



State Party Report

**on the State of Conservation
of the
East Rennell World Heritage Area
(Solomon Islands)**

Property ID N854

In response to World Heritage Committee decisions:

**Decision 37 COM 7B.14
(Decision 37 COM 8C.1)**

For submission by 1 February 2014

East Rennell World Heritage Area (Solomon Islands) (N854)

i. Executive Summary:

The World Heritage Project began in Solomon Islands in 1988 and in 1989, SIG ratified the UNESCO World Heritage Convention on the 10th September 1992 and approved and gave support in principle for World Heritage Listing of Lake Tegano on Rennell Island (Renbel Province) and Marovo Lagoon. Subsequently on the 5th November 1998, East Rennell was inscribed on the World Heritage List. It was the first World Heritage property designated from the insular Pacific region, and the first site under customary tenure to achieve world heritage status.

East Rennell (ER) was listed under Criterion ii (ix) dealing with significant on-going ecological and biological processes that are evident on the island.

Since its listing, the site has been threatened by many environmental, social and management challenges, posing potential risks to the property's integrity and thus its OUV. Logging developments, introduced rat species, climate change, limited community livelihood options including the lack of capacity for communities to manage the site are just a few.

Therefore in its 38th Session, the World Heritage Committee inscribed the property on the list of World Heritage Sites in the Danger (*Decision WHC 37 COM 7B.14 (9)*).

Solomon Islands in partnership with the Provincial Government, NGOs, Management Committee and communities have undertaken measures to improve on the Property's current status. This report has been prepared in response to the request from UNESCO World Heritage Centre regarding Committee Decision 37COM 7B.14 to update the current state of conservation of the East Rennell World Natural Heritage property, Solomon Islands. This reports on update the report of the state of conservation of the property presented to the Committee in 2013. It focuses on the following areas:

- Progress made in 2012/2013 in respect of the decision WHC 37 Com 7B.14
- Assessment of the State of Conservation of World Heritage Values
- Some Corrective measures and
- Next steps on producing Desired State of Conservation Report

ii. WHC Decision 37 COM 7B.14

The World Heritage Committee,

1. **Having examined** Document WHC-13/37.COM/7B,
2. **Recalling** Decision 36 COM 7B.15, adopted at its 36th session (Saint-Petersburg, 2012),
3. **Commends** the State Party for passing the Protected Areas Act 2010 and for drafting the 2009 Rennell-Bellona Province Lake Tegano Heritage Park Ordinance, and **urges** the State Party to apply both of these instruments to the East Rennell property as soon as possible to ensure full and strict legal protection of the property;
4. **Reiterates its request** to the State Party to immediately ban all commercial logging from East Rennell to avoid loss of the property's Outstanding Universal Value;
5. **Also reiterates its request** to the State Party to urgently undertake an assessment of the impact of invasive species, especially of associated introduction of rats and invasive snails, to institute control and eradication measures as a matter of utmost priority, and to assess the

feasibility of a long-term biosecurity programme to prevent reinvasion, and **encourages** the State Party to apply for International Assistance to support these actions;

6. **Requests** the State Party to address the over-exploitation of coconut crab and other marine resources and to apply harvesting regimes based on traditional resource management practices, and including the restrictions recommended by the mission;

7. **Also requests** the State Party to take full account of the impacts of climate change on the property and the livelihoods of the East Rennell community, and make provisions in the Management Plan for climate change adaptation and mitigation measures;

8. **Further requests** the State Party to undertake an assessment to ascertain whether on-going logging of forests in West Rennell could have severe adverse impacts on the forests within the property, the fact that the property is not strictly protected against logging, and the introduction of invasive species represent a clear ascertained and potential danger respectively to the ecological integrity of the property and its Outstanding Universal Value, in conformity with Paragraph 180 of the Operational Guidelines;

9. **Decides to inscribe East Rennell (Solomon Islands) on the List of World Heritage in Danger;**

10. **Requests furthermore** the State Party, in consultation with the World Heritage Centre and IUCN and with both in-country and other international partners' support, to develop and implement an Emergency Action Plan to remove the threats and provide support to the customary owners to enable them to protect the property to World Heritage standards and in accordance with traditional management practices;

11. **Requests moreover** the State Party, in consultation with the World Heritage Centre and IUCN, to develop a proposal for the Desired state of conservation for the removal of the property from the List of World Heritage in Danger and a set of corrective measures, for examination by the World Heritage Committee at its 38th session in 2014;

12. **Finally requests** the State Party to submit to the World Heritage Centre, by 1 February 2014, an updated report on the state of conservation of the property, including a report on the progress made in the implementation of the above recommendations, for examination by the World Heritage Committee at its 38th session in 2014.

1. Response from the State Party to the World Heritage Committee's Decision, paragraph by paragraph

37COM Cambodia 2013

Decision 37COM 7B.14

The World Heritage Committee requests that the State Party of the Solomon Islands to:

Decision 37 COM 7B.14 paragraph 4

Immediately ban all commercial logging from East Rennell to avoid loss of the property's Outstanding Universal Value;

The State Party (Solomon Islands Government) has limited powers to stop applications for commercial logging or mining activities on customary owned areas. Any prescribed developments – e.g. commercial logging, mining, road constructions - should apply for *development consent* from the Director of Environment and Conservation before commencement (Solomon Islands Environment Act 1998). Should an application be approved, the Solomon Islands Code of Logging Practice should be complied with by logging operations.

Consistent monitoring is required by land owners and/or forestry and environment officers to ensure that standards are adhered to. Developers and landowning groups still would need educational awareness and strict monitoring protocols to ensure that environmental damages are minimal. Customary landowners and/or developers have opportune settings to apply for any developments once landowners give their consent. Similarly, current or future logging applications for West Rennell has and will have the potential to directly or indirectly affect the OUC of the property through habitat fragmentation and degradation especially near the site boundary.

Thus, efforts were undertaken with NGO partners, the management committee and the Rennell and Bellona Provincial Government to ensure that no logging developments occur in the site. With the introduction of the Protected Areas (PA) Act 2010, such areas can be effectively protected from developments placing communities on the forefront of managing the area, complementing the World Heritage Site property management plan with legal recognition under the national legislation. Should the property be declared under the PA Act 2010, then the State may then be able to protect the property from logging or mining development applications.

As a step in 2012, Live and Learn Environmental Education – a non-governmental organization – supported by the Government, conducted environmental awareness with communities presiding within the property on the newly enacted national Protected Areas Act 2010. Communities were informed of the option to register the East Rennell property under the national Protected Areas Act. This may ensure more effective protection of the site adding value to the developed provincial ordinances and the property's management plan. Communities requested that more awareness be undertaken in 2014. Financial and technical support will be required.

Decision 37 COM 7B.14 paragraph 5

Urgently undertake an assessment of the impact of invasive species, especially of associated introduction of rats and invasive snails, to institute control and eradication measures as a matter of utmost priority, and to assess the feasibility of a long-term biosecurity programme to prevent reinvasion, and encourages the State Party to apply for International Assistance to support these actions;

In response to the reactive mission report conducted in 2012, in collaboration with Australian Government, technical assistance was offered to Solomon Islands through Professor Steve Turton (TOR – Attachment A) who carried out the assessment of the impact of invasive species on the property (Attachment B).

Rats, invasive snails etc were found to be potential threats on the property impacting on peoples food gardens and thus their livelihoods.

National efforts to priorities invasive species management include:

- Working with SPREP's invasive species program. Further opportunities to develop an invasive species program for the property exist. Discussions need to be made with the Provincial Government, the management committee and the key agencies.

