

MARINE PARK MANAGEMENT: ISSUES AND CHALLENGES

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ABSTRACT

This paper describes the main issues causing the degradation of marine park resources and also explains the challenges faced by Sabah Parks in managing them. Generally, the degradation of marine park resources is caused by two factors namely natural and human interference. The natural causes are very significant because their effects are continuous and occur at a larger scale compared with that of human cause. Therefore, not many actions can be carried out on the ground because they are of universal issues. For the human interference effects, various actions and strategies had been implemented. However, the implementation is less effective because of inadequate manpower, logistics and financial resources.

At present, one of the problems faced by Marine Park Management is to conserve and maintain marine park resources. In 1996, the tropical storm Greg which hit the park areas had caused a loss of live coral cover, and exposed reefs turned to coral rubble. These impacts together with human activities had caused increased and serious degradation to marine park resources. The degradation of marine parks shall affect the sustainability of tourism in the marine parks in the future. Although various strategies had been implemented to control these problems, degradation of marine park resources still occurs. It is suggested that public awareness regarding the importance to preserve and maintain all these marine park resources should be emphasised through education programmes.

1.0 INTRODUCTION

The Board of Trustees of the Sabah Parks is a statutory body established under The National Parks Ordinance, 1962. The Board comes directly under The Ministry of Tourism Development, Environment, Science and Technology. Currently, six (6) parks had been gazetted and placed under the control of Sabah Parks. Three (3) of the parks are categorised as marine parks because their major component is marine environment. These parks are Tunku Abdul Rahman Park, Turtle Islands Park, and Pulau Tiga Parks which comprises of three islands (Pulau Tiga, Pulau Kalampunian Damit and Pulau Kalampunian Besar). The others are terrestrial parks namely Kinabalu Park (established 1964), now a World Heritage Site, Tawau Hills Park (established 1979), and Crocker Range Park (established 1984).

Tunku Abdul Rahman Park, off Kota Kinabalu, Sabah was established in 1974 comprising a major portion of Pulau Gaya and the whole of Pulau Sapi with the aim to protect the marine life especially the coral reefs from human exploitation. In 1979, this park was expanded to include Pulau Manukan, Pulau Mamutik and Pulau Sulug resulting in the extension of the area to 4,929 ha. In the East Coast of Sabah, Pulau Selingan, Bakungan Kecil and Gulisan which are small low-lying islands form the cluster of the Turtle Islands Park in the Malaysian waters. These islands are famous for the green and hawksbill turtles nestings, the eggs of which are placed in open-air hatcheries set up since 1966. Meanwhile, the fringing reefs around the Pulau Tiga Park are considered as amongst the most beautiful in Sabah. This islands is noted for wild animals such as the megapodes (*Megapodius freycinet*), the harlequin tree frog (*Rhacophorus pardalis*), the monitor lizard (*Varanus salvator*) and the common skink, the yellow lipped sea krait (*Laticauda colubrina*). All these marine parks have their own unique identity and resources.

However, due to the economic and human needs, the quality of these marine resources had become poor. A general survey carried out by the Marine Research Unit of Sabah Parks in 1998 showed that more than 50% of the coral reefs in Tunku Abdul Rahman Park (TARP) are in Index 2 of Reef Health Index, and only about 16% of the coral reefs located at the monitoring stations are in the Index 3 and 4 (Table 1). For the Turtle Islands Parks, the “manta tow” survey carried out in 1998 showed that the average live coral cover for three islands was about 27%, while the rest was either dead coral or sand and rubble.

The Oxford University Expedition on Coral Reef Survey in the TARP has been carried out since 1987. To date, four expeditions have been carried out in 1987, 1991, 1994 and 1999. Basically, this expedition concentrated more on the long-term study on the changes to the coral reef especially in TARP area. These studies showed that the coral reef in TARP had declined ranging from 31% to 45% Live Coral Cover (LCC) in 1994 to ranging from 1.6% to 14% in 1999. (Table II). However, the changes in species diversity showed a slight increase on a few reefs.

