million per visit and international visitors will spend approximately IDR 18.9 million per visit. Thus the total economic value of whale shark tourism in CBNP was around IDR 142.35 billion per year or US$ 10.54 million [1]. This can be compared to the situation in the South Ari Atoll, Maldives, where a study estimated the direct expenditure on whale shark excursions at US$7.6 ± 2.7 million in 2012 and $9.4±2.0 million in 2013. These estimates were based an annual volume of tourists involved in whale shark excursions of 72,000–78,000 [10]. Meanwhile, a separate study in the Maldives [11] reported that, based on a willingness to pay survey, tourists would be willing to pay an additional US$106±15 per trip (mean±SD) on top of the regular dive price in order to see sharks in their natural environment, and would be willing to donate US$56±6 (mean±SD) towards a shark conservation fund [11].

3.4. Community participation in whale shark tourism

In the process of sustainable tourism development, community perception, participation and empowerment are considered as a critical component of success. This study attempted to asses these components.

Participation is a vital component of the self-help process and people must be involved in the decisions that are likely to affect their quality of life. Through participation they gain confidence, self-esteem and knowledge, and develop new skills [12]. Through participation the community would have opportunities to decide on the direction of development they would like to see. Several hierarchies of community participation have been described, such as the "ladder of citizen participation" proposed by [13]. Other classifications of community participation described in [14] include the three clusters of coercive participation, induced participation and coercive participation proposed by Tosun and the Pretty and Hine typology of participation comprising manipulative participation, passive participation, participation by consultation, participation for material incentive, functional participation, interactive participation and self-mobilization. These three hierarchies are summarized in Figure 4 [14].

Level 1	7. Self-mobilization 6. Interactive participation	8. Citizen control 7. Delegated power 6. Partnership	Spontaneous participation: Bottom-up; active participation; direct participation; participation in decision making; authentic participation; self planning.
Level 2	5. Functional participation 4. Participation for material incentives 3. Participation by consultation	5. Placation 4. Consultation 3. Informing	Induced participation: Top-down; passive; formal; mostly indirect; degree of tokenism, manipulation; pseudo-participation; participation in implementation and sharing benefits; choice between proposed alternatives and feedback;
Level 3	2. Passive participation 1. Manipulative participation	2. Therapy 1. Manipulation	Coercive participation: Top-down, passive; mostly indirect, formal; participation in implementation, but not necessarily sharing benefits; choice between proposed limited alternatives or no choice; paternalism, non-participation, high degree of tokenism and manipulation.
Level 4	**Non-participation**		
	Pretty's (1995) typology of community participation	Arnstein's (1969) typology of community participation	Tosun's (1999) typology of community participation

Figure 4: Summary of Normative Typologies of Community Participation [14]

To explore the kind of participation communities in the study area would prefer, we asked a question on participation with three options based on the Tosun three-tier concept. The results (Figure 5) show that 85% of respondents preferred *direct and active participation*, while only 14.5% chose *indirect and passive participation* and only a very small percentage selected *coercive participation*.

To gain a more in-depth perception on community participation in managing the whale shark tourism, we offered the respondents three models to choose from. The results (Figure 6) show that around two-thirds of community members preferred the model *"owned and managed by local community"* (69.5%), while over a quarter chose *"owned by outsiders and managed by locals"* (27.3%) while a small minority selected *"owned and managed by outsiders"* (3.2%).

One interesting finding from the study was that, during the process of initiating the development of whale shark tourism in Botubarani, Labuan Jambu and Kota Kaimana, communities had been involved. There had been meetings at which they discussed the issues together.

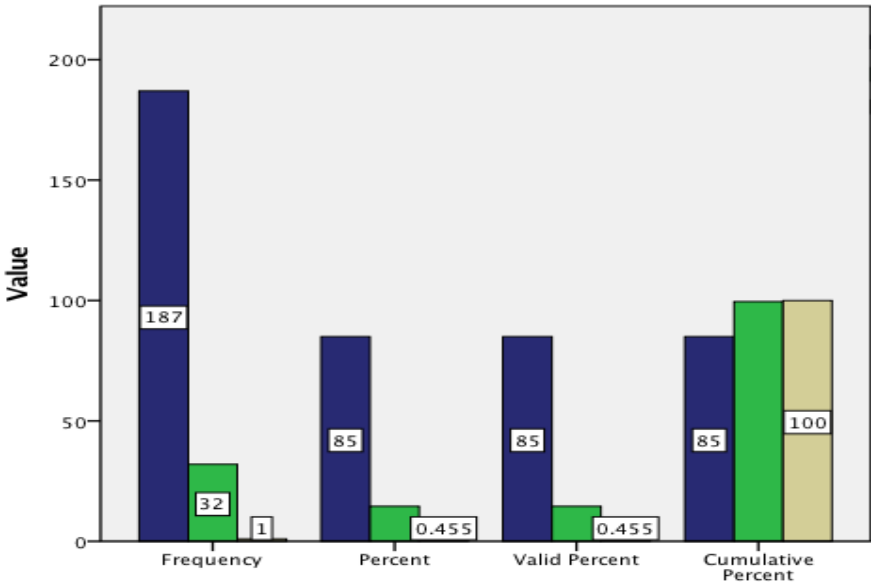

Figure 5: Type of participation community members would prefer. Legend: Dark blue = direct and active participation; green = indirect and passive participation; buff = coercive participation

