

Name of Protected Area: Lihir Island Protected 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 <i>Person 1: Name, Organisation, Address, Email, Phone</i>	Bernard Suruman, CEPA, Boroko, National Capital District, Port Moresby, bsuruman@dec.gov.pg.
<i>Person 2: Name, Organisation, Address, Email, Phone</i>	Madeline Lahari, CEPA, Boroko, National Capital District, Port Moresby, mlahari@dec.gov.pg.
Today's Date	20/02/2017
Name (or names) of protected area	Lihir Island Protected Area
Size of protected area (ha)	1980 (It is unclear whether the PA covers the whole island. This is disputed by the local communities, who understand the PA exists on the terrestrial component within the mining lease. NOTE: This assessment is in relation to the smaller area of land within the mining lease area and does not cover the whole island as this whole island concept is not supported by the community.
PNG Code or number	52
World Database of Protected Areas site code (these codes can be found on www.unep-wcmc.org/wdpa/)	15894
What level or kind of protected area is it? (National Park, Wildlife Management Area, Sanctuary, Reserve, Locally Managed Marine Area etc)	Protected Area
IUCN Category	NA
International protected area? e.g. World Heritage or Ramsar?	NA
Country	Papua New Guinea
Province/s	New Ireland
District/s	Lihir
Local level governments	Nimamar
Ward/s	15 wards
Nearest big town	Kavieng
Location of protected area (brief description)	Lihir Island and PA is located about 30km from the mainland (about 2-3 hours by boat) and 900km NE of Port Moresby. It is a volcanic sea mount that rises steeply from the coast to about 600m above sea level. It is 22km wide (N to S) and 14.5 km (E-W). There is a collapsed caldera (Luise caldera). The island is dominated by limestone overlain by volcanic soils. The protected area is not believed to include the whole island or the marine environment. It is contained within the mining lease and extends only along the coastline (e.g. to the low water mark). The gold deposit in Luise caldera is mined by Newcrest Mining Ltd.
Map references	Lihir 1:1000000 Topo sheet 9186.
When was the protected area gazetted or formally established?	06/06/1991

Reference for gazettal or Memorandum of Understanding (MoU)	
Who owns the protected area? please enter Government Private Community/ customary landowners, private, Other (name) and include Clan name(s)	Customary land and mining lease to Newcrest Mine Ltd (effective to 2052). Six major clans (and sub-clans); one language groups (Sunglik language).
Number of households living in the protected area	Unclear (it was reported that most people have been resettled within the mining lease area, within their respective customary land).
Population size within the protected area	About 12,000. (+3000 migrants who are coming in to work in the mine and also reside in the mine headquarters). There are about 3000 people in Kapit and Putput.
Who manages the protected area? (e.g. please enter government, customary landowners [add clan names] management committee [how many and what gender])	CEPA is supposed to be the manager of the PA. The landowners want assistance in management. Newcrest Mine works under the relevant legislation to manage the mine. There is a community department within Newcrest that monitors the activities of the mine. There is an association which is to look after the welfare of the immediate landowners affected by the mining. There is no Management Committee to manage the PA. Newcrest Mine Ltd. has an Environment Management and Monitoring Plan Unit to address issues related to mining.
Total number of staff (this means anyone working on the protected area in paid jobs – whether NGOs, community, rangers or customary landowners	1 CEPA staff to ensure compliance with the relevant mining regulations. (Environment Department with Newcrest which has staff to do monitoring and reporting to CEPA). There are no people responsible for specific management of the PA.
<i>Temporary paid workers</i>	0
<i>Permanent paid workers</i>	1
Annual budget (US\$) – excluding staff salary costs	0
Operational (recurrent) funds	0
Project or special funds	Newcrest Mine Ltd provides some special project funds. Amount is unknown.
Reason for protected area establishment	The PA was established to protect megapode resources and nesting areas from the activities of non-customary people attracted to a large mining operation.
What are the main values for which the area is designated (Fill this out after data sheet 2)	Megapodes, leather back turtle nesting, bamboo, sacred sites.
List the primary protected area management objectives (add lines if needed after the most important objectives): <i>Management objective 1</i>	Preserve the current resources for future generations. (When Newcrest obtained their mining permit they were required to protect the habitat of the megapodes).
<i>Management objective 2</i>	Develop economic resources.
<i>Management objective 3</i>	Protect social and cultural resources.
Number of people involved in answering the assessment questions	4
Name/organisation/contact details of people participating in the assessment	<i>Gabriel Luluaki</i> , CEPA Lihir Island, PO Box 6601, Boroko, NCD; <i>Jordon Bulo</i> , Environment and Climate Change Division, New Ireland Provincial Administration, PO Box 103, Kavieng, New Ireland Province, buloemmanuel@gmail.com; <i>Jerome Ananias</i> , Malie Specific Issue Committee, c/- LMALA 120, Lihir, Kavieng, New Ireland Province; <i>Patrick Mait</i> , Lihir Attols Environment Association, Lihir, Kavieng, New Ireland Province.