2.0 ISSUES AND CHALLENGES

The main attractions of marine parks are actually the natural resources themselves. The coral reefs, fishes, mangroves, coastal vegetation, beautiful beaches with clear blue waters, and the peaceful and harmonious condition of the islands. The combination of all these marine resources or the existence of one or two of them becomes the main tourist attraction. But now, the question is, how do we maintain and protect all these resources and at the same time fulfill the demand from tourists? In other words, how sustainable tourism can be continued in the long run. Generally, the issues that will arise in this context are, what are the threats that affect these marine parks resources? And what are the efforts carried out or obstacles faced by Sabah Parks in solving these problems. Basically, the drastic declines on marine resources quality are caused both by nature and human. A combination of natural and anthropogenic effects threaten the survival of marine resources especially on coral reefs in marine parks in Sabah.

2.1 Tropical Storms Greg 1996

Occasional tropical storms and extreme low tides have significant impacts on reefs, but these rarely cause permanent damage, and reefs recover naturally over time. Reef decline was evident in the Tunku Abdul Rahman Park, due to natural (tropical storms) and anthropogenic effects (fish bombing and pollution). Tropical storms are infrequent in Sabah (normally on a 50-year cycle), but the tropical storm Greg that hit the park in 1996 caused a loss of live coral cover on most reefs. The damage caused by Greg was severe, reducing coral cover on exposed reefs in the east (Manukan, Sapi, and Sulug reefs) to coral rubble (Table VI: Mitchell 1999). By 1999, however, the damaged reefs were showing signs of recovery with slow recruitment of solitary corals (*Fungia* sp.; Mitchell, 1999) and fishes (Cabanban, 1998). Between September 1997 and May 1998, the species richness increased by 57 %, although the numbers of indicator species were still low. Overall the reefs within the parks are still good compared to other area out of the parks.

A natural wave also occurs from time-to-time especially during the Monsoons and could caused damage to the coral reefs. However, their impacts are less when compared to the damage caused by the storm Greg. The tropical storm never occur around the Turtle Islands Park, nevertheless the normal wave sometime occurred during Monsoons. This wave also caused damage to the some part of the reef. The latest manta tow survey carried last January 2001, showed that most of the damage on the two surveyed reefs was caused by wave.

2.2 Crown-of-Thorn

The outbreaks of crown-of-thorn starfish on Marangis reef in 1991 and 1994 had damaged an area of branching coral. In 1999, the outbreaks of these starfish occurred again at Gaya area, specifically the area adjacent to the former Quarry . In Turtle Islands Parks, the outbreaks of crown-of-thorn starfish have occurred six times from 1995 (3 outbreaks), 1996 (2 outbreaks) and one outbreak in June 2000 (Marine Research Unit, Sabah Parks). Although the damage caused by this starfish to coral reefs is not serious, these outbreaks need to be controlled.

The Sabah Parks, Marine Research Unit had carried a long term monitoring program to ensure the outbreaks of "crown of thorn" starfish can be controlled. The collections of "crown of thorn" starfish are also done from time-to-time during the outbreaks.

2.3 Bleaching of Coral Reefs

The rising sea surface temperatures, especially the above-normal warm period between 1997 and 1998, resulted in bleaching and mortality of many scleractinian corals, compounding the already-fragile state of the coral reef environments. Bleaching is mostly associated with the very strong La Nina event that started in June,1998 after an equally strong El Nino from 1997. In Tunku Abdul Rahman Park, bleaching was observed in May 1998, about 30-40 % of live coral cover at Pulau Gaya, adjacent to the Park, was reported as bleached when the sea water temperature was 32° C (Mitchel & Cabanban, undated).

In principle, there are not much efforts that can be done by Marine Park Management with regards to these natural effects. This is because the natural effects are universal issues and can occur in any places in the world. However, the Sabah Parks management will monitor the degradation of marine parks resources from time to time caused by these natural causes, particularly in term of the rate of degradation and the locations involved.

