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Pakistan Wetlands Programme

SOCIO-ECONOMIC BASELINE REPORT, ASTOLA ISLAND



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Acronyms and Abbreviation			
Balochistan Partnership for Sustainable Development	BPSD		
Embassy of the Kingdom of Netherlands	EKN		
Exclusive Economic Zone	EEZ		
Global Environment Facility	GEF		
The International Union for Conservation of Nature	IUCN		
Maritime Disaster Management Plan	MDMP		
Maritime Security Agency	MSA		
Natural Resources	NR		
Pakistan Poverty Alleviation Fund	PPAF		
Pakistan Wetlands Programme	PWP		
Rapid Assessment and Prioritisation of Protected Areas Management	RAPPAM		
United Nations Development Programme	UNDP		
World Wide Fund For Nature	WWF		

	Conversion Table	
1 maund	40 Kg	
1 nautical mile	1.852 km	



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EXECUTIVE SUMMARY

Astola Island (Haft Talar) is located in the Arabian Sea south of Pasni and considering its high ecological importance it was declared as a Ramsar site on 10th May 2001. it hosts the endangered Green turtle (*Chelonia mydas*) and endemic reptiles such as the viper *Echis carinatus astoli*. It is an uninhabited island with fishermen frequently visiting throughout the year except for the monsoon season.

Under Pakistan Wetlands Programme (PWP) a socio-economic study was conducted in January 2011 to determine the dependence of various communities on the island. Secondary data helped in getting some information about the island prior to field survey. First hand information about natural resource use was gathered from the fishermen community present on the island and from various government and non government organisations (NGOs). Astola Island lies beyond the jurisdiction of Marine Fisheries Department Balochistan (i.e. upto 12 nautical miles) and thus is mainly managed by Maritime Security Agency and other departments of the Navy. They are also responsible for its natural resource management.

Fishermen coming to island include Baloch, Sindhi and Bengali. They catch fish, crabs and lobsters in its water. Few of them also collect sea shells from the area. At a time there are 10 to 15 boats near the island each boat having around 5 fishermen on the average. A boat mostly stays for around 7 to 10 near the island. Few fishermen live on the two huts present on the island for about two weeks. They use around 714 kg of fuelwood from the island in a year. The island is being polluted by solid waste (including damaged fishing gears, food wrappers etc) dumped on its coast by the fishermen who come to visit it. Nets sometimes get stuck to the corrals present near its coast and damage it.

Astola Island is facing tremendous pressure and is at threat from various anthropogenic activities occurring in the Arabian Sea such as oil pollution, illegal fishing, solid waste dumping, turtle and its egg hunting.

INTRODUCTION

Pakistan Wetlands Programme (PWP) was launched with financial assistance from the Global Environment Facility (GEF), United Nations Development Programme (UNDP) and the Embassy of the Kingdom of Netherlands (EKN) in July 2005. This \$11.8 million project is being implemented by WWF-Pakistan on behalf of the Ministry of Environment. It is a seven year project and aims at promoting conservation of freshwater, wetlands and the associated globally important biodiversity. Under this programme majority of the wetlands of Pakistan are being surveyed to gather baseline information. The main aim of PWP is to create an environment that would enable conservation of all major wetlands of Pakistan through equitable sharing of natural resources (NR), securing rights of access specially for poor communities, diversifying livelihoods, improving the income earning potential of stakeholders and creating incentives for sustainable wetlands management. This is being achieved through two objectives: the first deals with national level issues while the second would provide a replicable working example of wetlands conservation in the form of communitybased management plans for four wetlands complexes (that are: Salt Range Wetlands Complex, Northern Alpine Wetlands Complex, Central Indus Wetlands Complex and Makran Coastal Wetlands Complex), each representing a specific eco-region.

This socio-economic baseline report will provide information about the dependence of various communities on the natural resources of Astola Island (also known as Haft talar meaning seven hills) and the role being played by different government departments in its management.

PROBLEM STATEMENT

Astola Island is a Ramsar site of international importance as it hosts the endangered Green turtle (*Chelonia mydas*) and endemic reptiles such as the viper *Echis carinatus astoli*. Possibly the Hawksbill turtle (*Eretmochelys imbracata*) also nests on the beach at the foot of cliffs.¹ However, human intervention in the area such as introduction of feral cats and unsustainable fishing practices is posing threats to natural wildlife. Major reason for this is lack of awareness amongst fishermen and lack of ownership of government departments.

ASTOLA ISLAND

Astola Island (Haft Talar) is 4 km long and 0.6 km wide island present in the Arabian Sea south of Pasni. Its south face has various caves while on the top of Astola Island there is a Hindu Temple and on the north face of Astola Island there is also a mosque used by fishermen community.

Astola Island does not have any fresh water supply thus making the environment less favourable for human and animal population. However, fishermen come to the island occasionally and stay here for a few weeks. Vegetation on Astola Island comprises of shrubs and bushes.

¹ The Annotated Ramsar List of Wetlands of International Importance

OBJECTIVE

This socio-economic baseline report provides information regarding natural resource dependency of the people who visit Astola Island and role of different government departments in the management of its natural resources. The main objective of the study is:

"The development of indicators and mapping of socio-economic information including demography, settlement, livelihoods and natural resource use for Astola Island."

METHODOLOGY

Socio-economic baseline study has been conducted to get information regarding natural resource dependency of various communities on Astola Island and contribution of its resources to their income and social setup. The level of natural resource use is highly dependent on awareness amongst the dependent communities and role played by different government departments in its management. Prior to field survey, already available literature was consulted to gather some basic information about the area. First hand information about natural resource use was gathered from the fishermen community present on the island and from various government and non government organisations (NGOs).