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	CEPA, customary landowners, Provincial Government, NGOs.
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?

The precise location and boundaries of the Protected Area are unknown. The PA, when it was established in 1991, was largely without the knowledge of the community (RAPPAM 2006). The Lihir Special Mining Lease was granted in 1995 (i.e. after the WMA was gazetted) for a term of 40 years. In 2010 Newcrest acquired the Lihir operations. Lihir is owned and operated by Lihir Gold Ltd, a 100% subsidiary company of Newcrest. In PNG the state owns all minerals at six feet or more below the earth (s 5 Mining Act 1992). If customary landowners own the land there is a conflict of interest with the state's ownership of minerals below it. The government also owns all the water and the government can issue licenses for the use of water e.g. for domestic or industrial use or disposal of waste etc. The environmental plan for the mine allows for direct disposal of mine tailings by a submarine tailings disposal system (at 125m depth). Waste rock dumping at sea is also permitted with an area covering 1.8km N and 2.3km S of Lihir. Low grade ore is stockpiled on the shoreline in Luise Harbour. CEPA maps indicate that the whole of the island is within the PA, but the participants at the workshop disputed this, indicating that only the Special Mining Lease area was within the PA, and that it extended only to the low water mark. Large scale mining for gold takes place within the PA and it has had an impact on megapode habitat. A Megapode Management Plan was developed when the mine began operations and aimed to relocate megapode burrows to other non-impacted areas. Now that the mine is in place many in the community have abandoned their subsistence base. Cash income is received in the form of royalties from the mine. There is a prohibition on the taking of megapode eggs or adults by all except the landowners.

Table 2. Key values of the protected area

No.	Key values	Brief description	Note if endangered species or ecosystem (IUCN)
1	Megapode eggs	The megapode eggs are an important source of protein and there is a barter system to exchange these for other products.	
2	Leatherback turtles	These are important and in the past were used as a source of protein. There is some research to suggest that the leatherbacks move from Canada to Kapit beach.	Leatherback turtles, <i>Demochelys coriaca</i>
3	Bamboo forest (with orchids) and sago	Bamboo is used for housing, to fence gardens and to support yam crops; there are sago plants and the forest produces timber for building houses.	
4	Sacred sites (Traditional entry point)	There is a highly significant area where decisions are made and it is strictly for males only.	

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	Megapode (<i>Medapodius freycinet/eremita</i>) nest in the warm sandy soil (they do not build mounds) – this habitat is mainly in the volcanic caldera and has been impacted by gold mining in the caldera. Leatherback turtles, <i>Demochelys coriaca</i> (Kapit beach) are present. A management plan was in place to improve nesting and hatchling development. There are birds, marine pelagic and coastal reef fish, seagrass, freshwater and estuarine fish, freshwater macro invertebrates, green turtles. Little information on reptiles and insects, mammals.
2. Presence of rare, threatened, or endangered species (plants and animals)	2	Leatherback turtle nesting sites.
3. Ecosystems (e.g. wetlands, grasslands, coral reefs etc) that are rare because they have been cleared or destroyed in other areas	2	Coral reefs are important (but these may not be within the PA).
4. Protecting clean, fresh water	2	
5. Sustaining important species in big enough numbers that they are able to survive here	2	
6. Providing a source of employment for local communities now	1	At the moment Newcrest Mine is providing for the employment for local communities.
7. Providing resources for local subsistence (food, building materials, medicines etc.)	1	The PA provides building materials, bamboo, sago and megapode eggs. However, the PA's role in providing subsistence materials is less important now due to the Mining take over as "there are not much forest resources".
8. Providing community development opportunities through sustainable resource use	0	The functions of the PA were not clarified in the community (e.g. there is no management committee) or under the Mining Lease.
9. Religious or spiritual significance (e.g. tambu places)	2	The sacred Ailia rock (in front of Luise caldera) has cultural significance to the community; the house boy system has been preserved in Kapit; and there are some sacred areas in the sea.
10. Plant species of high social, cultural, or economic importance	2	Bamboo and sago are important food sources.
11. Animal species of high social, cultural, or economic importance	2	Megapode eggs are important for cultural and economic reasons.
12. Attractive scenery	2	Views from the top of the pit looking out to sea are very beautiful. There are scenic beaches along the eastern and southern part of the island.
13. Tourism now	2	
14. Potential value for tourism in the future	2	
15. Educational and/or scientific value	2	Previous research was undertaken, but this is not currently occurring.
16. Maintaining culture and tradition on customary land and passing this on to future generations	2	Cultural values still being maintained.