- Community Engagement for community based eradication and/or control program. Technical support for training and educational programs must be gauged for this initiative.

Decision 37COM 7B.14 paragraph 6

Address the over-exploitation of coconut crab and other marine resources and to apply harvesting regimes based on traditional resource management practices, and including the restrictions recommended by the mission;

Over-exploitation of coconut crabs and other marines resources are being addressed through continuous efforts to provide communities with better management practices. This however needs to be addressed through local engagement, ongoing monitoring protocols for key indicator species etc. Traditional leaders and elders must be engaged to seek corrective traditional management practices to ensure that harvesting of coconut crabs and other marine resources are carried out properly – considering size limits, incentives for coconut crab farmers, etc. This is addressed in the revised Management Plan.

Decision 37COM 7B.14 paragraph 7

Take full account of the impacts of climate change on the property and the livelihoods of the East Rennell community, and make provisions in the Management Plan for climate change adaptation and mitigation measures;

Climate change is a major impact for the site. Assessment carried out in December 2013 noted that climate change impacts of sea level rise causing salinity changes in the insular lake will potentially affect communities livelihoods, water supply and food provisions for example tilapia stock in the lake. Cyclone occurrences in the area are also a continuing threat for the communities living within the property.

The Climate Change Division of the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) will also be working with Provincial Governments to mainstream climate change adaptation and mitigation efforts within the Provinces. East Rennell Management Committee will have the opportunity to address climate change issues faced by within the property during these consultations. Additional support may be gauged as well.

Decision 37COM 7B.14 paragraph 8

Undertake an assessment to ascertain whether on-going logging of forests in West Rennell could have severe adverse impacts on the forests within the property, the fact that the property is not strictly protected against logging, and the introduction of invasive species represent a clear ascertained and potential danger respectively to the ecological integrity of the property and its Outstanding Universal Value, in conformity with Paragraph 180 of the Operational Guidelines;

Attachment B reports on the findings on the on-going logging of forests in West Rennell and the introduction of invasive species. Recommendations will be reviewed by the State this year in consultation with communities of the property, the Provincial Government and stakeholders.

Decision 37COM 7B.14 paragraph 10

In consultation with the World Heritage Centre and IUCN and with both in-country and other international partners' support, to develop and implement an Emergency Action Plan to remove the

threats and provide support to the customary owners to enable them to protect the property to World Heritage standards and in accordance with traditional management practices;

Solomon Islands Government has allocated 0.5M for the management of the property in 2012 Development Budget. Additional support came from Australia partnerships, Live and Learn Environmental Education. The Assessment Report (attachment B) will form the basis of an Emergency Action Plan to remove and provide future support to customary owners. Solomon Islands however did not apply for the WHC funds due 2012 however will seek to mobilize resources with national and international partners (IUCN will serve as a potential partners including the Pacific Regional Hub) based on the Desired State of Conservation Report that is expected to be finalized by March 2014. Stakeholders will be consulted on practical ways forward to implementing the Emergency Action Plan.

Decision 37COM 7B.14 paragraph 11

In consultation with the World Heritage Centre and IUCN, to develop a proposal for the Desired state of conservation for the removal of the property from the List of World Heritage in Danger and a set of corrective measures, for examination by the World Heritage Committee at its 38th session in 2014;

A review of the assessment reports will serve as basis for a proposed stakeholders' consultation to be held in second quarter of 2014. Key partners such as the Pacific Regional Hub, WHC, UNESCO, IUCN and national stakeholders will be consulted. Under the project, Dr Turton will complete the DSOCR by March 2014 including a set of corrective measures for examination by the World Heritage Committee at its 38th Session in 2014.

Decision 37COM 7B.14 paragraph 12

Submit to the World Heritage Centre, by 1 February 2014, an updated report on the state of conservation of the property, including a report on the progress made in the implementation of the above recommendations, for examination by the World Heritage Committee at its 38th session in 2014.

The Solomon Islands State Party is pleased to submit its report on the state of conservation of the East Rennell World Heritage Area by 1 February 2013.

2. Other current conservation issues identified by the State Party

The State is aware that the Lake Tegano WH Site Association has raised concerns about possible toxin/oil leaks from 10 World War II planes sunk in the lake at the end of the war (see report attached). Communities express the need for the government and or development partners to facilitate in removal of these sunken planes from the lake. An alternative is to showcase these in communities for visitors and for educational purposes. Support for the removal of planes is required.

Another conservation issue noticed at the Property is the dependence on imported rice and tinned food from the main center - Honiara. Lake residents are finding it difficult to plant their taro crops as the presence of nematode and aphid infestations are destroying their traditional gardens. The Ministry of Agriculture needs to support the supply of alternate taro species and

even advice on possible chemical (pest) treatments that have minimal impacts on the food gardens.

3. In conformity with paragraph 172 of the *Operational Guidelines*, please describe any potential major restorations, alterations and/or new construction(s) within the protected area (core zone and buffer zone and/or corridors) that might be envisaged.

Currently no potential major restorations, alterations and/or new constructions within the protected area for the property.

East Rennell World Heritage Area

Assessment of the State of Conservation of World Heritage Values

Project

Background

East Rennell World Heritage Area inscribed on List of World Heritage in Danger

On 18 June 2013, the World Heritage Committee adopted decision 37COM7B.14 ([Attachment A](#)) to place the East Rennell World Heritage Area on the List of World Heritage in Danger. The key reason for the listing is the occurrence of logging in West Rennell and the possible impact of this logging and associated invasive species on the world heritage values of East Rennell.

Below are the actions requested of the Solomon Islands in decision 37COM7B.14:

- Application of the Protected Areas Act (including updating the Management Plan), including a 'ban' on commercial logging in East Rennell
- Application of the Provincial Ordinance
- Assessment of impact of invasive species (rats and snails)*
- Control and eradication measures for invasive species*
- Assessment of feasibility of long term biosecurity programme
- Application of traditional harvesting regimes for coconut crabs
- Account the impacts of climate change on the property and livelihoods
- Make provisions in the Management Plan for climate change adaptation and mitigation
- Assessment to ascertain whether ongoing logging of forests in West Rennell could have severe impacts on the forests within the property*
- Application for International Assistance to undertake all these actions
- Develop and implement an Emergency Action Plan to remove threats
- Develop a proposal for Desired State of Conservation and set of corrective measures due 1 February 2014*
- State of Conservation Report due 1 February 2014

*** Critical to this project**

Field work conducted by experts will form the basis of the Desired State of Conservation for the Removal of the Property from the List of World Heritage in Danger report along with a set of corrective measures. It is envisaged to be an initial phase of a larger, ongoing assessment and monitoring project. The Desired State of Conservation for Removal report will be used to develop an application for international assistance under the World Heritage Fund to assist the Solomon Islands protect the East Rennell World Heritage Area.