SECONDARY DATA

Secondary sources of information that helped in getting an idea of Astola Island are:

- > Astola Island, A Potential Site for Marine National Park, WWF Pakistan
- WWF Rapid Assessment and Prioritisation of Protected Areas Management, (by J. Ervin, 2003.)
- The Annotated Ramsar List of Wetlands of International Importance http://www.ramsar.org/cda/en/ramsar-pubs-annolist/main/ramsar/1-30-168_4000_0__

PRIMARY DATA

Direst interviews and field observations helped in getting primary data about the natural resource use and management of Astola Island. Information about Astola Island was gathered from the following stakeholders:

- Government department and Maritime Security Agency (MSA) officials
- Non Government Organisation (NGO) Officials
- > Fishermen

Focus Group Discussions (FGD) on natural resource management of Astola Island were held with relevant government department and NGO officials. Table lists the major officials with whom meetings were conducted

Table 1: Government department and NGO officials interviewed

Names	Designation		
Anayat Ullah	Assistant Director Fisheries Marine, Pasni		
Niaz Muhammad	Assistant Director Fisheries Establishment, Pasni		
Asghar Shah	District Coordinator, IUCN		
Leftinant Saleem	Officer Incharge, Maritime Security Agency, Base Pasni		

(Source: Socio-economic Survey, January 2011)

Rapid Assessment and Prioritisation of Protected Areas Management (RAPPAM)² questionnaire was used to get an idea of threats and pressures to the natural resources of the area. It has been developed by WWF International to determine the effectiveness of management of a protected area (PA). Internationally, this methodology has been tested and implemented in Algeria, Bhutan, Cameroon, China, France, Gabon, Mexico, Russia, South Africa and Swaziland. In Pakistan, RAPPAM methodology has been used for determining the pressures, threats and management activities in not only some protected areas but also in some ecologically significant wetlands. A slightly modified questionnaire of RAPPAM (Questionnaire attached in Annexure II) has also been used to determine the existing pressures, future threats and management activities conducted at the Ramsar site. Various officials interviewed with the aid of modified RAPPAM questionnaire are listed in Table 2:

Table 2: Names of officials interviewed with the aid of RAPPAM

Names	Designation	
Anayat Ullah	Assistant Director Fisheries Marine, Pasni	
Asghar Shah	District Coordinator, IUCN	

(Source: Socio-economic Survey, January 2011)

There are no permanent settlements on Astola Island and fishermen merely visit the island from August to May. Thus information regarding natural resource dependency and economic conditions of those fishermen were gathered with the aid of a structured questionnaire (Attached in Annexure I) and formal discussions. A total of nine fishermen working on different boats were interviewed.

DATA ASSESSMENT

Primary and secondary data was collected and analysed to determine socio-economic dependency of fishermen community on the natural resources of Astola Island. The sustainable and unsustainable practices of communities dependent on its natural resources were also determined. The role played by different government departments, MSA and NGOs in natural resource management individually and in liaison with one another and fishermen was also identified.

² Rapid Assessment and Prioritization of Protected Areas Management is a methodology developed by WWF – International to determine the effectiveness of management system of Protected Areas.

GOVERNMENT DEPARTMENTS, MSA AND NGOS

As Astola Island is present in Arabian Sea that is within the Maritime Zones of Pakistan thus it is being managed by MSA. Considering its ecological importance (Ramsar site) The International Union for Conservation of Nature (IUCN) is also playing an important role in its natural resource management. Information gathered during meetings with officials of different organisations is discussed in the following sections.

FISHERIES DEPARTMENT

As Astola Island is located south of Pasni providing habitat to fish, lobsters, turtles etc that are of high economic and ecological significance, thus a meeting was conducted with Assistant Director Fisheries Marine and Assistant Director Fisheries Establishment of Pasni. Fisheries Department are responsible for management of fishing activity with 12 nautical miles. Any fishing activity beyond 12 nautical miles is managed by marine mercantile department. Thus fishing activity conducted at Atola is not under the management of Fisheries Department.

ROLE OF FISHERIES DEPARTMENT

Fisheries Department boats patrol within 12 nautical miles area for effective management. Their major roles and responsibilities are:

- Issuing and renewal of fishing license.
- Prevent illegal fishing activity
- Provide support to stranded boats in the sea

Fisheries Department issues fishing license that is renewed every year. Amount of License money depends on the size of the boat. Table 3 gives the amount of money taken for issuing and renewing a license for different sized boats.

No	Boat Size (Feet)	 License / License Renewal Fee (Rs/Year)
1	12 to 19	100
2	20 to 34	200
3	35 to 54	1,000
4	More than 55	1,500

Table 3: License and license renewal fee for different sized boats

(Source: Socio-economic Survey, January 2011)

Fishing boat without a license is illegal. Fisheries Department prevents illegal fishing by patrolling within 12 nautical miles. The department has 2 patrolling boats each at Ormara, Pasni and Gawadar while one patrolling boat at Jiwani. These speed boats (for patrolling) have been provided with guns that have rubber bullets to stop illegal fishing. On the other hand fish trawlers are huge and equipped with guns. Fisheries Department has to face difficulty and is not able to perform its duty effectively as due to huge size the trawlers easily escape and can even open fire on the patrolling speed boats. Any boat caught in illegal fishing is fined based on the mode of illegal fishing activity and type of illegal fishing gear

used. For example, a boat using Gujju (local name for a small mesh size that is shaped like a bag) or Wire Net (local name for a nylon net with a mesh size less than 1 cm) is fined Rs 600,000. According to the information provided by Fisheries Department officials every year Fisheries Department gives Balochistan Government more than Rs 25 million fine money.

Apart from issuing license and ensuring only legal fishing practices in the sea, Fisheries Department also provides support to fishermen if their boat gets stranded in the sea.

MARITIME SECURITY AGENCY (MSA)

Maritime Security Agency established in 1987 is a civil force and naval officers are deployed in MSA on temporary basis for a specific time period. Apart from performing major responsibilities related to defence it has also been given additional tasks such as anti smuggling (example oil smuggling), anti narcotics, eradication of illegal fishing, etc. The mode of transferring oil from one boat to another is not monitored by MSA. On routine basis MSA patrols the sea by either helicopters or boats/ships to perform its monitoring duties.

Its area of responsibility extends upto 200 nautical miles however only for search and rescue of stranded boats it manages 840 nautical miles in the sea from the coast. The Maritime zones upto 200 nautical miles of Arabian Sea are:

- 1. Territorial Waters (12 Nautical Miles)
- 2. Contiguous Zone (24 Nautical Miles)
- 3. Exclusive Economic Zone (upto 200 nautical miles)

Territorial Waters is upto 12 nautical miles and apart from Maritime Security Agency Fisheries Department is also present in the area playing its role in natural resource management of the sea.