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
- 0** 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	H	Mining activities are occurring within the PA and this leads to an increase in housing and settlement, which places pressure on the resources within the mining lease/PA area.
1.1a Population increase in the protected area community	H	Outsiders are coming to Lihir to seek employment and this places pressure on the PA – they harvest resources from the PA.
1.2 Commercial and industrial areas	H	The PA has been taken over Mining activities.
1.3 Tourism and recreation infrastructure	0	
2.1 Customary land owner and community gardens and small crops	L	Gardening land is scarce as a result of increased population and the influx of outsiders into Lihir. Gardens have expanded into the forested area causing a loss of forest and biodiversity.
2.1a Drug cultivation	0	
2.1b Commercial plantations	0	
2.2 Wood and pulp plantations	0	
2.3 Livestock farming and grazing	0	
2.4 Marine and freshwater aquaculture	0	
3.1 Oil and gas drilling	0	
3.2 Mining and quarrying	H	The island is a Special Mining Lease that was granted in 1992 after the gazettal of the protected area. This has caused loss of vegetation, backfilling of the land and stockpiles.
3.3 Energy generation	0	
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	0	
4.4 Flight paths	0	
5.1 Hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)	L	The environment plan has restricted the harvest of megapode eggs. However, some outsiders and customary landowners still do this.
5.2 Gathering terrestrial plants or plant products (non-timber)	L	
5.3a Logging and wood harvesting for local/customary use	L	
5.3b Logging and wood harvesting – commercial logging	0	
5.4a Fishing, killing and harvesting aquatic resources for local/customary use	0	
5.4b Fishing, killing and harvesting aquatic resources for commercial use	L	
6.1 Recreational activities and tourism	0	
6.2 War, civil unrest and military exercises	0	
6.3 Research, education and other work-related activities in protected areas	0	

Threat type	Score (H,M,L,O)	Notes
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	
7.2 Dams, hydrological modification and water management/use	H	Additional information: The customary landowners (e.g. the people of Londolovit on Lihir Island) own the traditional Londolovit River where Newcrest Mining Ltd extracts water for its operations (since 1995). The people are not currently acknowledged as “water” resource owners and are not receiving adequate benefit from the use of the water. Water is said to belong to the State and the people are not getting paid for the take of their traditional water. Also the 1998 mining agreement only pays Londolovit for damages or ‘impact’ on the Londolovit River and not for usage of the water. The dam upstream has caused a decrease in the water level and loss of aquatic species and inconvenience to the community (anon 2017).
7.3a Increased fragmentation within protected area	M	
7.3b Isolation from other natural habitat (e.g. deforestation)	H	Patches of the mining lease have been cleared and the habitat is not connected within the PA (e.g. areas where the megapodes lay eggs).
7.3c Other ‘edge effects’ on park values	L	
7.3d Loss of keystone species (e.g. top predators, pollinators etc.)	0	
8.1 Pest plants	M	Introduced grasses and piper tree.
8.1a Pest animals	M	Giant African Snail, <i>Achatina fulica</i> (introduced in 1998 and some activity was undertaken to eradicate it); stinger bees (appear in swarms and are thought to have been introduced with imported timber; they can take over native habitat and particularly impact on birds).
8.1b Diseases such as fungus or viruses that make native plants or animals sick	M	
8.2 Introduced genetic material (e.g. genetically modified organisms)	L	
9.1 Household sewage and urban waste water	M	
9.1a Sewage and waste water from protected area facilities	0	
9.2 Industrial, mining and military effluents	H	Mining activities taking place within the PA. The impact is mainly in the marine environment (e.g. effluent from the refinery is pumped into the coastal waters). Additional information: Lihir uses Deep Sea Tailings Placement (due to high seismicity in the region). The tailings are diluted before discharge from a subsea pipeline onto the seabed (Newcrest 2017). The mine discharges about 100,000 ML of tailings slurry, contaminated with cyanide and other toxicants, into the sea each year and it contains about 2.5 Mt of sediment (Judd 2015). Sediments and toxic metals have accumulated in rivers and the near-shore environment, frequently poisoning and degrading food supplies for local people (Judd 2015). There is little monitoring of the long term impacts on the deep sea bed, especially in this area of seismic activity. However research by Hughes (2015) indicated at Lihir the effects are detectable up to 20km east of the discharge point and to at least 2000m water depth and was considered responsible for greatly reduced abundances and changes in higher taxon composition of the sediment fauna, impact on bottom dwelling fauna and macrofauna. Waste rock is transported in barges and disposed off-shore. About