Terms of Reference

Services

Undertake field work in the East Rennell World Heritage Area during November 2013. Based on your field work, research and knowledge of East Rennell World Heritage Area and the world heritage context documents listed at the end of this paper, provide the following:

1. Briefly describe your research or specialisation which relates to the outstanding universal value (OUV) of the East Rennell World Heritage Area (see OUV at [Attachment B](#)) and/or the potential impacts to these values. Also identify other places nationally and/or internationally where you have undertaken work on similar natural values.
2. Determine the indicators and methodology for assessing the State of Conservation of the OUV of East Rennell. The following 'three pillars' of world heritage listing need to be considered:
 - a. World heritage values – the special attributes for which East Rennell is listed;
 - b. Integrity; and
 - c. Protection and Management.
3. Assess the State of Conservation of the OUV of East Rennell, relevant to your expertise, detailing the current and potential impacts.
4. Relevant to your expertise, recommend corrective measures and the desired state of conservation for protecting the OUV of East Rennell.
5. Recommend indicators and a detailed monitoring plan for ongoing evaluation of the state of conservation of the OUV of East Rennell. This may be used to develop applications for international assistance to fund the ongoing monitoring of East Rennell.
6. Provide Items 1-5 in a field work report to the Department of the Environment. This will be used to develop a Desired State of Conservation for Removal report. Consider the guidelines for the Desired State of Conservation for Removal report ([Attachment C](#)) when writing your field work report.
7. Provide your field work report by email to the Project Officer, annie.sharrock@environment.gov.au in Word 2007 format.
8. After the field work, provide input to and review the Desired State of Conservation for Removal report.
9. Be available to provide clarification and input to the written field work report and the Desired State of Conservation for Removal report by phone and/or email.

Timeframe

- Field work reports to be submitted the Project Officer at the Department of the Environment (as outlined above under *Services*) no later than midnight, 8 December.
- Field work report authors will be available for phone conversations and email correspondence for matters of clarification for 6 weeks after submitting their field work reports.

Attachments

Attachment A

Decision 37 COM 7B.14: Inscription of East Rennell World Heritage Area on the World Heritage in Danger List

<http://whc.unesco.org/en/decisions/4957>

Attachment B

Statement of Outstanding Universal Value

<http://whc.unesco.org/en/decisions/4841>

Attachment C

Guidance Note for Desired State of Conservation for the Removal of a Property from the List of World Heritage In Danger

<http://whc.unesco.org/document/123577>

Further reading

Full listing of East Rennell World Heritage Area

<http://whc.unesco.org/en/list/854>

*Summary of the Reactive Monitoring Mission to East Rennell (decision WHC13-37 COM7B, p. 29)**

<http://whc.unesco.org/archive/2013/whc13-37com-7B-en.pdf>

*An extract of this decision relevant to East Rennell is available for your convenience

East Rennell World Heritage Area
Assessment of the State of Conservation of World
Heritage Values
Project
Final Field Report (6 January, 2014)

Prepared by:

Professor Steve Turton, PhD

Centre for Tropical Environmental & Sustainability Sciences

School of Earth & Environmental Sciences

James Cook University

Cairns, Australia

Background

East Rennell World Heritage Area inscribed on List of World Heritage in Danger

On 18 June 2013, the World Heritage Committee adopted decision 37COM7B.14 to place the East Rennell World Heritage Area on the List of World Heritage in Danger. The key reason for the listing is the occurrence of logging in West Rennell and the possible impact of this logging and associated invasive species on the world heritage values of East Rennell.

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- Assessment of feasibility of long term biosecurity programme
- Application of traditional harvesting regimes for coconut crabs
- Account the impacts of climate change on the property and livelihoods
- Make provisions in the Management Plan for climate change adaptation and mitigation
- Assessment to ascertain whether ongoing logging of forests in West Rennell could have severe impacts on the forests within the property*

- Application for International Assistance to undertake all these actions
- Develop and implement an Emergency Action Plan to remove threats
- Develop a proposal for Desired State of Conservation and set of corrective measures due 4 March 2014*

* Critical to this project

Field Report

- 1. Briefly describe your research or specialisation that relates to the outstanding universal value (OUV) of the East Rennell World Heritage Area (see OUV at [Attachment B](#)) and/or the potential impacts to these values. Also identify other places nationally and/or internationally where you have undertaken work on similar natural values.**

Professor Steve Turton, PhD, MSc, BSc

Steve is currently discipline leader for environmental science, geography & sustainability and leads the training, communication and capacity building theme in the Centre for Tropical Environmental and Sustainability Sciences at James Cook University. From 2005-2009, he was the Executive Director of the JCU/CSIRO Tropical Landscapes Joint Venture, located within the Australian Tropical Forest Institute at JCU in Cairns. From 2003-2005, he was Associate Professor in Geography and Director of Research for the Rainforest Cooperative Research Centre. Steve is a former Councillor of the Institute of Australian Geographers (2004-2007 and 2011-2012) and former member of the Wet Tropics Management Authority's Scientific Advisory Committee (2004-2011). He is also honorary Treasurer of the Association for Tropical Biology and Conservation (ATBC), Asia-Pacific Chapter. In 2009, he was appointed to the ATBC Council for a 2-year term. In 2010 he was a member of the Engineering & Environmental Sciences Panel for the Australian Government's Excellence in Research Australia initiative. He is immediate Past-President of the Australian Council of Environmental Deans and Directors and vice-president of the Institute of Australian Geographers. He is also chair of Australia's National Climate Change Adaptation Research Facility's Partners Advisory Group. Steve has been appointed as an expert reviewer for Working Group II of the IPCC's 5th Assessment Report.

Steve's research and teaching interests include tropical climatology, rainforest ecology, urban and road ecology, adaptation of tourism, agriculture and forestry sectors to climate change, and natural resource management (including protected area management and world heritage principles and practice). He works on these topics in northern Australia and Indonesia. Steve has published over 120 scientific papers in these fields of study, comprising refereed journal articles, book chapters and research/consultancy reports. He has also supervised over 50 honours and graduate research students during his time at JCU.

Steve and his research group have been heavily involved in research examining numerous threats to the OUV of the Wet Tropics of Queensland WHA over the past 20 years, notably climate change, forest fragmentation, linear infrastructure (roads/powerlines), invasive species and tropical cyclones. Steve's research groups have been world leaders in the development of mitigation strategies for linear infrastructure impacts on WH values in the WTQWHA. He has also developed an international reputation for documenting ecological effects of tropical cyclones on rainforests and

how land use change (e.g. fragmentation, habitat degradation) may alter the recovery responses of forests affected by cyclones.

Steve and colleagues have worked on a project in the Leuser National Park (Tropical Rainforest WH of Sumatra). This project examined effects of illegal logging and poaching on the OUV of the Park and produced recommendations for alternative livelihoods for human communities within and adjacent to the WHA (as a means for reducing illegal logging and poaching). In 2002, Steve contributed to a UNESCO-funded training workshop for managers responsible for Lorentz National Park (WHA) in Papua, Indonesia.

In 2008, Steve led a national project (funded by the Tourism CRC) examining the effects of climate change on the OUVs of several WH Properties in Australia: Kakadu NP, Wet Tropics of Queensland WHA, Great Barrier WHA, and the Blue Mountains WHA. The purpose of the study was to determine likely impacts of climate change on world heritage values, and how such impacts may affect nature-based tourism activities in the WHAs in the future.

Steve is currently leading a large project (funded by the Australian Department of Environment, formerly DCCEE) examining the anticipated impacts of climate change on natural resource management (including WH values) in the 'Wet Tropics Cluster' in northeast Australia (Torres Strait, Cape York, Wet Tropics and Mackay/Whitsunday NRM regions). This 4-year project will provide the underpinning science to inform NRM plans across the four regions, including both adaptation and mitigation strategies for future climate impacts. A large component of this study involves working with local people, including Indigenous communities across the region.