3.1 Human Interference: Visitors Pressure

The high arrival of tourists to marine parks will cause pressure to the marine resources. In the year 2000, Tunku Abdul Rahman Park received about 197,000 tourists and this figure is expected to increase in the future. With the increase in tourist arrival, there would be impacts such as damage of coral covers, increased garbage, shortage of water supply, and increased domestic wastes. The survey carried out by the Marine Unit of Tunku Abdul Rahman Park showed that there was a decline in the distributions of coral reefs in Pulau Sapi. Beside that, motorized sea sport such as jet ski also give direct negative impact on the coral reefs. In this connection, Sabah Parks management does not allowed this kind of activity (motorized sea sport) be carried out in Marine Parks.

In order to minimize visitors pressure, the management of Sabah Parks carried out several efforts to control the concentration of visitors on one island (area). In the permission given by Sabah Parks to the tour operators, it is stated clearly which island or area that they can go, and they should also submit the total number of their guests before they conveyed into the park. The main purpose of this control is to balance the distribution of visitors in the park so that they do not concentrate in a certain area or an island. This permission will be reviewed every year. Through this effort, the distribution of visitor can be controlled. The management of Sabah Parks is also in the process of implementing the concept of "zone areas" in particular at Tunku Abdul Rahman Park. The aim of these zone areas is to regulates all the activities carried out in the park areas in accordance with the purpose of the zone concerned.

3.2 Safety of the visitors

The safety of the visitors within in marine parks areas has now becomes an issue. The public assumes that any tragic incident that occurs in marine parks areas is the responsibility of the management of Sabah Parks. But in reality, a lot of matters should be considered. For example, the park staff always advise visitors to use life jackets whenever they want to swim or snorkel, but they simply don't heed the advice. There are some cases that happened in Pulau Sapi. For example, a tourist neglected his safety even he already knew that he could not swim because of a heart problem. When the tragic incident happened, the management of Sabah Parks is being blamed because of the staff's negligence.

In these respects, the Sabah Parks staff had actually done their best. They tried their best to rescue the visitors if there is something wrong. They also applied CPR and give them first-aid before send them to the hospital. But as a human being, one cannot escapes from God's fate.

3.3 Blast and cyanide Fishing

Blast fishing is still been reported within Tunku Abdul Rahman Park, especially at areas absence of enforcement rangers' stations. A few areas at the back of Pulau Gaya, the shallow water at quarry area (P.Gaya) and at the back of Pulau Sulug have evidences of a few patches of the blast fishing activities. However, these blasting incidents are under control.

In Turtle Islands Park, the threats of blast or cyanide fishing are not high. However from the latest survey using manta tow in January 2001 it showed that about 10 patches of evidences of blast fishing were present. However, from the observation that were made indicated that almost all of these craters are old ones, maybe a year or so. These damages are mostly caused by fisherman from the neighboring country, and this is very difficult to control because the international border is very close to the park. However, the Parks Enforcement Unit has the responsibility to patrol his area to minimise these problems occurring within the park areas even they experienced a lot of problems such as lack of man powers, high consumption of fuel and oil, and exposure to dangers caused by the illegal fisherman. For information purpose, the Parks Enforcement Unit does not carry any firearms when patrolling the park areas.

3.4 Enforcement

Enforcement of regulations within of the Marine Parks can still be improved. With respect to blast fishing, most of the enforcement boats are unable to catch blast fishermen because the boats are large and with deeper drafts and thus cannot pursue blast fishing boats over shallow water on reefs. Their ability to apprehend blast fishermen is also dampened by the nature of violence. Catching a fisherman in the act of throwing a home-made bomb is virtually impossible, and evident of bomb-making equipment or cyanide is quickly disposed on seeing approaching enforcement boats. Similarly, it is difficult to act legally against bomb-making, because the possession of ingredients such as fertilizer and empty beer bottles is not an offence. Most blast fishermen elude capture by enforcement officers, and a more realistic approach will be needed to deal with this issue. This approach might include education programs, the development of alternative livelihood options and a swifter and more efficient passage through the legal process for those apprehended.