The Contiguous Zone is from coast upto 24 Nautical Miles. It is subject to freedom for navigation, overflight, military exercises etc. However, Pakistan can take necessary measures within this area to prevent and/or punish infringement of its customs, fiscal immigration, laws and regulations.

The Exclusive Economic Zone (EEZ) is upto 200 nautical miles in the sea. In this area only Pakistan has the right to explore, use, conserve, and manage natural resources, both living and nonliving, present in sea on seabed, subsoil, and the subjacent waters. All economic activities can only be conducted by Pakistan and any foreign boat or people caught conducting economic activity in the EEZ can be caught by MSA.

NATIONAL MARITIME DISASTER MANAGEMENT PLAN (NMDMP)

In 2007 a National Maritime Disaster Management Plan (NMDMP) was prepared. Pakistan Navy and Pakistan Maritime Security Agency are its key implementing agencies. In light of NMDMP a Disaster Response Centre has been formed by Pakistan MSA which is activated in case of any sea disaster in the maritime zones of the country. The NMDMP is a doctrine document that provides information regarding various actions that need to be taken in case of a disaster (e.g. oil spill).

THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)

The International Union for Conservation of Nature is playing a very important role in the management of natural resources of Makran coast. Balochistan Partnership for Sustainable Development (BPSD) is being executed in the whole of Balochistan coast and a few other districts of the province. Under Pakistan Wetlands Programme, WWF – Pakistan is also working in specific sites along the Makran Coast. Thus the area and some activities being conducted by both IUCN and WWF – Pakistan are similar. To avoid overlapping of activities and for effective NR management both of these organisations are working in coordination and supporting each other.

UNSUSTAINABLE PRACTICES AT ASTOLA ISLAND

Astola Island is not included in the project area of IUCN, however according to the information provided by the official of IUCN the island is degrading due to a number of anthropogenic activities. Fishermen from Balochistan and Sindh come to fish around the Island. They stay there for a few days and dump damaged nets and other types of non degradable waste on its coast. Further they are not aware of sustainable fishing practices due to which fish in Arabian Sea is depleting at a high pace.

There is a vast diversity of corals near Astola Island and its market value is high. Some fishermen are engaged in coral mining activity. However, a study needs to be conducted to determine the level of coral mining activity done in the area and its impact. Corals are also damaged by ghost nets (nets that get trapped in corrals). Near corals there is a lot of fish thus sometimes the nets thrown by fishermen in such areas get trapped in corals.

Apart from illegal fishing and coral mining, marine life is also being adversely affected by oil being spilt in the sea by trawlers. Big fish trawlers dump their crude oil bars in the sea. However, details on its impact cannot be clearly stated as it depends a lot on ocean currents and a detailed study needs to be conducted to assess the damage caused by it. Another source of small amount of oil spill in the sea is during exchange of illegally smuggled oil from one boat to another in an inappropriate way.

SOCIO-ECONOMIC DEPENDENCY OF FISHERMEN ON NATURAL RESOURCES OF ASTOLA

Astola Island also known as *Haft talar* has high ecological significance and is located south of Pasni. Its natural resources are an importance source of income for fishermen communities that fish in its water. Fishermen from Sindh and Balochistan come to this area throughout the year from August to May. In June and July, Astola island is inaccessible as the sea becomes very rough and fishing activity seizes here.

Mostly fishermen come to Astola for a week or ten days and stay in their boats. Few of them come to Astola for upto a month. They live on the coast of the island where 2 huts have been made of wood. These huts when damaged are either reconstructed or repaired by the fishermen visiting the area. At a time there are 10 to 15 boats on the island.

This chapter provides information about the importance of natural resources of Astola Island in the lives of the dependent fishermen.

DEMOGRAPHY OF FISHERMEN

At the time of survey there were 13 boats in the sea near north face of Astola and fishermen of one boat were living in a hut made of wood at the shore. Fishermen from nine different boats were interviewed thus a sample size of 69%. All of the boats had come from Karachi. Except the Sindhi fishermen living in hut all of the other fishermen interviewed were Bengali. There were 44 fishermen (including boat driver and cook) on nine boats amongst which only 13 fishermen (30%) were literate. The average age of fishermen on boats was 25 years.

FISHING GEAR

The fishing boats in the area were of medium size ranging from 22 to 27 feet. The average size of boat was 25 feet. The major types of fishing gears used by fishermen are fishing rod with 200 to 300 hooks, ring net, net and gun. Four sample boats had one fishing rod for each fisherman. The average number of fishing rods for sample a boat is 3. The number of fishing gears owned by the sample fishing boats and an estimate for all boats present at a time near Astola Island is given in Table 4.

Eishing Goar	Sample Number		Estimated Number	
Fishing Gear	Total	Average	for all Boats	
Fishing Rods	29	3.2	42	
Ring Net	4	0.4	6	
Net	16	1.8	16	
Gun	1	0.2	3	

Table 4: Fishing gears used for fishing at a time near Astola

(Source: Socio-economic Survey, January 2011)

The fishing net used by fishermen near Astola is around 250 feet in length and the length of ring net ranges from 300 to 400 feet.

PATTI SYSTEM

According to the sample on the average there are five fishermen per boat. Thus at a time there are around 64 fishermen fishing in the sea near Astola. Every boat has a *Nakhuda* (also referred to as *Nakho*, person incharge of the boat), a boat operator, a cook and *Khalasi* (fishermen). Boat owners may give their boat to fishermen for fishing and hire a *Nakho* or he may himself work as a *Nakho* on the boat. In small boats Nakhuda/Nakhu also works as a boat operator.

The total fish catch and the net income is distributed between boat owner, Nakho, Boat Operator, Cook and Khalasi. The system of division of net income is known as *Patti* System where one share is known as a *Patti*. Half of the net income (Gross Income – Expenses = Net Income) is given to the boat owner. The rest of the net income is divided amongst the other fishermen through *Patti* system. The share given to each is given in Table 5 below.