2 Determine the indicators and methodology for assessing the State of Conservation of the OUV of East Rennell (including assessing the impact of invasive species). The following 'three pillars' of world heritage listing need to be considered:

(a) World heritage values – the special attributes for which East Rennell is listed (<http://whc.unesco.org/en/list/854>); *East Rennell is part of Rennell Island, the southernmost island of the Western Pacific, Solomon Islands Group. Rennell Island is the largest raised coral atoll in the world, covering an area of 87,500ha at 86km long and 15km wide and is located 250km due south of the Solomon's capital, Honiara. The World Heritage property occupies the southern third of the island and includes approximately 37,000ha and a marine area that extends 3km offshore. A prominent feature of the property is Lake Tegano, the former lagoon of the atoll, which at 15,000ha is the largest lake in the insular Pacific. Containing many rugged limestone islets the lake's brackish waters harbour numerous endemic species including an endemic sea snake. The surrounding karst terrain has a dense cover of indigenous forest. Remaining in its natural state, the forest has a rich biodiversity with many endemic species; four species and nine subspecies of land and water birds respectively, one bat and seven land snails.*

The property was the first natural property inscribed on the World Heritage List with customary ownership and management. Approximately 1,200 people of Polynesian origin occupy four villages within the boundaries of the property, living mainly by subsistence gardening, hunting and fishing. Frequent cyclones can have severe consequences for the local people and the biota, and rising lake water levels from climatic change are adversely affecting some staple food crops.

Criterion (ix): *East Rennell demonstrates significant on-going ecological and biological processes and is an important site for the science of island biogeography. The property is an important stepping-stone in the migration and evolution of species in the western Pacific and for speciation processes, especially with respect to avifauna. Combined with the strong climatic effects of frequent cyclones, the property is a true natural laboratory for scientific study. The unmodified forest vegetation contains floral elements from the more impoverished Pacific Islands to the east and the much richer Melanesian flora to the west. For its size, Rennell Island has a high number of endemic species, particularly among its avifauna and also harbours 10 endemic plant species.*

The wildlife includes 11 species of bat (one endemic) and 43 species of breeding land and water birds (four species and nine subspecies endemic respectively). The invertebrate life is also rich with 27 species of land snail (seven endemics) and approximately 730 insect species, many of which are endemic. The flora of Lake Tegano is dominated by more than 300 species of diatoms and algae, some of which are endemic. There is also an endemic sea snake in the lake.

(b) Integrity (<http://whc.unesco.org/en/list/854>); *East Rennell encompasses a number of marine, coastal and forest values, combined in one place and in a relatively undisturbed state. The clearly defined boundaries of the property encompass Lake Tegano as well as a continuous expanse of surrounding forest-covered karst terrain. The property also includes a marine area extending 3km offshore. Apart from subsistence garden cultivation, hunting, fishing and utilisation of forest products for building materials, the natural vegetation is little-modified by human impact and there are no serious invasive species of animals or plants. Both rats and alien land snails, which have decimated fauna of other islands, are absent.*

The location of the western boundary, determined by community and administrative borders, is not optimal as it excludes important forest habitat for some species, particularly birds. Previously reported threats from mining and commercial fishing have passed. However, potential logging operations in the lands adjacent to the property, in West Rennell, could have severe adverse impacts on the forests within the property. These forests are intrinsically linked to those of West Rennell and are insufficient on their own to ensure the long-term survival of a number of endemic birds.

Increasing water levels and salinity in Lake Tegano, induced by sea level rise due to climate change, are adversely affecting plant growth in low-lying areas. Of particular concern is the reduced harvest of taro and coconut, both of which are vital staple foods for the local community. Of particular importance and significance is the support for conservation from the local community.

(c) Protection and Management (<http://whc.unesco.org/en/list/854>); All land, islands and marine reefs within the property are under customary ownership, which is acknowledged in the Constitution of the Solomon Islands and the 1995 Customs Recognition Act. East Rennell is also protected under a National Protected Areas Act, passed in 2010 and administered by a recently established Ministry of the Environment. The legislation is focused on biodiversity conservation and explicitly applies to World Heritage properties, but it requires a Provincial Ordinance and local regulations and by-laws to empower the traditional owners and make it fully effective at the local level. The property has a management plan as well as an action plan for implementation. The management plan requires more specific policies to address vulnerabilities and threats including mining, logging, over-exploitation of coconut crabs and marine resources and invasive species and has no timeline or budget. Customary values and traditional management practices are not detailed in the plan, though a recent scoping study has begun the task of addressing this gap.

The recently created Lake Tegano World Heritage Site Association, comprising some 250 community members, has established a representative committee to co-ordinate management activities. The committee, recognised by the Government, requires funding, office and communication facilities and a presence or counterpart focal point in either the provincial or national Governments to ensure it is effective.

Heritage management and capacity-building projects, conducted by foreign donor Governments and international NGO's, have provided beneficial outcomes including: enhanced awareness and understanding of World Heritage obligations on the part of the community, Government officials and other stakeholders; better co-ordination and co-operation in community management activities; improved survey and monitoring of natural resources; a strengthened legal basis for protection and management; and initial arrangements for twinning East Rennell with an Australian property.

The ability of the traditional owners to adequately protect and manage the natural values and resources of the property is limited by a lack of funding, capacity and resources. In particular, they require funding and substantial rural development aid in the form of improved communication and transport facilities, health and medical services, education resources and income-generating small business enterprises based on sustainable uses of the natural resources. The isolation of the property and the consequent restricted access, requiring long- distance travel on infrequent and unreliable air services and extremely difficult overland travel assist in protection of the property but have also impacted on attempts to develop eco-tourism. Restricted transport links also hinder the ability of the community to obtain food and medical supplies, and to access markets for locally produced products.

Future priorities for management of the property include: full implementation of legal and planning provisions; community capacity-building and empowerment for managing projects and natural resources; and increased sources of sustainable funding, including income generation, to improve the

standard of living of the traditional owners and enhance their ability to protect the property to World Heritage standards.

Indicators and methodology for assessing State of Conservation for Outstanding Universal Value (OUV)

Context

East Rennell WHA is primarily listed for its OUV due to the Property being an outstanding universal example of a 'living island laboratory' emulating the *Theory of Island Biogeography* (MacArthur & Wilson, 1967); this is largely a consequence of the island's size and geographical isolation from rich biotas to its west and less-rich biotas to its east. The relative isolation of Rennell Island since its uplift from the seafloor means there are many endemic bird and snail species on the island (and some plants, a sea snake and potentially many undescribed invertebrates). Importantly, there are few natural predators (e.g. no native rats) that have allowed the unique endemic avifauna to evolve.

At the time of listing in 1998 East Rennell WHA was considered to have a high degree of 'integrity' as a WH Property demonstrating OUV. This integrity was largely due to its oceanic isolation from other islands in the region, high forest cover over the entire island with little human disturbance, no significant invasive flora or fauna, generally high integrity of the water quality in Lake Tegano and a relatively small semi-subsistence human population living in four villages near the lake.

Since listing as a Property, there are now many threats to the integrity of East Rennell and therefore its OUV. Logging in West Rennell has the potential to directly and indirectly impact on the OUV of the East Rennell through habitat fragmentation and degradation especially near the boundary of the Property. In turn, there will be an increased risk of invasive species (*Rattus* spp., Giant African Land Snail and potentially woody weeds) becoming a serious threat to the OUV of the Property (e.g. decline in endemic birds and snails, damage to vegetation, spread of weeds and disease).