Threat type	Score (H,M,L,O)	Notes
		200m of reclaimed land extends from the coastline and this has permanently altered the original coastline (Gare 2016).
9.3 Agricultural and forestry effluents (e.g. excess fertilizers or pesticides)	H	
9.4 Garbage and solid waste	H	
9.5 Air-borne pollutants	M	
9.6 Excess energy (e.g. heat pollution, lights etc.)	H	Disturbance to the natural habitats. With the introduction of the mine and lights there is a reduction in the numbers of turtles and megapodes into the PA/lease area.
10.1 Volcanoes	L	
10.2 Earthquakes/Tsunamis	H	
10.3 Avalanches/Landslides	L	There are landslides at the stock piles.
10.4 Erosion and siltation/deposition (e.g. shoreline or riverbed changes)	H	There is severe beach erosion.
11.1 Habitat shifting and alteration	H	
11.2 Droughts	M	
11.3 Temperature extremes	H	
11.4 Storms and flooding	H	Caused by coastal storms
11.5 Coral bleaching	H	Coral bleaching has occurred as a result of changes in sea surface temperatures; and there are also algae blooms
11.6 Intrusion by saltwater into gardens etc.	L	
11.7 Sea level rise	H	This is causing coastline erosion.
Other (please explain)		
12.1 Loss of cultural links, traditional knowledge and/or management practices	H	Social change has come as a result of mining. Many traditional cultural practices are not practiced or written down and with the passing of older generations, the culture is being lost.
12.2 Natural deterioration of important cultural site values	M	
12.3 Destruction of cultural heritage buildings, gardens, sites etc.	H	There used to be a men's house in the mining lease. This was preserved for some time, but now it has been relocated.
Other (please explain)		

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	Housing and commercial development	1.1,1.2	Clear understanding and awareness on developments taking place within the PA to the communities
2	Agriculture	2.1	Small gardens cause loss of forest and fragment habitat. There needs to be greater awareness and education provided to the local communities to minimise their impacts and to perhaps practice agriculture outside of the PA.
3	Mining, effluent, rock waste and water use	3.2	Mining activities take place within the PA and the impacts are diverse e.g. deep sea bed tailings disposal, dumping of waste rock in coastal areas, extraction of river water for processing operations and relocation of local communities. Monitoring and evaluation of environmental impacts are important to identify threats and to quickly address them. However, there is little monitoring of off-shore impacts from deep sea disposal of waste.

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	The PA is legally gazetted, although the precise boundaries are unclear, with the landowners not supporting the PA over the entire island.	Engage in consultation with the customary landowners to identify the area to be included in the PA and transition to a new class of protected area under the new legislation.
1b. Legal status			
2a. Protected area regulations	1	There is an Environment Management Plan developed by Newcrest Mine, but it applies only to the Special Mining Lease area.	Tighten the traditional laws.
2b. Protected area regulations			
3. Law enforcement	1		
4. Protected area objectives	2	Providing areas for megapodes and safeguarding them against people who do not have a customary right to harvest the eggs.	
5. Protected area design	0	As the boundaries are unclear the issue of design is difficult to assess. As the participants believe the PA to be the mining lease area, the PA is thus small in size and is dominated by a mine, thus reducing the effectiveness of the PA.	After the mine closure the size of the PA can be increased if there is community support.
6. Protected area boundaries	0	The boundaries of the protected area are unclear. Previous information (e.g. RAPPAM 2006) indicated that the boundary may cover the entire island.	Engage in consultation with the customary landowners to identify the area to be included in the PA and transition to a new class of protected area under the new legislation.
7. Management plan	0	There is an Environment Plan implemented by the Mine within the mining lease area. There is no Management Plan for the PA.	Once the boundaries of the PA are clarified, develop a Management Plan for the PA.
7a. Planning process	0		
7b. Planning process	0		
7c. Planning process	0		
8. Regular work plan	0		
9. Resource inventory	2	Resource inventories have been undertaken in the mining lease area.	The mining company should document the resources of the PA.
10. Protection systems	1	The mining company has some control system in relation to the mining lease area.	
11. Research and monitoring	2	Research is undertaken by Newcrest Mine for company use only.	CEPA should conduct research and encourage outside researchers to also undertake research.
12. Resource management	1	There is a lack of active resource management.	More collaboration is needed, especially between the provincial and national governments.

Issue	Score (0,1,2,3, NA)	Comment	Next steps
13a. Staff numbers	0	CEPA has one staff member whose role is to ensure the compliance of the mining company with relevant regulations.	There is a request to have staff employed and managed by the board for the PA.
13b. Other people working on the protected area	0		
14. Training and skills	0		Request that Newcrest Mine support community training.
15. Current budget	0		A budget is needed to effectively manage the PA.
16. Security of budget	0		
17. Management of budget	NA		
18. Equipment	0		
19. Maintenance of equipment	NA		
20. Education and awareness	2	The company conducts its own awareness raising programs.	
21. Planning for land use or marine activities	2		
22. State and commercial neighbours	2	There are agreements between the Company and the landowners in the absence of the management committee	
23. Indigenous people/ Customary landowners	2	In the absence of the management committee the landowners are in contact with the Company	
24a. Impact on communities	1		
24b. Impact on communities	1		
24c. Impact on communities	1		
25. Economic benefit	0	The PA provides no benefits. However many in the community are employed by the mine.	Revive the Management Committee and become actively involved with the management of this area.
26. Monitoring and evaluation	2	Because there is no management in place the results of any monitoring and evaluation are held by the company	Re-establish the Management Committee and ensure that all monitoring and evaluation data from Newcrest Mine are shared with the Committee and community.
27. Visitor facilities	0		CEPA, in conjunction with the mining company and landowners should develop an Agreement to establish relevant facilities.
28. Commercial tourism operators	0		
29. Fees	NA	There are no rules, bylaws, or penalty fees in place.	
30. Condition of values	1	The PA's values have been impacted by the mining operation.	
30a. Condition of values	1		
30b. Condition of values	0		
30c. Condition of values	0		

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
Megapodes (egg collection)	P	D	The reclamation and stock pile have disturbed the megapode site and the animals have moved to another area.
Leatherback turtle	P	D	The leatherback turtles have moved to Samo village to lay their eggs. Others have gone back to the smaller islands such as Mali.
Bamboo forest (with orchids) and sago	G	D	Restrict the take of bamboo as this is used every year for yam sticks and this is leading to the decline in the bamboo. Encourage more replanting of bamboo.
Sacred Sites (Traditional entry Points) – Ailia rock	G	S	There is a need for more awareness raising through the school curriculum and the use of formal strategies to improve the situation.
Fishing grounds and marine resources (outside the PA)	G	D	The decrease in fish stock may be due to many reasons and these causes must be established through research.

Table 8. Recommendations and ways forward

1.	2.	3.
Effective awareness - there is a need to have more awareness on the management arrangements for the PA.	Enabling policy – enable protected area policies to better manage Lihir Island. The drafting of the management plan for the PA is an important component. The current boundary is also inaccurate and must be re-negotiated with the community and re-demarcated.	Discourage immigration – there is a lot of outside influence within the area and strategies should be implemented to try to discourage immigration.

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

	Strengths	Challenges
1	Customary practices are still encouraged.	Minimising the impacts of the diverse outside influences that affect the PA, including impacts of mining.
2	Some biodiversity values remain.	Strengthening traditional laws in the face of an increasing cash economy and in-migration.
3		Clarifying the boundaries of the PA with the customary landowners.

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