Designation	Share / Patti
Nakhuda/Nakho	1.5 to 2
Boat Operator	1.25 to 2
Cook	1
Khalasi	1

Table 5: System of division of net income

(Source: Socio-economic Survey, January 2011)

A *Nakho* gets either 1.25 *Patti* or 2 *Patti*. Even if the *Nakho* is also operating the boat his share would be 2 *Patti*.

INCOME AND EXPENSE

As most of the boats come from Karachi thus the total expense of a trip is fairly high. The average net monthly income of a sample boat is Rs 69,556. Table 6 gives the total and average monthly expense and income for a boat.

Table 6: The total and average monthly income and expense of sample boats

	Monthly Gross Income (Rs)	Monthly Expense (Rs)	Monthly Income (Rs)
Total of Sample Boats	1,350,000	724,000	626,000
Average of Sample Boat	150,000	80,444	69,556

(Source: Socio-economic Survey, January 2011)

As a single boat contains on the average 5 men (1 *Nakhuda*, 1 driver and 3 *Khalasi*) thus according to the *Patti* system the net income shall be distributed amongst all. The share that goes to each when Nakho and Driver have 2 and 1.25 *Pattis* respectively is given below:

Share of Owner:	Rs 34,778	or	(Rs 69,556 / 2)
Nakhuda:	Rs 13,911	or	{(Rs 34,778 / 5) *2}
Boat Operator:	Rs 8,695	or	{(Rs 34,778 / 5) * 1.25}
Khalasi:	Rs 6,956	or	(Rs 34,778 / 5)

Thus on the average in a month a Khalasi coming to Astola Island earns Rs 6,956.

FISHING PRODUCTION

Major fish species caught by fishermen are Dohtar, Aal, Kalancho (Ghisr), Bangra and Gund. Apart from fish, fishermen also collect sea shells and lobsters and sell them in Karachi. According to some fishermen they are not allowed to catch lobsters as fishermen of Pasni do not let them. If any boat from Sindh is caught having lobsters fishermen of Pasni take all of it without paying them. Thus fishermen sell fish catch in Pasni while lobsters and sea shells in Karachi. The average fish catch of different species in a month by a boat is given in Table 7. The amount of fish caught by a boat is variable and it depends on the fishing season. For example, according to the information provided by fishermen Dohtar is available from August to May however its fish catch increases from September to January.

Local Name	English Name	Fishing Months	Average Monthly catch per Boat (kg)	Average Price (Rs/Kg)
Dohtar	Grimit	August to May	6,667	300 - 400
Aal	Leather Jack	August to May	3,000	500 - 600
Kalancho (Small size)	_	August to May		350
Ghisr (Large size)	Grouper	September to November	2,042	250
Bangra	Indian Mackerel	August to May	20,667	60 - 80
Gund	N/A	August to May	3,000	200
Lobister	Lobster	September to November & March to May	50 - 60	2,700
Sipian	Shells	August to May	2,479	40 - 100

Table 7: Amount of fish, lobster and shells caught

(Source: Socio-economic Survey, January 2011)

On the average in a month a boat catches 6,667 kg of Dohtar. The price of fish highly varies with its size. Grouper fish of small size is known as Kalancho and its price is Rs 350 per kg while large size Grouper called Ghisr by the locals is sold for Rs 250 per kg. Gund is a mixture of various types of fish which is sold as poultry feed. Around 3,000 kg of Gund is caught by a boat in a month. Lobster is more commonly found from September to November and from March to May.

Various shaped and coloured shells are found near and on the coast of Astola. Fishermen collect these shells and sell them in Karachi. On the average a boat catches around 2,479 kg of shells. As sea shells are available throughout the year thus the amount of sea shells collected by 12 fishing boat in nine months are 267,732 kg (2,479*9*12). The price of shell varies with their size and colour. Larger shells are sold for around Rs 40 per kg while smaller shells are sold for Rs 100 per kg. The price for some shells is:

Small White Shell:	> Rs 100 per kg
Big White Shell:	Rs 40 per kg
Small Red Shell:	Rs 100 per kg
Big Red Shell:	Rs 50 per kg

Fishermen also catch crabs and other types of fish such as Qud (English Name: Baracoda), Sanglo, Heera (English Name: Snapper), Dawan and Sourap in small amounts.

FUELWOOD

People living on the coast of Astola Island in small huts collect plants (shrubs and bushes) to use as fuelwood for cooking and heating purpose. At the time of field survey five fishermen of a boat were living in one of the huts. According to the information provided by them there are around 10 to 15 people living in the huts on the coast of Astola Island from September to November and March to May. The fishermen of that particular boat use around 30 kg per month of fuelwood during summers while 60 kg per month of fuelwood during winters. Thus the average monthly per capita fuelwood consumption is 6 kg during summers and 12 kg during winters. The average monthly consumption of fuelwood by fishermen staying at Astola Island for one year is given in Table 8. On the basis of average monthly consumption, the average annual consumption of fuelwood is calculated to be 714 kg.

Table 8 Average monthly and annual fuelwood consumption by fishermen on Astola Island

Month	Number of People	Average Fuelwood Consumption (kg)
August	5	30
September	12	72
October	12	72
November	12	144
December	5	60
January	5	60
February	5	60
March	12	72
April	12	72
May	12	72
Tota	al -	714

(Source: Socio-economic Survey, January 2011)

DEPENDENCE ON NATURAL RESOURCES OF ASTOLA ISLAND

Astola Island present south of Pasni has natural resources of high economic value. Fishermen of Sindh and Balochistan are dependent on them for their livelihood. Use of these natural resources within the carrying capacity of the ecosystem will provide them with long term economic benefit. However, lack of awareness amongst the fishermen results in excessive and unsustainable NR use. Dumping of non degradable waste such as nets, plastic bags etc degrades the natural habitat of various marine species and the beauty of the island.

