Management Effectiveness Tracking Tool: Bagiai Wildlife Management Area

Part 1: Basic information about the protected area

Table 1. Protected area information

Name, organisation and contact details for person(s) conducting the assessment ***Person 1*****:** *Name, Organisation, Address, Email, Phone*	Fiona Leverington, SPREP/Protected Area Solutions, Fiona@protectedareas.com.au
Person 2: *Name, Organisation, Address, Email, Phone*	Greg Peterson, SPREP/Protected Area Solutions, 283 Madill Road, Tandur, Q4570, Australia, gregpeterson53@hotmail.com; 0414300955
Today's Date	24/8/2016
Name (or names) of protected area	Bagiai Wildlife Management Area
Size of protected area (ha)	13,760
PNG Code or number	
World Database of Protected Areas site code (these codes can be found on www.unep-wcmc.org/wdpa/)	4205
What level or kind of protected area is it? (	Wildlife Management Area
IUCN Category	Not recorded
International protected area? e.g. World Heritage or Ramsar?	No
Country	Papua New Guinea
Province/s	Madang
District/s	Sumkar
Local level governments	Karkar Rural
Ward/s	22, 23 (10 ward areas all together)
Nearest big town	Madang
Location of protected area (brief description)	The WMA is on Karkar Island. Karkar is about a two hour boat trip from Madang and about half an hour by dinghy from the nearest point on the mainland. It is a volcanic island. The WMA is mainly on the eastern side of the island, extending from the coast to the volcanic peak and crater. It also extends 2km from the coast into the sea and includes two islands, Tuale (now disappeared) and Mangamarek. There are many small settlements along the coastline within the WMA.
Map references	Karkar Island is on two adjoining 1:100,000 Topographic maps i.e. Karkar sheet 8088 and Bagabag sheet 8188.
When was the protected area gazetted or formally established?	27/1/1977
Reference for gazettal or Memorandum of Understanding (MoU)	Gazette No. 7
Who owns the protected area? please enter Government Private Community/ customary landowners, private, Other (name) and include **Clan name(s)**	Customary landowners. >40 clans including: Losan, Birairau, Magusan, Suboura, Seg Marora, Bridakan and many more.

Number of households living in the protected area	5000
Population size within the protected area	16,000
Who manages the protected area? (e.g. please enter government, customary landowners [**add clan names**] management committee [**how many and what gender**])	The Management Committee is defunct, but could be revived. Ten members are on the original gazettal notice. Luiev Maror is the chief land manager.
Total number of staff	0
Temporary paid workers	0
Permanent paid workers	0
Annual budget (US$) – excluding staff salary costs	0
Operational (recurrent) funds	0
Project or special funds	0
Reason for park establishment	For protection of the WMA's values (this was the reason when conservation was very active, but now there is less interest). According to the 2006 RAPPAM, the WMA was established at the initiation of the Karkar local council in order to control the unsustainable hunting that was developing on the island, specifically to prevent the use of shot guns and the uncontrolled development of gardens. There was also a threat of mining and exploration.
What are the main values for which the area is designated (Fill this out after data sheet 2)	Breeding ground for wildlife, including flying fox and cuscus; the coastline and reefs provide fish and other marine life including nesting turtles; virgin forest; food items for the traditional barter system; and cultural values including traditional routes and meditation areas.
List the primary protected area management objectives (add lines if needed after the most important objectives): *Management objective 1*	To protect the area for future generations so that species can breed, multiply and migrate.
Management objective 2	To protect species, habitats and water.
Management objective 3	To protect cultural places
Number of people involved in answering the assessment questions	3
Name/organisation/contact details of people participating the assessment *(Please do not insert return/enter or dot points)*	*Luiev Maror*, chief land manager, Bagiai WMA, PO Box 2070, Jonba, Madang, 72377222; *Maitland Michael Kilil*, PO Box 995, Madang, 70797621; *Robert Said*, Acting Ward Member, Karkar Local Level Government, Ward 23, Boroman Village, PO Box 2070, Jonba, Madang, 73910467.
Customary landowners/other community; CEPA, Other national government agency; Provincial govt; local level govt; Protected area staff (anyone working on the protected area in paid jobs; NGO; Donors; External experts; Others	Customary landowners.
Please note if assessment was carried out in association with a particular project, on behalf of an organisation or donor.	SPREP through the PNG Protected Area Assessment Project, which is a component of the GEF Community-based Forest and Coastal Conservation and Resource Management Project in PNG.