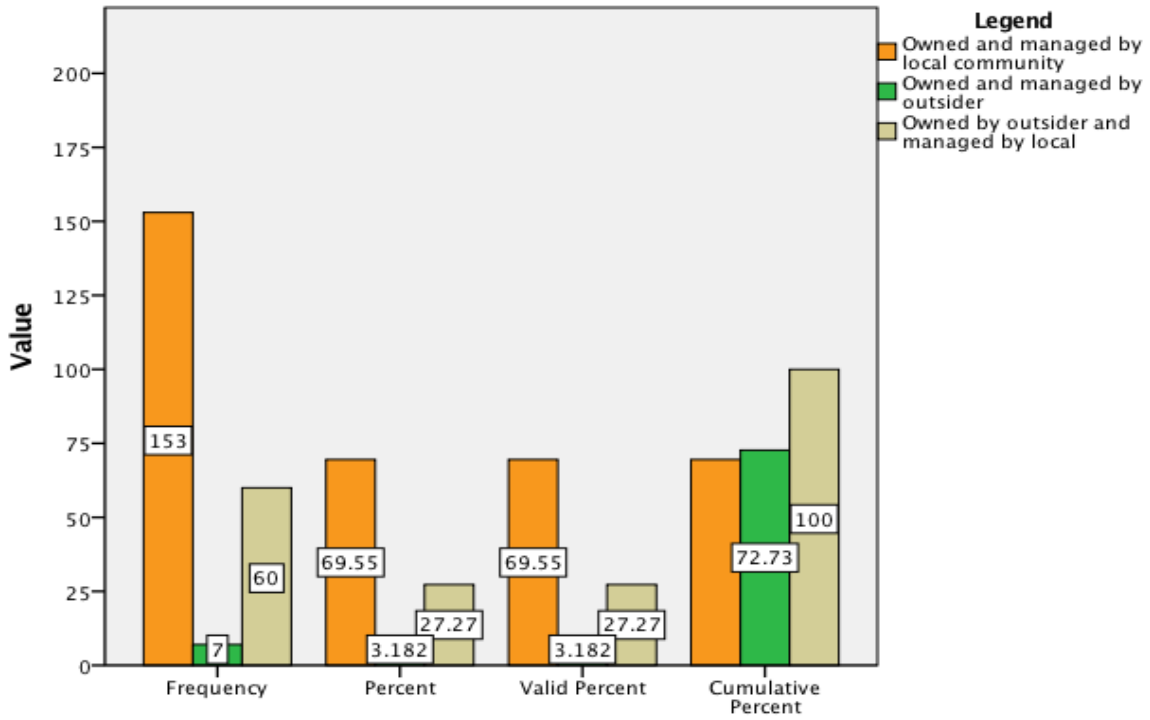

Figure 6: Management model that communities would prefer

3.5. Government roles and responsibilities

In many developing countries such as Indonesia, the government has played a major role in the evolution and development of the tourism industry. In this regard, apart from being involved in the formulation of tourism policy framework, and the development and initiation of the tourism development plan, governments in many developing countries have been actively engaged in tourism entrepreneurial activities, for example with regards to the operation and provision of hospitality and

other tourism facilities and services. Much research has explained and justified government involvement in the development and evolution of tourism, in developing countries in particular, and other countries in general [15]. The degree of active involvement in tourism development by government tends to reflect the importance of the tourism sector to the national or regional economy.

In this study we have asked the opinion of community members regarding the roles and responsibilities of government, with four options: provide training; promotion; provide infrastructures; and provide regulation. The results from 3 study sites combined (Figure 7) show that all four options were selected by around a quarter of the respondents.