Climate change is an ongoing threat to East Rennell, notably increasing salinity of Lake Tegano, due to rising sea level via the lake's subterranean connection to the ocean, is likely to impact on aquatic and lakeside ecology and hence the OUV for which the Property is listed. Increased salinity is likely to impact negatively on the local community who produce some of their essential food (e.g. taro and coconuts) in low-lying areas around the lake where better organic soils may be found. The future conservation integrity of East Rennell is intimately connected to the maintenance of the local community's sustainable livelihoods around the land, lake and sea. Climate change is a profound threat to the marine, freshwater and terrestrial ecosystems of Rennell Island and hence the livelihoods of the local people who depend on these ecosystems for their subsistence.

Rennell Island lies in the tropical cyclone belt and its ecosystems have evolved strategies to cope with effects of frequent high winds on its flora and fauna. Studies in Australia (e.g. Turton, 2012) and elsewhere have shown

that logged forests are more vulnerable to tropical cyclones, and forest fragmentation and habitat degradation reduce the ability of rainforests to recover following natural disturbances, i.e. their ecological resilience. These effects are greater on forested islands compared with continental forest areas, mainly because there are 'empty niches' on islands that can be easily filled by invasive plants and animals after disturbance.

Climate change is predicted to increase tropical cyclone intensity globally, while there is uncertainty about how it may affect cyclone frequency (Turton, 2012). It is, therefore, critical to build ecological resilience in the East Rennell WHA by ensuring retention of a high degree of forest cover (integrity) across the entire island, as intact ecosystems are more resilient to forest disturbance from natural events, such as cyclones, compared to fragmented ecosystems. Increased cyclone intensity also has implications for livelihoods of the local people who rely on the natural environment for their needs. The severe impact of Severe Tropical Cyclone Nina on Rennell Island in January 1993 being an example of high human vulnerability to cyclones on the island.

All land, islands and marine reefs within the property are under customary ownership, which is acknowledged in the Constitution of the Solomon Islands and the *Customs Recognition Act 1995*. East Rennell WHA is also protected under a *National Protected Areas Act 2010*, and administered by a recently established Ministry of the Environment. Hence, successful protection and management of East Rennell WHA is contingent on 'buy in' from the local people who own the land under customary laws. It would seem that the local people lack capacity to manage the Property under the current arrangements. These effects are compounded by their isolation from Honiara and a severe lack of funding, resources and world heritage training.

Indicators and methodology

Fieldwork was undertaken on Rennell Island from 26 November to 3 December, 2013. Local facilitation was provided by *Live and Learn Environmental Education (Solomon Islands)* and supported by Gwen Tovosia and Haikiu Baiabe. Table 1 summarises the four fieldwork components, methodology and indicators developed to assess OUV of East Rennell WHA.

Fieldwork component	Methodology	Indicators
Field visit to East Rennell WHA, to undertake assessments of the state (condition and trend) of OUV for the Property	Site visits to forest, Lake Tegano, four villages, traditional gardens and coast (fringing coral reef)	Forest cover ^{1,2} , forest recovery in abandoned gardens ² , abundances of endemic species in forest, lake islands and lake ¹ , dieback of taro and coconuts in swampy areas around the lake due to rising lake level and salinity ² , sightings of coconut crab ¹ , presence of rat (<i>Rattus rattus</i>) infestations (holes in small green coconuts, eaten and/chewed crops) ^{1,2} , presence of woody weeds in forest, villages, gardens and along road edges ² , implementation of management plan ³
Meeting with the Lake Tegano World Heritage Site Association	One-day social learning workshop with members of the association	Number of members attending the workshop ³ , representatives from four villages, mixed gender and age ³
Field visit to West Rennell to undertake assessments of impacts of logging operations, including discussions with local people about sightings of rats (<i>Rattus rattus</i>) near logging camps and log ponds and document impacts on food security; investigate possible introduction of Giant African Land Snail (<i>Achatina</i> spp.) via logging and (potentially) mining machinery.	Site visits to forest logging sites (old through to current), visits to logging ponds, meetings with local people over rat sightings (coconut plantations on coast and traditional gardens on the plateau)	Forest cover especially in critical forest areas near the WH boundary ^{1,2} , abundances of endemic species in forest ^{1,2} , number of logging roads/tracks, forest recovery in logged areas ² , compliance with logging code of practice ³ , presence of rat infestations (holes in small green coconuts, eaten and/chewed crops) ^{1,2} , presence of woody weeds and Giant African Land Snails in logged areas, along road edges and in forest, villages and gardens ²
Meetings with Government representatives in West Rennell (and Honiara before and after the field visit).	Formal meetings with representatives from the Departments of Environment, Forestry and Agriculture	Feedback aligns with field assessments ³

Table 1: Fieldwork components and methodology and types of indicators used in the study.

1. attribute indicators
2. integrity indicators
3. management indicators

3. Assess the State of Conservation of the OUV of East Rennell, relevant to your expertise, detailing the current and potential impacts.

Current Impacts within East Rennell WHA:

Field surveys of forests, Lake Tegano and its islands, and parts of the nearby coastline reveal that there are very few negative impacts occurring within the WHA at present. East Rennell still retains a high degree of attributes and integrity in terms of forest cover, abundances of endemic species, water quality in Lake Tegano, and fringing reef condition and cover along the coast (Appendix 1). Numerous endemic fauna were observed in the forests, within Lake Tegano and on its islands during the fieldwork (Appendix 1). Local villagers (population 1,200) are having an insignificant impact on the forest and its biota at this time, aside from utilising timber and non-timber products for their own use (e.g. building houses); they also continue to practice shifting cultivation for their subsistence crops in pockets of suitable soil. This traditional practice appears to be sustainable, with abandoned gardens rapidly recovering to an acceptable level of forest cover within a few years, with no significant woody weeds present. Locals also engage in occasional hunting of forest birds for food as well as fishing in the lake and adjacent fringing reef. Coconut crabs are a prized food item and there are concerns about their diminishing numbers.

The main adverse impacts documented in East Rennell are associated with climate change affecting the level and salinity of Lake Tegano, leading to dieback of coconut palms in swampy areas around the lake (Appendix 2). This process appears to be due to increasing salinity and water logging, resulting in anoxic conditions in the better organic soils on the western margins of the lake. Given that Lake Tegano is linked to the ocean via subterranean ducts the water level in the lake is directly affected by changes in average sea levels outside the lake. Coconut groves in other parts of the lake (islands and shoreline) are not being affected by this process at this stage and appear to be healthy, thereby providing an important source of food. Villagers are no longer able to grow higher yielding 'swamp' taro in the better organic soils on the western side of the lake. Department of Agriculture officials claim that there is a root nematode and leaf aphid attacking the taro crops in these areas and it seems they were both accidentally introduced from other islands due to a lack of intra-country biosecurity. There is a possible synergistic interaction between these crop pests and rising water levels and salinity in the lake. Lake Tegano is known to rise following heavy rain but the high water levels typically only last 1-2 weeks and quickly return to an average level. In the past, these short periods of high lake level have not generally affected taro or coconut production according to local people.

The main source of freshwater (aside from rainfall over the lake and runoff from the karst areas around the lake) is from five large springs that provide a constant flux of fresh water into the western margins of the lake. The fresh water originates from catchment areas to the west of Lake Tegano via

subterranean reservoirs and streams in the limestone karst. Plans to extend the world heritage boundary further west using the catchment as the boundary, in addition to a proposed (no logging) buffer zone to the west, will ensure the maintenance of vital freshwater fluxes into Lake Tegano. Logging of forest near the East Rennell WH boundary is likely to impact on groundwater hydrology with serious implications for the volume and quality of water supplied by the springs into the lake.

Concerns about overharvest of coconut crabs have now been addressed in the *East Rennell Management Plan* (in preparation).