Part 2: What makes this protected area special and important?

Bagiai WMA is part of Karkar Island. The highest peak is about 1800m and the volcanic crater is 1000m. Much of the conservation area is steep, forested country. The conservation area is the sparsely populated part of the island, where animals such as cuscus, flying fox and wild pig can breed. It faces long Island and Saisi. Turtles are carried by the current from Long Island and nest on the beaches. The traditional barter system traded fish and galip nut for upland products and garden products. The WMA has the only permanent river/creek on the island.

Table 2. Key values of the protected area

No.	Key values	Brief description	*Note if endangered species or ecosystem (IUCN)*
1	Breeding ground for wildlife – flying fox, cuscus	Cuscus (white, grey and black), flying fox, megapode and wild pigs are found in the WMA.	
2	Coastline and reef – fish and marine life including nesting turtles	Fish, turtles, many dolphins and whales (with blunt head up to 4m) and legends of dugong (mermaid). Turtle nesting sites are located on the beaches. The tides and currents from Milne Bay bring the turtles into there.	Not sure of species of dolphins and whales. Turtles are endangered.
3	Virgin forest	Medicinal trees and plants. The forest provides habitat for a variety of birds (blue dove and Torres Strait pigeon). Bush vines are used for ropes and bilums, some palm trees are used for making spear and traps are made from the bark. Clay (including rare black) is found in the ground and is used for decoration for customary purposes and only special clans have rights. There is a big water source and the council is trying to use this water for the whole island. The crater collects a lot of water in the wet season. On the foothills there are many streams and water is found all over the place. Hardly anyone lives in the steep area but people go up there for hunting.	
4	Food items for traditional barter system	Galip nut is used as a trade item (oil). It is a sign of honour and is part of the identity of the Karkar people. Other items for barter include fish, pandanus (oil and juice) and the galarga nut.	
5	Cultural values including traditional routes and meditation areas	There are ancestral and historic settlement areas where people would come and camp. These were traditional travelling, hunting and tradition routes. Spirits (masalai) live in the volcanic crater. People go to the bush in the WMA to meditate and connect with nature. An important men's practice that is important especially now is the Men's House system. However, this is dying out. Part of the reason that the WMA was declared was to enable the children to understand what is happening with the natural world. The *2006 RAPPAM survey noted 'The whole mountain is revered locally for its spiritual significance and, at least in the upper parts, this is very much still respected. Young people I walked with to the top were strictly observant of a code of silence in the upper parts of the mountain and, interestingly, there was a notable increase in visible birdlife in this area. It is still possible for local leaders to implement traditional management techniques that restrict access to certain areas and at certain times. This is, however, becoming less common'.*	

Table 3. Checklist of values/benefits

Not important 0; Important 1; Very important 2; Don't know DK

How important is the protected area for each of the listed values/benefits?	**Score** (0,1,2, DK)	**Comment**