Fishermen coming from Sindh and Balochistan not only catch fish, lobsters and crabs but also collect sea shells for commercial purpose. Sea shells are a very important integral part of the ecosystem as they provide home to Hermit Crabs and snails (shell making animals). Hermit Crabs do not have a shell of their own and to protect themselves from predators they live in shells left by dead snails. During its lifetime Hermit Crab changes its shell a number of time that is when the shell gets damaged or when the Hermit Crab over grows it. Collecting excessive amounts of sea shells for commercial purposes can result in reduction in Hermit Crab population apart from depleting a major CaCO³ providing source to the sea thus affecting the whole aquatic life. Field survey revealed that on the average a fishing boat collects 2,479 kg of sea shells in a month which is a fairly high amount.

RAPID ASSESSMENT AND PRIORITISATION OF PROTECTED AREAS MANAGEMENT (RAPPAM)

Rapid Assessment and Prioritization of Protected Areas Management is a methodology developed by WWF international to rapidly assess the issues related to management of a protected area. It is very useful in identifying areas that require to be focused on more so as to improvement protected area management. This methodology is an effective tool for park managers and policy makers which helps them identify management steps to ensure full functioning of PAs³. Despite the fact that Astola Island is not a protected Area but it is a Ramsar site of international importance. Thus the RAPPAM questionnaire was slightly modified according to the area. Details about RAPPAM methodology are given as Annexure V.

RAPPAM questionnaire developed by WWF international was used to determine the ground situation of HMWS. The questionnaire comprised of ten sections. Initially the respondent was asked about existing pressures and foreseen threats to the protected area. In the next nine sections information regarding socio-economic importance, vulnerability, management, staffing etc was gathered. Data was collected from 2 key informants belonging to Balochistan Fisheries Department and IUCN. The analysis of the data is discussed in the next sections.

MANAGEMENT OBJECTIVES AND AIMS

Astola Island was declared as a Ramsar site on 10th May 2001. However it has not been given any protection status by the government of Pakistan. Mercantle Marine Department of the Government of Pakistan are playing an important role in the management of marine life and monitor any illegal activity.

PRESSURES AND THREATS

The wetland is currently facing pressures and is at threat from anthropogenic activities. The trend, probability, extent, impact and permanence, of the major pressures and threats were identified by the respondents. Each pressure and threat has been ranked according to information provided by the respondents so as to determine the one liable to impact Astola Island the most. For example, the extent (i.e. area affected) has been ranked as:

Localised = 1 Scattered = 2 Widespread = 3 Throughout = 4

The highest score which a single pressure or a threat can attain is 17 if it is ranked at the highest end. As RAPPAM questionnaires were answered by three respondents, the highest score for a single pressure or threat, if it is ranked at the highest end by all of them, is 34 (17 x 2 = 34).

³ J. Ervin, 2003

WWF: Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology

Oil Pollution has been identified as the greatest pressure and threat on the natural resources of Astola Island. Oil pollution results from dumping of crude used oil bars and used oil into the sea, washing of tankers in the sea and leakage of oil into the sea during transferring smuggled oil of Iran from one boat to another. According to the respondents oil pollution is likely to occur over a wide spread area in the next five years and it is and shall in future also have a severe impact on the marine life. The impact is likely to be long term if not permanent.



(Source: Socio-economic Survey, January 2011)

Graph 1: RAPPAM assessment of oil pollution

Turtle and its egg hunting is another major pressure that has been identified by the two respondents. This pressure has increased over the last five years and is likely to increase in the future too. It could have a high if not severe adverse impact on the turtle population. Graph 2 gives details regarding RAPPAM assessment for turtle and its egg shell hunting.



Graph 2: RAPPAM assessment for turtle and egg shell hunting

As per the residents of the villages fish production has decreased over the last five years due to usage of banned fishing nets by the fishing trawlers. This pressure was also identified by Mr Asgar Shah of IUCN. According to him this pressure has sharply increased over the last five years and is occurring over a widespread area. Its impact is severe and permanent. There is a high probability that this activity shall continue in the future due to which fish production could decrease severely adversely impacting the economic conditions of the local fishermen apart from damaging marine ecology permanently.



Graph 3: RAPPAM assessment illegal fishing practice by trawlers

According to IUCN official illegal fishing is also practiced by the locals due to lack of awareness. Few locals fish in the months of June and July i.e. fish breeding season throughout the area. As a result of it they catch fingerlings thus resulting in decrease fishing production. There is a high probability that Illegal fishing shall continue in the future. The impact of catching fish during fish breeding season is severe and permanent (Graph 4).

Graph 4: RAPPAM assessment of illegal fishing by local fishermen

Some of the other pressures and threats identified by the respondents are sea water pollution, corral mining and ghost nets. Fishermen who come and fish in the waters of Astola Island mostly dump their solid waste including packets of food, damaged nets etc on its coast and the waste ultimately enters the sea. This activity has sharply increased over the last five years and it shall have a moderate and long term impact.

There are lots of corals near the coast of Astola Island. The nets of fishermen sometimes get stuck in these corals and thus damage them. This activity is occurring over a scattered area and has remained constant over the last five years. This activity shall have a severe and permanent impact. Fishermen who come to Astola Island sometimes also mine corals and sell them in Karachi. further research needs to be done to determine the impact of coral mining.

An overall picture of the scores allotted to pressure and threat by all respondents is given in Graph 5. Oil pollution of the sea has been ranked as the greatest pressure (Score = 28) and threat (Score = 29) to the marine ecology of Astola Island by the respondents.

Graph 5: Scores given to pressures and threats

After identifying and prioritizing pressures and threats the other sections of the RAPPAM questionnaire focus on socio-economic importance, vulnerability, objectives, legal security, management planning, management decision making, staffing, finances, research evaluation and monitoring. Questions were asked regarding each of these aspects. The answers to these are in Mostly Yes (score = 4), Yes (Score = 3), Mostly No (Score = 2) and No (Score = 1). The highest score given to any question is (4 * 2 = 8).

SOCIO-ECONOMIC IMPORTANCE

Astola Island is a high source of employment for fishing communities and they depend on the natural resources of the area for their subsistence (Score = 8). The area provides community development opportunities through sustainable resource use. There is a Hindu worship place and a mosque on the island and thus it has high religious importance. The area has high unusual aesthetic importance and high recreation value. Astola Island has plant and animal species of high social, cultural, economic, scientific and educational value (Score = 8).