3.5 Pollution of Solid Wastes

The pollution of solid wastes in Marine parks of Sabah is one of the challenges faced by Sabah Parks. Pollution of the solid waste in marine parks areas not only affects the cleanliness of beach but also the growth of coral reefs and aquatic life, such as turtles species. The status of solid wastes pollution depends on the distance from the mainland and the direction or magnitude of the winds. Tunku Abdul Rahman Park, which is only about 8 to 10 kilometer away from Kota Kinabalu City center, experienced this problem seriously particular during heavy rain or flooding on the main land compared to Pulau Tiga Park or Turtles Islands Park. The main source of these wastes come from settlements in Pulau Gaya, and from the rivers of Sembulan, Putatan, Kinarut and Tuaran whose estuaries faces the park areas. All these wastes are brought to Tunku Abdul Rahman Park areas especially at the beach by winds and sea current.

In 1999, the Marine Research Unit at Pulau Manukan carried out a one-year program to collect the underwater rubbish/litter from 3 islands (Manukan, Mamutik and Sapi) every month. The result from this program showed that 47.4% of the collected garbages comprise of plastic bags and plastic used for domestic purpose (Table III). It also showed that the collections of rubbish/litter were higher during heavy rain or flood occurring at the mainland that goes through the rivers and then to the open sea.

In this connection, the major task faced by Tunku Abdul Rahman Park management is, how to clean all the beach's area as soon as possible before the tourists come at 8.00am. However, this task cannot be completed on time if the amount of solid wastes are high and continuously coming. Usually, when this situation happens, tourists start to complain the Sabah Park Management.

3.6 Decline in Water Quality

Water quality has declined in the Tunku Abdul Rahman Park, with an increase in sediment and nutrient loading of water draining into Kota Kinabalu Bay from surrounding watersheds. This has increased turbidity, which has had a negative effect on the growth rates of corals. The sub-optimal water quality may also affect the survivorship of planktonic larvae of reef organisms. Water quality monitoring carried out by the Marine Unit in Tunku Abdul Rahman Park in July 2000, showed that the parameter of Turbidity (TCC) in Pulau Manukan, Mamutik, Sulug and Sapi are higher which is under Class III of Interim National Water Quality Standard for Malaysia. Meanwhile, the parameter of *E.coli* at all the monitoring points are still under Class IIA which is excellent quality.

The relation between water quality within marine park areas and the activities which are carried out surrounding in the park is very significant. For instance, most of the water quality parameters in Tunku Abdul park are determined by activities carried out in the mainland. In this connection, the monitoring of water quality within parks areas will be carried out continuously by Sabah Parks. All

this information is very useful for the park management to monitor the changes of water quality in the future and for the safety of visitor.

3.7 Sedimentation

There is only one study that had been done on sedimentation by a student from UKM about 7 years ago (Lim, 1993). There were 7 study sites established, 4 sites were at P. Gaya and 1 site each on P. Manukan, Mamutik and Sulug. From the result, it showed that the sedimentation within the TARP is high with average ranging from 5.02+2.88 to 16.38+2.88 mgmcm⁻²h⁻¹ with P. Gaya site showed the highest sedimentation followed by P. Mamutik and P. Sulug respectively. These maybe due to the location of these islands which is very close to the mainland, rivers and so on.

Land reclamation near Kota Kinabalu had contributed in one-way or another to the high sedimentation of the sea which then spread to TARP area. These activities increase sedimentation load from erosion and rivers. Nutrient-enrichment comes from storm drains in Kota Kinabalu, and the Inanam rivers, which drain directly into Sepangar Bay off Kota Kinabalu. Heavy sediments loading also threaten the remaining reefs, and was possibly responsible the long-term decline of reefs in the area. These are also believed to be some of the factors that caused high sedimentation to the seas and to the park.

3.8 Limited fresh water supply

The supply of fresh water for marine parks in Sabah comes from underground water. The increase in visitors' arrival each year had caused high demand of fresh water. As a consequence, the over exploitation of underground water had turned the water into brackish taste especially at Pulau Manukan. It is also observed that the water condition at Pulau Sapi is getting bad.

The Sabah Parks management is considering to obtain fresh water supply through under sea pipe from the mainland in order to solve this problem. Another alternative is the installation of desalination plants. However, this project will involve a substantial amount of money.