The Lake Tegano World Heritage Site Association raised concerns about possible toxins being released from 10 World War 2 planes that were deliberately sunk in the lake at the end of the war. The Association has GPS coordinates for these planes and members are requesting assistance for their removal from the lake.

The Association also raised a number of issues that are affecting their ability to manage the WHA and therefore maintain and preserve its OUV. There is an urgent need to secure long-term financial support for the Association to fulfill its functions and to effectively implement the *East Rennell Management Plan*. Local people are also concerned about the lack of sustainable livelihoods that many thought would have followed the world heritage listing of East Rennell in 1998, notably eco-tourism and associated training for local people. Lack of communications and basic infrastructure (e.g. poor condition of the access road from Tigoa township and airport) are preventing local people from developing sustainable livelihoods within the Property; there is an increasing reliance on remittances from family in Honiara. People are becoming increasingly dependent on imported rice and tinned food and are requesting support from the Department of Agriculture to recommend taro varieties that are better suited to the changing conditions in their traditional gardens near the lake as well as assistance with the nematode and aphid infestations that are destroying their taro crops. It is understood that there are chemical treatments available for these common taro pests.

Current impacts from outside East Rennell WHA:

Logging operations in West Rennell are posing a serious threat to the OUV of East Rennell WHA because of the inherent need to maintain forest integrity across the entire island. Presently there are four logging leases in West Rennell and one planned, although the oldest lease on the north side of the island has ceased operations due to a land dispute and subsequent High Court decision. There are currently two active log ponds in West Rennell (Lughughi Bay and Kanggava Bay in the south) where barges load up logs for export overseas (Appendix 3). The old log pond associated with the land dispute (Lavena Bay) is no longer operational. There are plans for another log pond in far northwest of Rennell Island and a bauxite mine in the same area that may share the site proposed for the log pond.

Logging operations in the lease areas follow a *Code of Practice for Logging*, enforced by the Solomon Islands Department of Forestry. Only five tree

species are taken during the logging process and non-target tree (e.g. figs) are left untouched where possible. Many of the logged areas demonstrate a form of selective logging where affected areas are surrounded by intact forest thereby ensuring reliable parent tree sources for seed rain as well as providing important remaining habitat for avifauna (Appendix 4). Areas that were logged four years ago are recovering well and appear to be following a normal forest successional pathway that has been previously observed following natural disturbance from tropical cyclones (Appendix 4). Early successional native tree species (e.g. *Macaranga* spp.) and vines (e.g. *Merremia peltata*) do not appear to be pervasive in the logged areas but will need to be closely monitored to ensure that later successional trees and shrubs will eventually enter the forest ecosystem as the recovering canopy fills in. Soil compaction due to the logging machinery does not appear to be significant due to the rocky limestone substrate. The field surveys revealed no significant woody weeds (e.g. *Lantana camara*) in the logged areas. This remains an ongoing threat to the OUV of East Rennell WHA due to lack of biosecurity on the island, with accidental weed introductions most likely to occur via logging operations.

According to a Department of Forestry official about 60% of West Rennell has forest suitable for logging while the remaining 40% is unsuitable due to forest structure and being located on less accessible karst areas. However, due to ongoing land disputes among the customary landowners it is unlikely that 60% will ever be cleared. This should be taken in context that about one third of the forests of Rennell Island are protected in the East Rennell WHA.

The field surveys revealed the introduction and spread of the black ship rat (*Rattus rattus*) from the three log ponds in West Rennell, suggesting that the rats have entered the island via barges due to a lack of biosecurity on the island. The black rat is among the most widespread invasive vertebrates on islands and continents (Shiels et al., 2013). It survives well in human-dominated environments, natural areas, and islands where humans are not present. *Rattus rattus* is typically the most common invasive rodent in insular forests (Shiels et al., 2013). Few vertebrates are more problematic to island biota and human livelihoods than *R. rattus*; it is well known to damage crops and stored foods, kill native species, and serve as a vector for human diseases (Shiels et al., 2013). The black rat is an omnivore, yet fruit and seed generally dominate their diet, and prey items from the ground to the canopy are commonly at risk and exploited as a result of the prominent arboreal activity of black rats.

Evidence of invasion by black rats includes small holes chewed into green coconuts in coastal plantations near the log ponds (Appendix 5) and extensive damage to a kumara crop in a traditional garden, some 8 km south of the original log pond at Lavena Bay (Appendix 5). Records show that logging commenced in the northern area some four years ago. The owner of the kumara crop confirmed that 2013 was the first year that rats had attacked their crop suggesting rats are moving south along the road from the Lavena Bay log pond at about 2 km per year. Rats also appear to be moving along the coastline from the log ponds, utilising coconut plantations for food, and there is now evidence that rats have invaded inland areas, perhaps using

the logging roads as conduits. The extent and spread of rats into intact forest areas remains unknown at this stage. Of immediate concern is invasion of rats at the Kanggava Bay log pond as this is the closest known invasion site to the East Rennell WHA boundary.

At this stage the rats appear to be only eating small (green) coconuts and kumara crops, as local people stated that other crops were not being eaten. This issue will require further investigation among the local communities. It should be noted that the common house mouse (*Mus musculus*) has been established on Rennell Island for many years and occasionally nibbles at kumara tubers but is never destructive. This small mouse species poses no threat to the OUV of East Rennell.

Black Rats are known to eat a range of food resources, including native seeds, bird eggs, bird fledglings, land snails and a variety of crops. It is likely that there have been multiple introductions of Black Rats (and potentially other species) into West Rennell via the ocean-going barges that originally came from China and now process logs through Honiara Port, where Black Rats are common. Trapping surveys will need to be undertaken to confirm whether we are dealing with one or more rat species (e.g. *R. tanezumi*, *R. exulans*). Trapping surveys and options for monitoring and eradication are discussed later.

While Black Rats have not yet reached the East Rennell WH boundary it is highly likely that their rate of spread will increase exponentially over time with a very high probability of reaching the boundary within a few years in the absence of a major eradication program to slow their spread. In the meantime, rats pose a significant threat to the endemic avifauna and land snails that reside in the forests of West Rennell and are therefore a threat to the OUV of East Rennell WHA. They also pose a threat to human food security, as they are known to eat a range of crops.

Plans for a fifth logging lease in northwest Rennell will exacerbate the threat of further rat invasions via barges unless stringent biosecurity measures are not applied as part of the conditions (e.g. baiting programs for the barges and log ponds). Ideally, this logging lease should not be approved in the first place.

Potential impacts

The accidental introduction of the Giant African Land Snail (*Achatina* spp.) into Rennell Island is considered to be serious potential threat to the OUV of East Rennell WHA and also to food security on the island. Considered one of the 100 world's worst invasive alien species intense concern is raised due to its adverse impact on agriculture, human health and native fauna (Vogler et al., 2013); moreover, once established this snail is impossible to eradicate. The Giant African Land Snail is now well established around Honiara and spreading. Vectors for its introduction include logging machinery, ship containers and transportation of adults and eggs via vegetables from areas where the snail is established. The lack of biosecurity on the island (e.g. quarantine checks at the sea and air port) mean there is a strong possibility

that this highly invasive species will soon be detected on Rennell Island.

At the time of the field visit it was revealed that there are plans to commence bauxite mining in the northwest of the island during 2014. Mining will target small areas (0.5-1.0 ha) for high-grade bauxite deposits that will be exported via barges at a site on the northwest coast. Less than 2% of West Rennell is suitable for bauxite mining. However, given that the bauxite deposits are scattered in pockets across West Rennell, there is likely to be much higher forest canopy loss due to the construction of access roads. Mining activity will impact on the integrity of OUV in the East Rennell WHA in a similar way to logging, i.e. loss of forest cover and habitat.