Graph 6: RAPPAM assessment for socio-economic importance

VULNERABILITY

Astola Island is a Ramsar site and has high international ecological importance. However legally as it has not been given any protection status the illegal activities in the area are difficult to monitor. Market value of its resources i.e. fish and corals is high and the recruitment and retention of employees is difficult (Score = 8). Details regarding vulnerability of the Ramsar site are given in Graph 7.

Graph 7: RAPPAM assessment for vulnerability

OBJECTIVES AND LEGAL SECURIY

As mentioned above Astola Island has not been declared as a protected area by the government. It does not have any clearly management objectives that would provide for the protection and maintenance of biodiversity.

Staff and financial resources are not adequate to conduct critical law enforcement activities. Conflicts with local community are resolved fairly and effectively.

STAFFING AND FINANCES

The level of staffing is not sufficient to effectively manage the area. Staff members do not have adequate skills to conduct critical management activities. Training and development opportunities are not appropriate to the needs of the staff (Score 2). Details on staffing are given in Graph 8.

Graph 8: RAPPAM assessment for staffing

Funding in the past 5 years and in the next five years is not adequate to conduct critical management activities. Financial management practices do not enable efficient and effective area management. The long term financial outlook of the area is not stable.

MANAGEMENT PLANNING AND MANAGEMENT DECISION MAKING

As Astola Island is not a protected area thus management plan for it does not exist. Details on management decision making are given in Graph 9.

Graph 9: RAPPAM assessment for management decision making

RESEARCH EVALUATION AND MONITORING

Astola Island has high ecological importance however research on key ecological and social issues is not consistent with its needs. Staff does not have regular access to scientific research and advice. Critical research and monitoring needs have not been identified and prioritized either.

RAPPAM ANALYSIS

Astola Island has high ecological and socio-economic importance. However it is facing numerous pressures and its natural resources are at threat due to various anthropogenic activities. Oil pollution of the sea seems to be the biggest pressure on and threat to marine ecology. Oil pollution along with illegal fishing practices is resulting in a tremendous decline in fish production.

Turtle and its egg hunting are also one of the major pressures existing in the area. Corrals present near the island add tremendous beauty and increase its ecological value. However corral mining for commercial purposes and ghost nets are excessively damaging them. All of these pressures on the island are due to lack of any protection status and absence of management plan for the area. Lack of staffing and financial resources makes it difficult to monitor the illegal activities. Recruitment and retention of employees is also difficult. Market value of the area resources is high making it further vulnerable.

Astola Island is an important source of employment for fishing communities. It has high religious, cultural and aesthetic importance. Plant and animal species have high social, cultural or economic value. Research on key social and ecological issues is not according to the needs of the area and further research should be conducted for its effective management.

CONCLUSION AND INTERVENTIONS

CONCLUSION

Field survey revealed that there are no permanent settlements on Astola Island. However, fishermen frequently visit the island except during monsoon season when the sea is very turbid and thus the island becomes inaccessible. Fishermen catch fish, crabs, lobsters and sell them to middlemen either in Pasni or Karachi. However some of the fishermen also catch fish and as per information provided by an official they are also involved in corral mining. Few fishermen that stay on the island for some weeks collect wood and use it as fuel for burning.

Major pressures on the natural resources of the Ramsar site are:

- Pollution of the island by disposal of non biodegradable solid waste on its coast by the fishermen.
- > Damaging of corrals by nets that get stuck in the corrals (ghost nets)
- Reduction in fish population due to illegal fishing practices. Illegal fishing gears of very small size used by huge trawlers also catch of small fingerlings resulting in long term impact on the fish population.
- Sea water pollution by oil spillage during transferring of smuggled oil from one boat into another
- > Turtle hunting by fishermen

INTERVENTIONS

Astola Island has tremendous beauty however due to lack of facilities, awareness and security issues there is hardly ant tourism activity in the area. Eco-tourism should be promoted as it would provide as another income source for the people of Pasni. Thus their dependency on fishing would reduce.

Awareness regarding importance of corrals for ecosystem, proper disposal of waste and use of sustainable fishing practices needs to be given to the local fishermen of Balochistan. Strict law enforcement needs to be placed to prevent usage of illegal fishing gears and spillage of oil into the sea.

Considering tremendous ecological importance the Ramsar site should be declared as a protected area and a management plan should be made to manage the ecosystem.

REFERENCES

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- WWF Pakistan, 1995 Astola Island A Potential Site for Marine National Park
- > The Annotated Ramsar List of Wetlands of International Importance

http://www.ramsar.org/cda/en/ramsar-pubs-annolist/main/ramsar/1-30-168_4000_0__

ANNEXURE I FISHERMEN SURVEY QUESTIONNAIRE

Questionnaire Socio-economic Baseline

(Astola Island) PWP

- 1. Date _____
- 2. Name of Interviewer _____
- 3. Name of Respondent _____
- 4. Age of Respondent _____
- 5. Place of Origin _____
- 6. Boat Size (Feet) _____

7. Fishing Gears

Number	Description
	Number

- 8. Fishing Months _____
- 9. Fishing Area _____

10. Fishermen on Boat

Designation	Age	Education	Village / Area of Residence

<u>11. Fishing</u>

No.	Names of Fish Species	Names of Months it is Fished	Amount of Fish Caught (kg/month)	Domestic Consumption (kg/month)	Amount of Fish Sold (kg/month)	Price(Rs/Kg)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

12.	Gross	Income	(Rs)	
			· · ·	

13.	Total Expense	(Rs)	
-		· · /	

14. Net Income (Rs) _____

15. Division of Income (Patti System)

Owner	
Nakhuda / Nakho	
Boat Operator	
Cook	
Khalasi	
16. Remarks	

ANNEXURE II MAP OF ASTOLA ISLAND

ANNEXURE III RAPPAM QUESTIONNAIRE (ASTOLA ISLAND)

KEY NOTES

The first three sections list the pressures and threats on the Ramsar Site. The respondent should be asked to fill as many of these as are applicable on the area.

After section 4 the questions are answered as Yes, Mostly Yes, Mostly No and No.