1. Biodiversity – the presence of many different kinds of plants, animals and ecosystems	2	Cuscus (white, grey and black), flying fox, megapode; fish, turtles, many dolphins and whales (with blunt head up to 4m) and legends of dugong (mermaid), turtle nesting sites are located on the beaches; and forest species.
2. Presence of rare, threatened, or endangered species (plants and animals)	DK	Not known, but there may be a tube-nosed bat.
3. Ecosystems (e.g. wetlands, grasslands, coral reefs etc) that are rare because they have been cleared or destroyed in other areas	2	The forest ecosystem is important as it is now the only place to get many resources e.g. cane/rattan.
4. Protecting clean, fresh water	2	The WMA is the main freshwater source and it may in future be extracted for use over the whole island.
5. Sustaining important species in big enough numbers that they are able to survive here	2	Important breeding ground for flying fox (only breeds once a year).
6. Providing a source of employment for local communities now	DK	
7. Providing resources for local subsistence (food, building materials, medicines etc.)	2	The WMA is an important breeding ground and provides many resources, including building materials.
8. Providing community development opportunities through sustainable resource use	2	The water resources are important for future development.
9. Religious or spiritual significance (e.g. tambu places)	1	There are important sites and more may need to be identified.
10. Plant species of high social, cultural, or economic importance	2	As above.
11. Animal species of high social, cultural, or economic importance	1	Eagle feathers for head-dresses.
12. Attractive scenery	2	
13. Tourism now	1	
14. Potential value for tourism in the future	2	Tourism could be very important, as the WMA is a very safe place with good scenery and biodiversity.
15. Educational and/or scientific value	2	Children in primary school do not know very much about the bush, fish, ecology or food chain.
16. Maintaining culture and tradition on customary land and passing this on to future generations	2	Maintaining culture is very important and we need to identify specific boundaries to important cultural sites.

Part 3: What are the threats to the protected area?

Table 4: Threats to the protected area

H **High** significance threats are seriously degrading values. This means they are badly damaging some value –it might be a kind of animal or plant, or your traditional gardens

M **Medium** threats are having some negative impact – they are damaging values but not so badly

L **Low** threats are present but not seriously damaging values

1 **N/A** where the threat is not present in the protected area or where something is happening but is not threatening the values at all

Threat type	Score (H,M,L,0)	Notes
1.1 Housing and settlement	L	Most of the WMA is remote with little settlement. There is mainly settlement expansion on the coastline.
1.1a Population increase in the protected area community	L	
1.2 Commercial and industrial areas	0	
1.3 Tourism and recreation infrastructure	0	
2.1 Customary land owner and community gardens and small crops	M	The fear is that the gardens will expand to become more large-scale and cause a loss of forest and other plant material.
2.1a Drug cultivation	L	Recent incidence of people planting marijuana.
2.1b Commercial plantations	H	Copra and cocoa plantations are expanding and people may encroach into the WMA. Part of the commercial plantations (Middleton) are within the WMA.
2.2 Wood and pulp plantations	L	
2.3 Livestock farming and grazing	0	There used to be cattle grazing.
2.4 Marine and freshwater aquaculture	0	
3.1 Oil and gas drilling	0	
3.2 Mining and quarrying	0	
3.3 Energy generation	L	There is a proposal for a geothermal plant to extract steam from the volcano. There has been discussion about starting up a hydro-electric plant. Currently, most people use solar power. There is also a proposed biodiesel plant.
4.1 Roads and railroads (include road-killed animals)	0	
4.2 Utility and service lines (e.g. electricity cables, telephone lines)	0	
4.3 Shipping lanes	L	International shipping lanes pass between Karkar and Madang and there is at least one ship per day. This number may increase. They are supposed to go outside Karkar Island.
4.4 Flight paths	0	
5.1 Hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)	M	There is always some poaching by outsiders.
5.2 Gathering terrestrial plants or plant products (non-timber)	M	
5.3a Logging and wood harvesting for local/customary use	M	
5.3b Logging and wood harvesting – commercial logging	M	
5.4a Fishing, killing and harvesting aquatic resources for local/customary use	L	Fish and other marine resources are used for local subsistence purposes. There are still clams but numbers may have decreased. Derris poison root used for fishing. There is no monitoring of fish numbers or of other marine species and it is difficult to know the status. (Note: in 2006 the RAPPAM listed fishing and shell collecting as the most severe threat).
5.4b Fishing, killing and harvesting aquatic resources for commercial use	M	The tuna cannery sometimes sits off the coast for days and employs fish attracting devices. This is illegal as the community has a 2km exclusion zone in relation to resource extraction.

6.1 Recreational activities and tourism	0	No tourists visit the WMA.
6.2 War, civil unrest and military exercises	0	
6.3 Research, education and other work-related activities in protected areas	0	
6.4 Activities of protected area managers (e.g. construction or vehicle use)	0	
6.5 Deliberate vandalism, destructive activities or threats to protected area staff and visitors	0	
7.1 Fire and fire suppression (including arson)	L	Some fire is natural in the system.
7.2 Dams, hydrological modification and water management/use	0	
7.3a Increased fragmentation within protected area	H	The main source of fragmentation is from human activities, mainly gardens which are expanding.
7.3b Isolation from other natural habitat (e.g. deforestation)	L	
7.3c Other 'edge effects' on park values	0	
7.3d Loss of keystone species (e.g. top predators, pollinators etc.)	L	
8.1 Pest plants	L	There is a broad-leafed weed spreading from the road, and currently it is found only on the edge of the road.
8.1a Pest animals	L	Cane toad and giant Japanese snails (pigs eat them) are found in the WMA.
8.1b Diseases such as fungus or viruses that make native plants or animals sick	0	
8.2 Introduced genetic material (e.g. genetically modified organisms)	0	
9.1 Household sewage and urban waste water	0	Villagers mostly have pit toilets and waste is not a problem.
9.1a Sewage and waste water from protected area facilities	0	
9.2 Industrial, mining and military effluents	0	
9.3 Agricultural and forestry effluents (e.g. excess fertilizers or pesticides)	0	
9.4 Garbage and solid waste	0	
9.5 Air-borne pollutants	0	
9.6 Excess energy (e.g. heat pollution, lights etc.)	0	
10.1 Volcanoes	L	The island has an active volcano (last eruption 1979) and this may cause some problems in the future.
10.2 Earthquakes/Tsunamis	L	The last big earthquake was in 1979.
10.3 Avalanches/Landslides	0	
10.4 Erosion and siltation/ deposition (e.g. shoreline or riverbed changes)	L	Erosion is occurring on the shoreline.
11.1 Habitat shifting and alteration	M	The beachfront ecosystem has changed. There used to be dunes with vines for about 5-10 m from the coast and this protected hermit crabs that are used a lot for baits. Now the saltwater has come up and washed the beach and dunes away. When the waves come in they really pound the reef and break it. There also used to be tree-moss from 500m up, but now it is all dead.

11.2 Droughts	M	There was drought and fire last year.
11.3 Temperature extremes	M	There is more heat and more hot days.
11.4 Storms and flooding	M	There is no flooding, although there is more wind and storms. The wind is stronger e.g. it breaks off the mango flowers and we lose the mango crop.
11.5 Coral bleaching	H	There are lower tides and more sun. The coral closer to the land is exposed at low tide and is being bleached and becomes a sandbank.
11.6 Intrusion by saltwater into gardens etc.	M	There is evidence of salt water intruding into gardens.
11.7 Sea level rise	M	This is reducing the area for turtles to nest.
Other (please explain)		
12.1 Loss of cultural links, traditional knowledge and/or management practices	M	The traditional barter system is disappearing. This was important for creating relationships.
12.2 Natural deterioration of important cultural site values	L	Waves now pound the gravesite and the cemetery has disappeared.
12.3 Destruction of cultural heritage buildings, gardens, sites etc.	L	
Other (please explain)	M	Increased isolation - because the sea is getting rougher, it is getter more difficult to get to Madang by boat. We lose about five people at sea every year.

Table 5. Worst threats and ways forward

Threat No.	**Threat** (Most significant first)	**Threat number or name** (copy no. from Table 4)	**Nature of the threat, impact and how to reduce the impact.**
1	Commercial plantations	2.1	Part of the commercial plantations (Middleton) are within the WMA. The people are planting more copra and cocoa and when they run out of land they will encroach further into the WMA.
2	Climate change (e.g. coral bleaching, habitat shifting, droughts, temperature extremes, storms, salt water intrusion, sea level rise)	11.1,11.2,11.3,11.4, 11.5,11.6,11.7	Climate change is having noticeable impacts (e.g. coastal erosion, coral bleaching, loss of marine biodiversity, impacts on subsistence gardening).
3	Hunting of terrestrial animals	5.1	Mainly undertaken by outsiders; impacts on species diversity and abundance.
4	Fragmentation	7.3a	Loss of native vegetation and related habitats.
5	Loss of cultural traditions	11.1	Loss of traditional barter system.

Part 4: What is the management like in the protected area?

Table 6. Management effectiveness scores, comments, next steps

Issue	Score (0,1,2,3, NA)	Comment	Next steps
1a. Legal status	3	Legally gazetted in 1977.	
1b. Legal status			
2a. Protected area regulations	1	There are some traditional rules e.g. it is not permitted to cut any tree that is standing.	Increase the community awareness of the WMA rules e.g. put up signboards, fence important areas, have a presence in the WMA (e.g. we need to show that the government has authority and that it has a greater presence in the WMA).
2b. Protected area regulations			
3. Law enforcement	1	The WMA has been neglected, with no interest shown in it. None of the villages or clans really know what is happening with conservation.	As above – there needs to be improved awareness among the community.
4. Protected area objectives	1	There are agreed objectives but the WMA is not really managed according to them.	
5. Protected area design	3	The size and shape of the WMA is quite good.	
6. Protected area boundaries	3	The first time the people have seen the WMA boundary is at this workshop. However, everyone understands where the boundary is. GPS coordinates may not be known.	The WMA boundaries need to be better marked on the ground and the GPS coordinates identified. A map in the community would also help. (*Note: the gazettal notice says that the area continues 200m seaward and the CEPA map does not indicate this*).
7. Management plan	0	There is no Management Plan.	Seek assistance to develop a Management Plan for the WMA and include all relevant stakeholders.
7a. Planning process	0	Customary landowners are not consulted about management as there is no Management Plan.	
7b. Planning process	0	There is no plan to review.	
7c. Planning process	0	There is no monitoring or evaluation that informs planning and management.	
8. Regular work plan	0	There is no regular work plan.	
9. Resource inventory	0	There is very little information available on the WMA.	Create a management plan and undertake a resource inventory to help inform the management planning processes.
10. Protection systems	0	There are no patrols or permits. The main rule is that only fallen timber can be cut for use.	
11. Research and monitoring	0	There is no research or survey work.	Research is essential to underpin effective planning and management. We do not know if

			anyone is interested in doing research. We could look for volunteers (SIL can connect people and help with logistics- have office in Madang).
12. Resource management	0	No activities are occurring.	
13a. Staff numbers	0		
13b. Other people working on the protected area	1	One of the customary landowners (Luiev) walks around to see if everything is okay and checks on the area, but he is alone and it is a big area.	We need to reconvene regular meetings and seek assistance to develop a Management Plan and related support systems.
14. Training and skills	1	Luiev's skills in understanding the area and its people are high, but most people have no training.	Scientific knowledge could be improved, e.g. understanding food chains, relevant laws and mediation.
15. Current budget	0		
16. Security of budget	0		
17. Management of budget	NA		We may need to set up a bank account if the WMA is reinvigorated.
18. Equipment	0		
19. Maintenance of equipment	NA		
20. Education and awareness	0		Attendees have plans to increase awareness in the community
21. Planning for land use or marine activities	0	Adjacent planning and activities (e.g. fishing for the tuna cannery) do not take account of the WMA.	
22. State and commercial neighbours	0	There is no contact with state or commercial neighbours.	The government agency needs to facilitate contact with the WMA.
23. Indigenous people/ Customary landowners	3	Customary landowners have total say over what happens within the WMA.	
24a. Impact on communities	0	There is no communication between the landowners and CEPA or the Local Level Government.	
24b. Impact on communities	0	There are no programs to improve the landowners' welfare.	
24c. Impact on communities	1	The customary landowners actively support the WMA.	
25. Economic benefit	0	The WMA provides no paid employment.	
26. Monitoring and evaluation	0		
27. Visitor facilities	0		There is tourism potential e.g. we could take people up to the top of the volcano and go diving.
28. Commercial tourism operators	0	They go to Karkar but do not go to the WMA.	
29. Fees	0		

30. Condition of values	2	There are some issues or threats, but the most important values are intact. Much traditional knowledge has been lost e.g. the sunbird makes a noise when the big eagle is up in the tree, but the children do not understand this anymore. If they destroy the places where the swallows nest when they fly up from Australia, then where will they go?	
30a.Condition of values	0	No research underpins the assessment of values.	
30b. Condition of values	0	There are no management programs to address threatening processes.	
30c. Condition of values	0	There are no routine management activities.	

Part 5: Condition and trends of protected area values

Table 7. Values, condition and trend

Key value (from Table 2)	**Condition Score** (VG, G, F, P, DK)	**Trend Score** (I, S, D, DK)	**Information source and justification for Assessment and HOW the condition can be IMPROVED**
Breeding ground for wildlife e.g. flying fox and cuscus	G	D	Could be improved if fewer people hunted.
Coastline and reef – fish and marine life	G	D	Difficult to know from the surface what is happening. Climate change has the biggest effect on the condition of the marine resources.
Virgin forest	G	D	Where people cannot access easily it is very good but in other areas there is encroachment and loss of forest and habitat.
Food items for traditional barter system	F	D	Unless people start replanting, the galip tree will disappear.
Cultural values including traditional routes and meditation areas	F	D	Michael's grandfather and father used the traditional routes and temporary settlement areas. He knows about them, but our children don't. If these traditions are not recorded, no one will know where they are.

Table 8. Recommendations and ways forward

1.	2.	3.
More government input and resources (e.g. money), improved knowledge of the WMA, and assistance to reinvigorate the WMA.	More awareness programs in the community, both about the protected area and its wildlife. Participation of landowners and management teams.	Tourism is important in the future, but we need to get some infrastructure in place for low-key village-based tourism. Make sure people who are going to the volcano must have a local guide.

Table 9. Strengths and challenges (facilitator/recorder synthesis)

	Strengths	Challenges
1	The protected area is on Karkar Island and there are relatively few threats and pressures from outside at present. It is an area of outstanding beauty with an active volcano, and steep slopes with a steep slope into the sea.	Maintaining the biodiversity values in the face of expanding landowner gardens, increased harvesting of wildlife and expansion of cocoa/copra plantations into the protected area.
2	The WMA is established and there is a relatively low level of settlement within the protected area. The traditional laws have been incorporated into the WMA and are generally followed, or mediation is undertaken to stop the activity. There is not much difference now than if the WMA had not been introduced, but the government laws can give more strength to the arrangements.	Addressing the impacts of climate change, which is a high level threat with observed changes including increased winds damaging the reefs, increased temperatures causing reef bleaching, and greater risk in travelling by boat across the ocean to other islands and Madang.
3	Language is still strong, and there are cultural links to the land. Tok place (the language spoken in the village) has been recorded but only for the bible. There are two very different languages spoken on Karkar Island.	Stemming the loss of cultural knowledge (much traditional knowledge and practices are being lost compared to 50 years ago and there are no records of where the cultural places are) in the face of numerous outside influences.
4	People are closely linked to the land and feel that the land owns them rather than that they own the land.	Achieving effective outcomes with no resources or support from the government or any other organisations. The management committee has not functioned for a long time and there is a low level of awareness among the community members generally.

References

Eaton, P. 1986. Potential World Heritage Areas: Karkar and Long Island, Ples 2:63-72.

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Middleton, J. 2011. My life on Karkar, Crawford House Publishing, Adelaide.