4.0 Conclusions

Generally, there are a lot of issues faced by Marine Parks Management especially for Sabah Parks in order to preserve their marine resources for tourism attractions. All these issues can be divided by two groups which is natural issues and human interference issues which can affects the marine park resources. In term of the decline of marine parks resources due to the natural effects, there is not much efforts that can be done by Marine Parks Management. This is because of the natural effects are universal issues and can be happen in any place in the world. However, the issues arise are those caused by human interference such as fish bombings, pollution of wastes, degradation of water quality and coral reefs cover can be controlled through effective planning and mitigation measures. It is suggested that there are three ways in which the marine park resources can be improved; namely the strengthening of enforcement capacity, whereby the various Government Departments invest more heavily in enforcement, in terms of both personnel and funding; the gazettement of additional marine parks and, the development and implementation of education programs which includes alternative livelihood projects for the fishermen.

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Table I: TUNKU ABDUL RAHMAN PARK: REEF HEALTH INDEX

Location	Station	Index
Pulau Manukan	S1	1
Pulau Manukan	S2	2
Pulau Manukan	S3	2
Pulau Manukan	S4	4
Pulau Manukan	S5	2
Pulau Sulug	S6	1
Pulau Sulug	S7	1
Pulau Sulug	S8	2
Pulau Mamutik	S9	2
Pulau Mamutik	S10	2
Pulau Mamutik	S11	3
Pulau Mamutik	S12	2
Pulau Mamutik	S14	3
Pulau Manukan	S13	2
Pulau Gaya & Pulau Sapi	S18	1
Pulau Gaya & Pulau Sapi	S19	1
Pulau Gaya & Pulau Sapi	S20	2
Pulau Gaya & Pulau Sapi	S21	2
Pulau Gaya & Pulau Sapi	S22	3
Pulau Gaya & Pulau Sapi	S23	2
Pulau Gaya & Pulau Sapi	S24	3
Pulau Gaya & Pulau Sapi	S25	2
Pulau Gaya & Pulau Sapi	S26	1
Pulau Gaya & Pulau Sapi	S27	1
Pulau Gaya & Pulau Sapi	S28	1
Pulau Gaya & Pulau Sapi	S29	2
Pulau Gaya & Pulau Sapi	S30	2
Pulau Gaya & Pulau Sapi	S31	2
Pulau Gaya & Pulau Sapi	S32	2
Pulau Gaya & Pulau Sapi	S33	2
Pulau Gaya & Pulau Sapi	S34	2
Pulau Gaya & Pulau Sapi	S35	2
Pulau Gaya & Pulau Sapi	S36	3

Index:	Description	Percent Cover
1	Average of live corals are very low or none. Comprises dead corals, rubble or sand. Diversity of marine species in these areas is very low.	0 – 10 %
2	Sand, dead corals or debris of broken coral combined with algae. Live coral cover is patchy. Diversity of marine species is average in these areas.	11 – 30 %
3	Coral reefs covered some in parts with sand, dead corals or debris of broken corals. The diversity of marine species in these areas is average.	31 – 50 %
4	The growth of the corals is high with the diversity of marine species in the area also high.	51 – 75 %

- 5 The coral reefs are healthy and cover most of the substrate
With a diversity of marine species in these areas. 75 – 100 %

Sources : Survey 1998, Marine Research Unit of Sabah Parks

Table II: Temporal changes in coral cover and species diversity within the Tunku Abdul Rahman Park (TARP), from 1997 to 1999.

Reefs	1987	1991	1994	1999
Merangis				
Average live coral cover (%)	40.5	41.5	34.5	14.2
Total number of genera	42.0	52	54	-
Recovery: some signs coral recruitment				
Sapi				
Average live coral cover (%)	47.0	30.5	37.5	4.1
Total number of genera	46.0	53.0	53.0	-
Recovery: No signs of recovery				
Staghorn Patch				
Average live coral cover (%)	30.0	36.5	33.0	1.6
Total number of genera	46.0	47.0	50.0	42
Recovery: No signs of recovery				
Manukan				
Average live coral cover (%)	30.0	36.5	38.5	35.0
Total number of genera	39.0	46.0	-	44
Recovery: stable LCC, some an increase LCC				
Sulug				
Average live coral cover (%)	-	32.5	19.0	2.9
Total number of genera	-	50	45	44
Recovery: No signs of recovery				
Mamutik				
Average live coral cover (%)	-	18.0	19.5	12.3
Total number of genera	-	41	49	50
Recovery: slight signs coral recruitment, other no signs of recovery				
Tanjong Wokong				
Average live coral cover (%)	-	-	31	5.4
Total number of genera	-	-	-	54
Recovery: No signs of recovery				

Source: Mitchell, 1999

Table III: The Percentage of Underwater Garbage of Tunku Abdul Raman Park, 1999

Location	Composition of Garbage (category)					No. Of Begg
	1	2	3	4	5	
P. Manukan	43%	21.50%	19.35%	8.60%	7.53%	23.25
P. Mamutik	57.20%	17.72%	9.10%	8.10%	7.80%	19.75
P. Sapi	40.70%	17.86%	14.28%	14.28%	12.86%	14
					Total:	57

Keys:

Category 1: All kinds of plastic begs

Category 2: All kinds of metal (aluminium, tin can etc)

Category 3: All kinds of glass (mostly bottles)

Category 4: All kinds of plastic bottles (soft drink bottles, toys etc)

Category 5: All kinds of degradable materials (cotton, paper etc.)

Sources : Marine Research Unit of Sabah Parks, 1999.

- **WHAT IS A MARINE PARK?**

Under the Fisheries Act 1985 (Act 317), a marine park is defined as "any area or part of an area in Malaysian fisheries waters established as a marine park or marine reserve under Part IX of the Act. In general it is an area of the sea zoned i.e 2 nautical miles from the shore, as a sanctuary for coral reef community.

In Sabah, a park whose major component is a marine environment can be called as a marine park and managed by the Boar of Trustees of the Sabah Parks.

At the present, there six (6) parks in Sabah, three of these parks are consider as a Marine Parks. There are Tunku Abdul Rahman Park, Kota Kinabalu, Turtle Islands Park, Kuala Penyu and Pulau Tiga Park in Kuala Penyu.

The marine component of these three marine parks are only 20,618 ha. which is about 7.76 percent of the total area of Sabah Parks system.

2.0 WHAT ARE THE ATTRACTIONS IN MARINE PARKS

2.1 Diversity of coral reefs

2.2 Diversity of fish,

2.3 Sea grass and mangroves,

2.4 Beautiful beaches pattern

2.5 Rock formation (geological)

2.6 Clear blue waters, and peaceful and harmonious conditions.

3.0 WHAT ARE THE BENEFIT OF MARINE PARKS

3.1 Medical Breakthrough

3.2 Fish Breeding Ground

3.3 Natural Breakwater

3.4 Dazzling Underwater wonderland

3.5 Enhancement of Education and research activities marine species

4.0 ISSUES AND CHALLENGES OF MARINE PARK MANAGEMENT :

Natural and Human Interference

4.1 Tropical Storms Greg 1996

4.2 Bleaching of coral reefs

4.3 Visitor Pressure Effects

4.4 Safety of the visitors

4.5 Blast and Cyanide fishing

4.6 Enforcement

4.7 Pollution of solid wastes

4.8 Decline of water quality

4.9 Sedimentation

5.0 WHAT WE CAN DO TO KEEP MARINE RESOURCES ALIVE

- Don't buy souvenir taken from the reef.
- Watch the type of sea food you order- many types of shrimp and reef fish are caught by destroying coral reefs.
- If you are a diver, dive responsibly. Try not to touch coral reefs, anchor on reefs or stir up sediment.
- If you visit coral reef areas, make sure the hotel and boats you use are not dumping sewage and other pollutants in to the water.
- If you own a salt water aquarium, make sure the fish are not caught by destructive methods like cyanide fishing.
- Support the creation of Marine park and other protected areas that protect and conserve coral reefs.