"Yes" indicates that all or nearly all of the requirements are met.

"**Mostly Yes**" indicates that most of the requirements are met, or are likely to meet in the near future, or the requirements are met but respondent has some reservations of saying a qualified yes.

"Mostly No" answer indicates that only a few requirements are met or even if most of the requirements are met the results are still unsatisfactory.

"No" answer indicates that none or almost none of the requirements are satisfied.

QUESTIONNAIRE

Name of Respondent:

Specific Management Objectives: _____

Critical Management Activities:

1 PRESSURES AND THREATS

- 1.1 Pressure -----
- 1.2 Has it been a pressure in the last five years?
 - (1) Yes (2) No
- 1.3 In the last five years this activity has?
 - (1) Increased sharply
 - (2) Increased slightly
 - (3) Remained constant
 - (4) Decreased slightly
 - (5) Decreased sharply

1.4 The overall severity of the pressure over the last five years has been?

Extent		Impact	Permanence
Throughout (>50%)		Severe	Permanent (>100 years)
Widespread (15-50%)		High	Long term (20-100 years)
Scattered (5-15%)		Moderate	Medium term (5-20 years)
Localized (<5%)		Mild	Short term (<5 years)

- 1.5 Threat -----
- 1.6 Will it be a threat in the next 5 years?(1) Yes (2) No
- 1.7 The probability of the threat occurring is?
 - (1) Very high (2) High (3) Medium (4) Low (5) Very low
- 1.8 The overall severity of this over the next five years is likely to be?

Extent		Impact		Permanence	
	Throughout (>50%)		Severe	Permanent (>100 years)	
	Widespread (15-50%)		High	Long term (20-100 years)	
	Scattered (5-15%)		Moderate	Medium term (5-20 years)	
	Localized (<5%)		Mild	Short term (<5 years)	

2 PRESSURES AND THREATS

- 2.1 Pressure -----
- 2.2 Has it been a pressure in the last five years?
 - (1) Yes (2) No
- 2.3 In the last five years this activity has?
 - (1) Increased sharply
 - (2) Increased slightly
 - (3) Remained constant
 - (4) Decreased slightly
 - (5) Decreased sharply

2.4 The overall severity of the pressure over the last five years has been?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

- 2.5 Threat -----
- 2.6 Will it be a threat in the next 5 years?

- (1) Yes (2) No
- 2.7 The probability of the threat occurring is?
 - (1) Very high (2) High (3) Medium (4) Low (5) Very low
- 2.8 The overall severity of this over the next five years is likely to be?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

3 PRESSURES AND THREATS

- 3.1 Pressure -----
- 3.2 Has it been a pressure in the last five years?
 - (1) Yes (2) No
- 3.3 In the last five years this activity has?
 - (1) Increased sharply
 - (2) Increased slightly
 - (3) Remained constant
 - (4) Decreased slightly
 - (5) Decreased sharply

3.4 The overall severity of the pressure over the last five years has been?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

- 3.5 Threat -----
- 3.6 Will it be a threat in the next 5 years?
 - (1) Yes (2) No
- 3.7 The probability of the threat occurring is?

(1) Very high (2) High (3) Medium (4) Low (5) Very low

3.8 The overall severity of this over the next five years is likely to be?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

4 PRESSURES AND THREATS

- 4.1 Pressure -----
- 4.2 Has it been a pressure in the last five years?
 - (1) Yes (2) No
- 4.3 In the last five years this activity has?
 - (5) Increased sharply
 - (6) Increased slightly
 - (7) Remained constant
 - (8) Decreased slightly
 - (5) Decreased sharply
- 4.4 The overall severity of the pressure over the last five years has been?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

- 4.5 Threat -----
- 4.6 Will it be a threat in the next 5 years?

(1) Yes (2) No

- 4.7 The probability of the threat occurring is?
 - (1) Very high (2) High (3) Medium (4) Low

(5) Very low

4.8 The overall severity of this over the next five years is likely to be?

Extent	Impact	Permanence
Throughout (>50%)	Severe	Permanent (>100 years)
Widespread (15-50%)	High	Long term (20-100 years)
Scattered (5-15%)	Moderate	Medium term (5-20 years)
Localized (<5%)	Mild	Short term (<5 years)

5 SOCIOECONOMIC IMPORTANCE

- 5.1 The area is an important source of employment for local communities.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.2 Local communities depend upon the area resources for their subsistence.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.3 The area provides community development opportunities through sustainable resource use.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.4 The area has religious or spiritual significance.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.5 The area has unusual features of aesthetic importance.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.6 The area contains plant species of high social, cultural or economic importance.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.7 The area contains animal species of high social, cultural or economic importance.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.8 The area has high recreational value.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.9 The area contributes significant ecosystem services and benefits to communities.
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No
- 5.10 The area has a high educational and/or scientific value
 - (1) Yes (2) Mostly yes (3) Mostly no (4) No

6 VULNERABILITY

- 6.1 Illegal activities within the area are difficult to monitor.(1) Yes (2) Mostly yes (3) Mostly no (4) No
- 6.2 Law enforcement is low in the region.

	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.3	Bribery and corruption is common throughout the region.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.4	The area is experiencing civil unrest and/or political instability.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.5	Cultural practices, beliefs and traditional uses conflict with the AREA objectives.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.6	The market value of area resources is high.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.7	The area is easily accessible for illegal activities.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.8	There is a strong dema	resources.							
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.9	The area manager is ur	nder pressure to unduly e	exploit the area resources.						
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						
6.10	Recruitment and retention of employees is difficult.								
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No						

7 OBJECTIVES

7.1 Area objectives provide for the protection and maintenance of biodiversity

Yes (2) Mostly yes
Mostly no
No

7.2 Area employees and administrators understand the area objectives and policies

Yes (2) Mostly yes
Mostly no

7.3 Local communities support the overall objectives of the area

Yes (2) Mostly yes
Mostly no
No

8 LEGAL SECURITY

8.1 Staff and financial resources are adequate to conduct critical law enforcement activities.

(1) Yes (2) Mostly yes (3) Mostly no (4) No

8.2 Conflicts with the local community are resolved fairly and effectively.(1) Yes (2) Mostly yes (3) Mostly no (4) No

9 MANAGEMENT PLANNING

- 9.1 There is a comprehensive inventory of natural and cultural resources(1) Yes (2) Mostly yes (3) Mostly no (4) No
- 9.2 There is an analysis of, and strategy for addressing, area threats and pressures