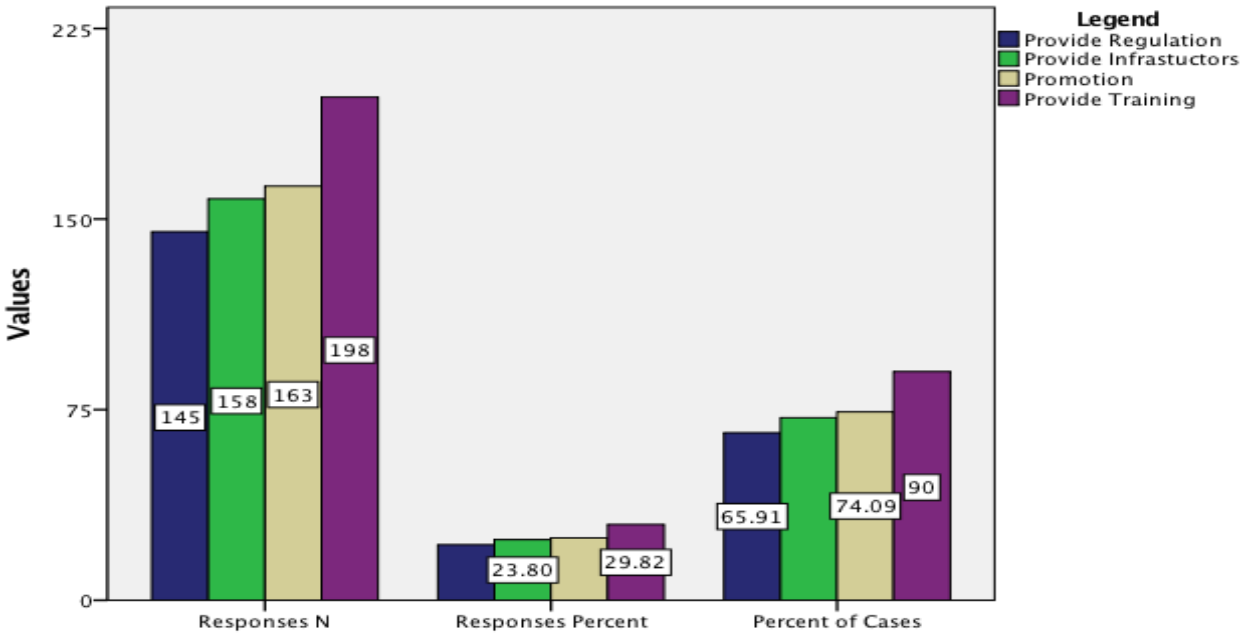

Figure 7: Community responses regarding the roles and responsibilities of government

3.6. Infrastructure availability

Tourism relies heavily on four component elements: attraction, accessibility, accommodation and amenities. These components played significant roles in the development of whale shark tourism watching development in the study area. In Botubarani, access from Gorontalo is relatively easy, with several options; the study revealed that most visitors used land transportation such as cars and motor-bikes to reach Botubarani. In Teluk Cendrawasih, Kaimana and Labuan Jambu, visitors used both cars and boats to reach the sighting locations.

In term of accommodation, in Botubarani visitors could only stay in Gorontalo, where hotels and simple accommodation are available. Similar accommodation is also available in Kaimana and Kwatisore, while in Labuan Jambu the community is about to initiate the provision of simple accommodation such as homestays where visitors are able to stay with a host family and share experiences with them such as the local culture. Another important element is that, at each site, the actual sighting experience required dedicated transportation by sea. The price for these trips, e.g. taking a boat to a *bagan,* was greatly influenced by the distance and varied among locations.

4. Discussion

When attempting to develop tourism in general, and wild-life tourism such as whale shark watching tourism in particular, there are bound to be many challenges and various factors need to be considered and fully understand. This includes ecological, socio-cultural, economic and governance factors.

4.1. Ecological aspects and their influence

Concerns over the ecological effects of tourism have been raised since 1960, when many scholars realized that the tourism industry had the capability to either moderately alter or completely transform destinations in adverse ways. In the case of whale shark watching tourism, it is crucial to maintain the habitat and ecosystem of the whale shark in order to ensure that this natural resource is available long term. Over the past 10 years, several tagging studies has been initiated on whale sharks in various parts of the world. Conservation International Indonesia has been conducted such tagging in Teluk Saleh, Kaimana and Teluk Cendrawasih in collaboration with various organizations. The BPSPL Makassar, a working unit from MMAF, has also conducted a similar approach in Botubarani. These studies are mainly aimed at understanding the behaviour and movement patterns of this animal, and making information available to promote better management of whale shark tourism. Marine Protected Areas (MPAs) are one approach that it could be useful to consider. In this study site, two locations (Kaimana and Teluk Cendrawasih) are managed under an MPA approach, while the other two are not.

4.2. Economic aspects and their influence

If the ecosystems and habitats of whale sharks are fully maintained, the economic aspect would be influenced in a positive way, as this would provide or maintain income generation for locals and other relevant stakeholders involved in this tourism. In Botubarani, a community tourism group (Pokdarwis) has been generating and managing almost IDR 50 million per month as the income generated from whale shark watching tourism. In addition, tourism can draw the attention of policy makers to provide better infrastructure in destination areas. However, learning from other places such as Bali and Lombok, although communities in the destination areas have greater economic opportunities and tend to generate higher incomes than before, there are also many draw-backs. For example almost everything has become more expensive, including food, raw materials, and even the price of land which is rapidly increasing.

4.3. Socio-cultural aspects and their influence

The socio-cultural aspect is extremely influential and needs to be considered carefully. Socio-cultural is a hybrid term, widely used to refer to traits, conditions and changes in both social organization and the culture of a group of people. Tourism can influence culture in a positive or negative way. For example it might promote and help retain certain aspects of traditional culture or conversely accelerate their disappearance. It is not unusual for tourism to help nurture cultural activity at a destination, including elements previously fading away. On the other hand, tourism can contribute to various social problems as well promoting the migration of people to destination areas looking for job opportunities, changes of life style, etc.

It is interesting to look at Doxey's socio-cultural impact model of tourism development. This begins with a *euphoria* stage when residents begin to support tourism development and are ready to share their community with visitors. This stage is most likely to occur when local economies have been stagnant and tourism seems to offer new opportunities for growth. This support is based on economic projections that often tend to ignore or downplay social factors. The *apathy* stage may follow, in situations where tourism has become integrated and accepted as part of the community's economic base and is no longer a novelty. The social structure of the destination area may well have changed, with significant migrant influx, and local people may view tourism benefits as accruing to a limited number of residents (often migrants). Many no longer believe in the once hoped-for economic potential and job opportunities from tourism, and do not see tourism as an important factor in their lives and livelihoods. The *irritation* stage is likely to arise when tourism development has not been planned in sustainable way, for example in terms of zoning. Local residents must now share with outsiders areas that used to be their own livelihood or recreational areas. If the environment or the attractiveness of the local area is drastically modified (reduced) through development, visitor numbers may decrease resulting in economic decline. At this time the poorly unplanned tourism development begins to receive attention and local residents perceive a loss of income or some other aspect of

quality of life, and start to blame tourism for this loss. Finally, the situation may degrade to the stage of *antagonism* where the sense of loss income and place become more profound, residents start to blame tourists for the change rather than the unplanned and uncontrolled development processes which led to this situation. This situation may be further compromised as the type of tourist most likely to visit once the euphoria stage is over is likely to be an entirely new type of visitor, less interested in local customs and traditions and more drawn to specific physical attractions which may not be viewed as positive by local communities.

4.4. Governance factor

Managing stakeholder interests in the tourism sector needs integrated approaches. Factors involved in governance include controlling regulations, market regulations, civil society, contextual control, self-regulation, and cooperative management. Ideally, all these aspects should be taken into consideration when developing any nature-based tourism where communities are central to the development.

In the aspect of controlling regulations, the government acts a regulator of social change and therefore establishes legally binding rules to control business activities, the utilization of natural resources, etc. For example, the Minister of Marine Affairs and Fishery issued the regulation No 18/Kepmen-KP/2013 to fully protect the whale shark. Under the market regulation aspect, the role of government is mainly as a facilitator of market processes and to ensure fairness in their implementation. In this context, the self-interest of government should be seen not as a problem but rather as a solution.

The involvement of communities in tourism development should help to ensure good results during the process involved, where social society is empowered. Communities should be given an opportunity to play a key role and to create trust and cooperation. Often the community is seen as social capital, in that they have shared norms and values and systems which can be activated by and for goals of mutual benefit.

In the aspect of contextual control and self-regulation, tourism operators, NGO and community's play a key role. We expect that these stakeholders should be able to voluntarily promote regulations and best practices during the implementation of whale shark watching tourism. There is a strong belief that if these social actors understand their working environment, then they know how to (1) manage their affairs without government help; (2) solve their own problems; and (3) take a lead in terms of planning and implementing an appropriate product.

Cooperative management is also important to promote collaboration during implementing tourism development. At the local level, community development initiatives such as whale shark watching tourism have a better opportunity of being accepted by local people if developers acknowledge that different groups within a community want different things, including roles, functions and responsibilities. Establishing community cooperation to manage whale shark watching tourism activity at community level is good idea and might ensure better outcomes in many cases.

5. Conclusion

Developing nature-based tourism centred around local communities is becoming increasingly popular. Ensuring the engagement and direct participation of local people in the initiation process will help further steps. In order to protect the object of interest, in this case the whale shark, it is vital to have a management plan to ensure the sustainable use of this animal for non-extractive tourism. Finally, co-management or close cooperation among various stakeholders relevant is also important.

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