Other threats from bauxite mining include further introductions of rats and other invasive plants and animals (e.g. Giant African Land Snail, woody weeds) that may be carried on the barges and mining machinery. Plans to bring in soil to replenish the bauxite duricrusts as part of the forest restoration program poses another biosecurity threat as this fill may contain soil pathogens.

In addition to faunal invasives there is an increased risk of introduction of woody weeds to Rennell Island via logging and/or mining machinery. At present the island is remarkably free of highly invasive weed species that have plagued other islands in the Pacific.

4. Relevant to your expertise, recommend corrective measures and the desired state of conservation for protecting the OUV of East Rennell [including detailed control and eradication measures for invasive species].

Corrective measures to maintain OUV within East Rennell WHA:

As stated above East Rennell WHA is largely intact with few immediate threats to its OUV being presented from within the Property boundary. The greatest threats to its OUV are from outside the boundary, almost entirely from adjacent West Rennell due to logging and (planned) mining activities. Nonetheless, there are some threats occurring from within the Property that require urgent attention. Table 2 summarises the key threatening processes within the East Rennell WHA and outlines corrective measures to ameliorate these threats.

Table 3 summarises the key activities occurring in West Rennell that are serious threats to the desired state of conservation for protecting the OUV of East Rennell WHA. These are based on the underlying premise that East Rennell cannot retain its OUV without also maintaining a high degree of forest cover (integrity) in West Rennell as well as ensuring that invasive species are eradicated or prevented from reaching the island through strict biosecurity measures.

Threats to OUV of East Rennell WHA	Corrective measures
Climate change (rising lake levels and increasing salinity)	<p>Seek input from Department of Agriculture for advice on taro and coconut varieties that will be more tolerant of changing conditions (in the case of taro there is also a need to deal with a root nematode and leaf aphid).</p> <p>Better monitoring of tilapia populations in the lake to ensure that they are harvested sustainably and are not being affected by increasing salinity.</p> <p>Consider replacement fish species that may be better suited to higher salinity.</p> <p>Solomon Islands Government to continue to lobby the international community about the threats of climate change on the OUV of East Rennell WHA.</p>
Lack of funding for the Lake Tegano World Heritage Site Association to undertake their mission and to implement their management plan for East Rennell WHA	<p>Secure ongoing funding for Lake Tegano World Heritage Site Association to provide critical on site management and monitoring of the condition and trend of the WHA and any management actions that may be applied to maintain OUV e.g. actions to attain sustainable harvests of coconut crabs.</p> <p>Ensure funding is provided for capacity building and training for members of the Association.</p>
Lack of opportunities to develop sustainable livelihoods within East Rennell WHA	<p>Provide funding, capacity building and training to local people within the villages located in East Rennell WHA to allow them to develop new sources of income to supplement their subsistence activities, e.g. ecotourism, fish farming, arts and crafts utilising timber and non-timber forest products.</p>
Lack of basic infrastructure (roads, health & education facilities, electricity) and communications in East Rennell WHA	<p>Urgently seek funding to upgrade the road between Tigoa (West Rennell) and Lake Tegano (East Rennell) to open up ecotourism and other livelihood opportunities.</p> <p>Provision of a communications tower in East Rennell is a critical priority for the four villages in the Property to ensure sustained communication with the outside world and to underpin any business opportunities.</p>
Presence and possible impacts of 10 World War 2 planes in the waters of Lake Tegano	<p>Seek funding from the US Government for a salvage operation to remove the planes from Lake Tegano to avoid further contamination. There may be opportunities to retain some of these planes in the villages as tourist attractions.</p>

Table 2: Threats to OUV of East Rennell WHA and corrective measures

Threats to OUV of East Rennell WHA	Corrective measures
<p>Logging and (planned) mining are both reducing forest cover in West Rennell and threatening important forest habitat near the WH boundary that is utilised by avifauna from East Rennell.</p>	<p>Continue to apply the Code of Practice to existing logging leases until their completion.</p> <p>Logged areas should be monitored to ensure that the forest is recovering (e.g. vegetation and bird monitoring that should involve local people). Unlogged (control) areas should also be monitored for bird species and abundances.</p> <p>The Solomon Islands Government should not approve any more logging leases and should not approve any mining leases on Rennell Island.</p> <p>Establish a sizeable no-logging (buffer) zone between West Rennell and the East Rennell WH boundary.</p>
<p>The introduction of <i>Rattus rattus</i> to Rennell Island via barges is a critical threat to the OUV of East Rennell WHA.</p>	<p>Seek urgent international funding to commence an extensive rat monitoring and eradication program in West Rennell and further east, working closely with local people and relevant state and provincial government personnel.</p> <p>Enforce immediate biosecurity restrictions on the logging companies working in West Rennell (e.g. require a poison baiting program on all barges and in and around the logging ponds).</p> <p>Future applications for new log ponds should not be approved by the Solomon Islands Government in West Rennell.</p>
<p>The potential introduction of the Giant African land snail is a serious threat to the OUV of East Rennell WHA.</p> <p>The potential risk of woody weed invasions is a threat to the integrity of the forests on Rennell Island, particularly in disturbed areas.</p>	<p>Enforce immediate biosecurity restrictions on logging companies working in West Rennell and at the airport in Tigoa and seaport at Kangava Bay (e.g. washing down of logging machinery prior to travel to Rennell Island, inspection of fresh vegetative produce at airport and seaport, education campaigns in the community to raise biosecurity awareness about alien snails and woody weeds).</p>

Table 3: Threats to OUV of East Rennell originating from outside the WHA and corrective measures.

5. Recommend indicators and a detailed monitoring plan for ongoing evaluation of the state of conservation of the OUV of East Rennell [including evaluation of the invasive species and their impacts to the OUV of East Rennell]. This may be used to develop applications for international assistance to fund the ongoing monitoring of East Rennell.

Forest cover, vegetation and avifauna surveys

Forest cover is a useful attribute and integrity indicator for OUV for world heritage properties such as East Rennell. Given that a high degree of forest cover is a critical requirement for protection of the OUV in East Rennell, not just in the WHA, but for the entire island, it would seem to be a vital inclusion in any monitoring program. Forest cover ideally should be measured using a combination of remote sensing and ground-based vegetation cover measurements and this approach is suggested as appropriate for Rennell Island. While forest cover is almost 100% in East Rennell (excluding the lake and minor roads and village areas), this is not the case to the west of the Property where logging is reducing forest cover and therefore the integrity of the OUV ascribed to the East Rennell WHA.

Presence and abundance of forest-dependent birds (especially endemics) is another useful attribute and integrity indicator for determining the status of the OUV of East Rennell. Bird surveys in logged and un-logged forest areas across the island should form the basis of the monitoring program.

Table 4 provides a set of recommended indicators and a monitoring plan for the ongoing evaluation of forest cover and presence/absence of birds as core indicators for the state of conservation of the OUV of East Rennell WHA.

Invasive species

The establishment of black rats (*Rattus rattus*) on Rennell Island, together with threats imposed from potential invasive species, such as other rat species and the Giant African Land Snail require the implementation of a properly funded and comprehensive surveillance program for invasive species on the island, together with an eradication program for black rats. The rate at which rats spread once they establish on an island is not well known as it does not appear to have been documented before (Shiels et al., 2013). Rennell Island is unusual being one of the few islands, of its size in the Pacific, that has never had any rats until now; even the widespread Polynesian Rat, that often accompanied early voyagers around the Pacific, never became established on the island.

A full eradication of black rats on Rennell Island will be very difficult because of its large size (Shiels et al., 2013). Typically, rat eradication campaigns on islands are completed by aerial broadcast of toxicants, such as brodifacoum. There are many steps that come before such measures are applied, particularly getting the local residents on-board and weighing up the non-target effects (e.g. ground-foraging birds, domestic animals). These are expensive campaigns (typically millions of US dollars), and the amount of

toxicant is substantial, especially on islands that have prominent land crabs, like Rennell. The crabs consume massive amounts of bait but do not die from it because the toxicants only affects vertebrates; however, because they eat so much of the bait the application rates are double or triple what they would have to be on islands without land crabs or other substantial non-target consumers. If the rats are indeed contained in one section of the island, then it seems reasonable to consider a partial island-eradication. However, usually this does not happen because the eradication groups favour the 'all or nothing' approach, largely a result of the very fast spread of rats and difficulty in detecting them when they are in low densities.

Table 5 provides a set of recommended indicators and a monitoring plan for the ongoing evaluation of invasive species as core indicators for the State of Conservation of the OUV of East Rennell WHA. The indicators apply to a confirmed invasive species (black rat) and also potential invasive species (Giant African Land Snail). Presence of woody weeds should be incorporated into the vegetation surveys (Table 4).

Indicators	Monitoring plan
Forest cover (% and ha) derived from remote sensed imagery (e.g. satellite, aerial photography, unmanned aerial vehicle (UAV) surveys of logged areas).	Prepare a baseline map of current forest cover for Rennell Island where possible comparing it with pre-logging forest cover. Biannual monitoring of logged areas using UAV surveys to monitor forest recovery. Update the baseline map every 5 years to monitor change in forest cover and condition.
On ground forest vegetation and bird surveys on Rennell Island (both within and outside the WHA) to determine <ul style="list-style-type: none"> • Forest cover and height and species composition (or life-forms) • Presence and density of forest birds (notably endemics) • Presence of woody weeds 	Establish baseline vegetation transects in logged and unlogged areas on Rennell Island to monitor forest recovery over time in logged areas and to monitor any changes in unlogged areas (bi-annual surveys). Bi-annual bird surveys should be conducted along the same transects following establishment of baseline surveys. Local people should be trained and employed in monitoring programs. Ground surveys should include GPS coordinates to allow for ground-based verification of forest structure and condition obtained from remote sensing.

Table 4: Indicators and monitoring plan for forest cover and avifauna on Rennell Island.

Indicators	Monitoring plan
<p>On-ground surveys for black rats (<i>Rattus rattus</i>) and other possible rat species on Rennell Island:</p> <ul style="list-style-type: none"> • Presence of rats • Population density • Current distribution • Rate of spread, particularly along coastal areas and roads 	<p>Establish a monitoring scheme across the island to document the invasion front from the north, as well as confirm a rat-free south (East Rennell WHA). There are a number of ways that one can monitor for rats, ranging from traps, tunnels, chew blocks or sticks, and detection dogs. Surveys of the residents and impacts of rats on their gardens and coconut plantations should also be used.</p> <p>Apply localized control of rats in areas that have conservation value. This usually means near-constant baiting (bait boxes to limit non-targets) and/or trapping; but at minimum it would occur during the reproduction season(s) of the species or habitats one is trying to conserve. It might be several years before this would be necessary at East Rennell WHA, but the invasion front could be slowed and contained using these techniques in order to buy time until a partial eradication could commence.</p>
<p>On-ground surveys for Giant African Land Snails on Rennell Island:</p> <ul style="list-style-type: none"> • Presence of snails in vulnerable areas (e.g. air/sea ports, villages, log ponds) 	<p>Establish a surveillance system for Giant African Land Snails with cooperation from the Departments of Agriculture, Forestry and Environment together with local communities. Focus should be on tighter biosecurity measures at places of disembarkation on Rennell Island (airport, seaport, log ponds) to prevent the accidental establishment of alien snails on the island.</p> <p>Local people should be educated about the biosecurity risk via an education campaign and asked to play an active role in local surveillance.</p> <p>Logging companies should apply best practice methods to clean down machinery before delivery to Rennell Island and should monitor biosecurity measures on barges and at log ponds to prevent alien snails from establishing on Rennell Island.</p>

Table 5: Indicators and monitoring plan for invasive species on Rennell Island.

Other issues

Table 6 provides a set of indicators and monitoring plans for responding to the range of other issues that are affecting the OUV of East Rennell WHA. Other than climate change, these issues are largely about management and developing sustainable livelihoods for the four villages located in the East Rennell WHA.

Indicators	Monitoring plan
<p>Climate Change: Rising lake levels and salinity impacting on vegetation and crops (taro and coconuts) in the western margins of Lake Tegano; impacts on aquatic flora and fauna (including tilapia) in the lake.</p> <ul style="list-style-type: none"> • Changes in tilapia, coconut and taro production • Changes in lake levels and salinity 	<p>Continue to monitor the health of coconuts around the lake, particularly in the swampy areas. Undertake periodic salinity measurements across the lake to define baseline conditions.</p> <p>Establish a program, with Department of Agriculture and local communities, to treat the nematode and aphid pests currently affecting the swamp taro crops in East Rennell.</p> <p>Establish a tilapia-monitoring program for the lake.</p>
<p>Management and training: Lack of funding for the Lake Tegano World Heritage Site Association to undertake their mission and to implement their management plan for East Rennell WHA</p> <ul style="list-style-type: none"> • Long-term funding for the Association • Completion and application of the <i>East Rennell Management Plan</i> • Local people trained in ecotourism, protected area management and other relevant sustainable livelihood activities 	<p>Monitor the activities of the Lake Tegano World Heritage Site Association and their communities to ensure that they are receiving adequate financial and other relevant support (e.g. training, capacity building) to enable the Association to protect the OUV of East Rennell WHA.</p>
<p>Infrastructure and basic facilities: Lack of basic infrastructure (roads, health & education facilities, electricity) and communications in East Rennell WHA</p> <ul style="list-style-type: none"> • Upgrade of road between Tigoa and Lake Tegano • Construction of a communications network for the four villages in East Rennell • Better health and training facilities for East Rennell 	<p>Monitor the upgrade of the access road, establishment of the communications network and establishment of better health and training facilities.</p>

Table 6: Indicators and monitoring plan for climate change, management and sustainable livelihoods in East Rennell WHA.

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Appendix 1: Forests and biota in East Rennell WHA



Take Tegano: looking northwest from the far southeast corner of the lake (S.M. Turton)



Bird Island, Lake Tekano (S.M. Turton)



Fringing coral reef on south coast (S.M. Turton)



Lake Tegano taken from the south (S.M. Turton)

Appendix 2: Coconut die back, Lake Tegano (East Rennell WHA)



(S.M. Turton)



(S.M. Turton)

Appendix 3: Log pond at Lughughi Bay (West Rennell)



(S.M. Turton)



(S.M. Turton)

Appendix 4: Recently logged and regenerating (logged) forest (West Rennell)



(S.M. Turton)



(S.M. Turton)



(S.M. Turton)



(S.M. Turton)

Appendix 5: Black rat damage to crops (West Rennell)



(S.M. Turton)



(S.M. Turton)



(S.M. Turton)



(S.M. Turton)