(1) Yes (2) Mostly yes (3) Mostly no (4) No

10 MANAGEMENT DECISION MAKING

10.1	There is a clear internal	l organization.				
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
10.2	Management decision r	making is transparent.				
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
10.3	Local communities part	icipate in decisions that a	affect them.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
10.4	There is effective comm	nunication between all le	vels of area staff and administration.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
11	STAFFING					
11.1	The level of staffing is sufficient to effectively manage the area.					
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
11.2	Staff members have ad	equate skills to conduct	critical management activities.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
11.3	Training and developme	ent opportunities are app	propriate to the needs of the staff.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
11.4	Staff performance and	progress on targets are p	periodically reviewed.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			
11.5	Staff employment cond	itions are sufficient to ret	ain high-quality staff.			
	(1) Yes (2) Mostly yes	(3) Mostly no	(4) No			

12 FINANCES

12.1 Funding in the past 5 years has been adequate to conduct critical management activities. (1) Yes (2) Mostly yes (3) Mostly no (4) No 12.2 Funding for the next 5 years is adequate to conduct critical management activities. (1) Yes (2) Mostly yes (3) Mostly no (4) No 12.3 Financial management practices enable efficient and effective area management. (1) Yes (2) Mostly yes (3) Mostly no (4) No 12.4 The long-term financial outlook for the area is stable. (1) Yes (2) Mostly yes (3) Mostly no (4) No

13 RESEARCH EVALUATION AND MOINITORING

13.1 The impact of legal and illegal uses of the area are accurately monitored and recorded

(1) Yes (2) Mostly yes (3) Mostly no (4) No 13.2 Research on key ecological issues is consistent with the needs of the area (1) Yes (2) Mostly yes (3) Mostly no (4) No 13.3 Research on key social issues is consistent with the needs of the area (1) Yes (2) Mostly yes (3) Mostly no (4) No 13.4 Area staffing have regular access to scientific research and advice (1) Yes (2) Mostly yes (3) Mostly no (4) No 13.5 Critical research and monitoring needs are identified and prioritised (1) Yes (2) Mostly yes (3) Mostly no (4) No

ANNEXURE IV SOCIO-ECONOMIC BASELINE SURVEY PICTURES

Picture 1: Meeting with Fisheries Department Officers, Pasni

Picture 2: Meeting with District Coordinator IUCN

Picture 3: Map showing the 840 nautical mile area of Pakistan

Picture 4: Interview with Bengali Community

Picture 5: Fishermen in a boat near Astola Island

Picture 6: Damaged nets discarded at the coast of Astola Island

Picture 7: Fishing boats nears the coast of Astola Island

Picture 8: Mosque used by fishermen present at Astola Island

Picture 9: Fish catch of fishermen living in the hut on Astola Island

ANNEXURE V RAPPAM METHODOLOGY

The RAPPAM Methodology can:

- Identify management strengths and weaknesses
- > Analyse the scope, severity, prevalence, and distribution of a variety of threats and pressures
- Identify areas of high ecological and social importance and vulnerability
- > Indicate the urgency and conservation priority for individual protected areas
- Help to develop and prioritise appropriate policy interventions and follow-up steps to improve protected area management effectiveness.

RAPPAM Methodology is basically designed for broad level comparisons among various PAs. Although it can be applied to a single protected area, the RAPPAM Methodology is not designed to provide detailed, site-level adaptive management guidance to protected area managers. It can however be used as a framework for developing a site-level monitoring tool⁴. It can however be used with slight modification on sites that are not protected but have significant ecological importance.

Pressures and Threats

The first section of the modified RAPPAM questionnaire addresses pressures and threats to the Ramsar site. Illegal or legal activities and events which have an adverse affect on the integrity of the area are termed as pressures. Over the past five years various forces have been exerting pressure over Astola Island, which were identified by the respondents. Trend of pressure, extent, impact and permanence for each pressure was determined. Trend is always measured over a specific time period, which in this case was past five years. It was determined as to whether over the past 5 years the identified pressure has increased decreased or is still the same as it was five years back.

Threats are probable or imminent pressures, which are likely to occur and would have a detrimental impact on the integrity of the area in future. Threats which are likely to occur in the next five years along with their probability of occurrence, extent, impact and permanence were determined.

The overall severity of a pressure and a threat is measured by three parameters:

- Extent
- Impact
- > Permanence

Extent is the percentage of the area which will be impacted and is assessed in relation to its possible occurrence. For example the extent of fishing activity would be measured taking into consideration only the fishable water. "Throughout" means that an activity occurs in more than 50% area of its potential range, "Widespread" is when an activity occurs from 15 to 50% area, "Scattered" is 5 to 15% area while if an activity occurs in less than 5% area of its potential range it is termed as "Localized".

A pressure may directly or indirectly affect the resources of an area. The degree or level of its affect is termed as impact and is categorized as severe, high, moderate and mild. Serious damage or loss to the resources of a protected area is a "Severe" impact. Significant damage to the area resources is termed as "High". "Moderate" impact is when the damage to the natural resources of a area which is

⁴ J Ervin, 2003

WWF: Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology

detected but it is very significant. "Mild" impact is damage which is considered insignificant as it is not easily detected.

The time required by a protected area to recover from the damages of a pressure or a threat naturally or by human intervention is given by permanence. Recovery is defined as the restoration of ecological structures, functions and processes to levels that existed prior to the activity's occurrence or existence as a threat. Recovery time assumes that the activity ceases, and that either management interventions take place or natural processes are allowed to occur. "Permanent" damage is damage to a resource that cannot recover, either by natural processes or with human interventions, within 100 years. "Long term" damage can recover in 20 to 100 years. "Medium term" damage can recover in 5 to 20 years. "Short Term" damage can recover in less than 5 years.⁵

⁵ J. Ervin, 2003

WWF: Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology