Mangrove Baseline Vegetation Mapping of Maramasike Passage, Malaita Province

Final Report

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Source: http://www.flickr.com

Solomon Islands

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Contents

1. Introduction

Mangrove ecosystem provides immense benefit to both coastal communities and the environment in general. They also house some of the world's biodiversity and according to literature; the Pacific region has the world's mangrove biodiversity (Ellison 2007). In our efforts to conserve these biodiversity, mapping has become a major component. This involves the use of remote sensing (RS) and geographic information system (GIS). RS and GIS provide data in the form of digital magnetic types and in different colour bands of the electromagnetic spectrum (Anderson, 1996). The availability of such data in different colours makes it very useful for the delineation of the different vegetation zones or habitat classes distinctly. Characterizing the different zones can be carried out through visual interpretation and digital analysis by RS and GIS techniques. The number of classes used will depend on the level of information the user wants to represent on the map or on the level of detail provided by the satellite imagery (Congalton, 1999).

This mapping work was developed to fit the MESCAL Projects Outcome 1, Activity 1.2 (Documentation of Ecological, Economic, Social and Cultural Status and Values of Mangroves) by conducting a baseline mangrove vegetation map of the demonstration site of the MESCAL Project. The following outputs were anticipated from this undertaking: 1) baseline vegetation map highlighting zones, habitat types and species if possible and 2) a final report highlighting the work undertaken and recommendations of future mapping work that can be done at the site.

2. Project site

The MESCAL Project demonstration site is located on the small Malaita side of the Maramasike Passage. The site extends from Raroi Su'u Lagoon in the north of the Passage to Wailulu (Figure 1).

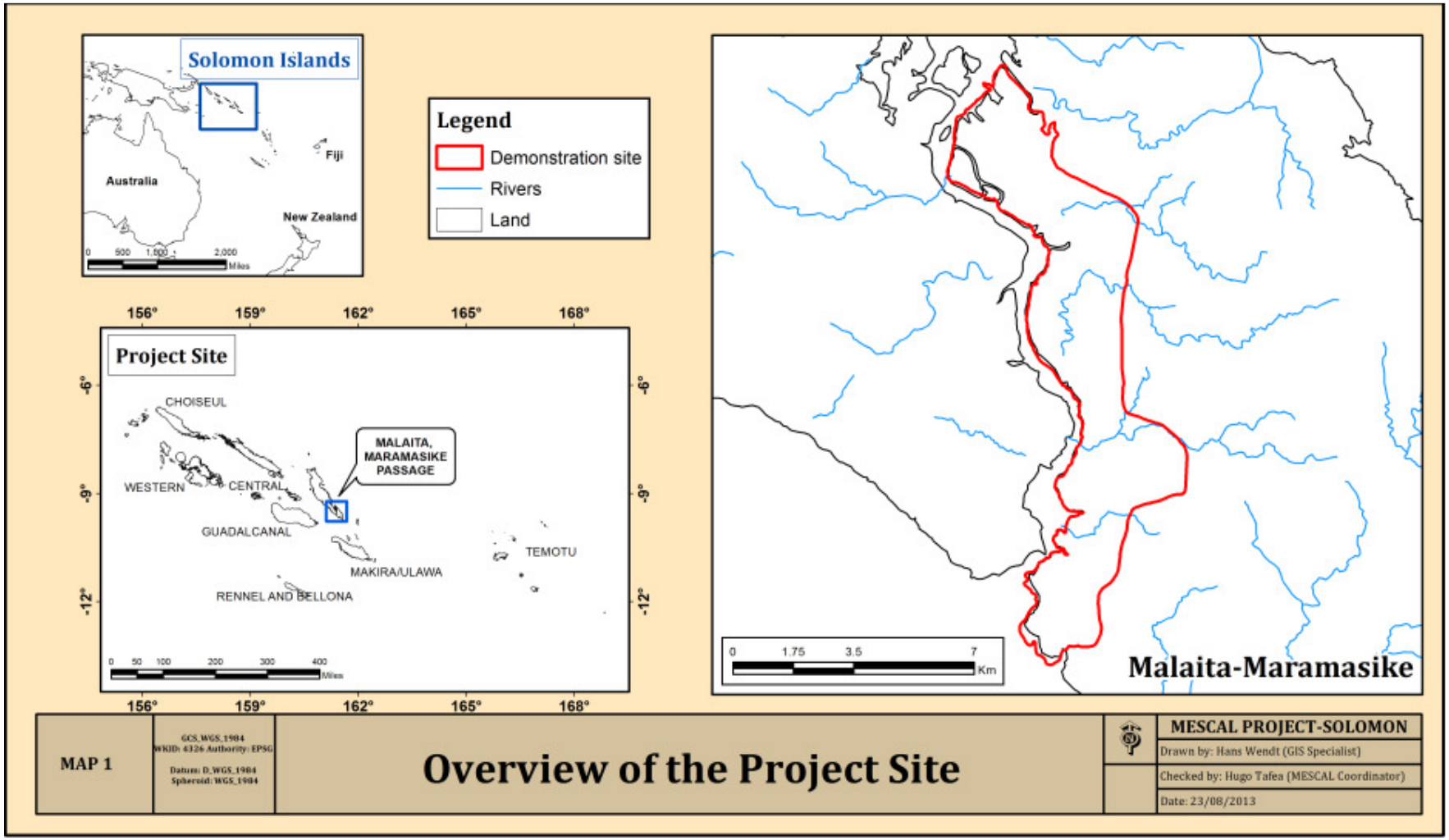

Figure 1: MESCAL Project demonstration site on the small Malaita side of the Maramasike Passage

3. Data used and mapping methodology

Google-Earth Landsat imagery was used for this mapping work since there was no high resolution satellite imagery available for the project area. RS and GIS tools were used to demarcate the various mangrove boundaries and associated vegetation zones within the area of interest using the image. A number of existing sources of information was also used to assist in the categorization of the different vegetation zones. These sources of information and levels of classification are as follows:

- Principal vegetation types (according to Mueller-Dombois and Forsberg 1998)
- Use of topographic maps to indicate the nature of the terrain and
- GIS vector layers of the Solomon Islands

Seven categories were determined using visual interpretation of the image to produce a hierarchical classification of the principal vegetation types (according to Mueller-Dombois and Forsberg 1998) of the mapped area. The seven categories included:

- Agriculture,
- Back of mangrove forest and shrub,
- Coastal strand,
- Human habitation,
- Lowland rainforest,
- Mangrove forest and
- Shallow reef.

4. Results and discussion

The seven vegetation types that were classified in section 3 are shown in Table 1 with descriptions of how they were analyzed. Figure 2 shows a visual representation of the different vegetation types on a map.

Table 1: Vegetation types of the mapped area of interest analyzed through visual interpretation using the base imagery in Google-Earth and expert knowledge.

Vegetation type	**Description**
Agriculture	Includes all cultivated areas and bare lands analyzed through visual interpretation using the base imagery in Google-Earth and expert knowledge.
Back of mangrove forest and shrub	Includes mangrove associated species, forests and shrubs analyzed through visual interpretation using the base imagery in Google-Earth and expert knowledge.
Coastal strand	Includes coastal vegetation that occupies sandy beaches and beach ridges starting at the high water mark and analyzed through visual interpretation using the base imagery in Google-Earth and expert knowledge.
Human habitation	Includes all areas covering villages and settlements analyzed through visual interpretation and vector layers of the study site.
Lowland rainforest	This is one of the most widespread vegetation type throughout the Solomon Islands. Usually they are found in areas up to 600 meters elevation. This vegetation type was also analyzed through visual interpretation using the base imagery in Google-Earth and expert knowledge.
Mangrove forest	Includes all mangroves demarcated from the base imagery in Google-Earth together with the assistance of topographic map.
Shallow reef	Includes shallow reef areas that are visible and can be interpreted visually and mapped using the base imagery in Google-Earth.

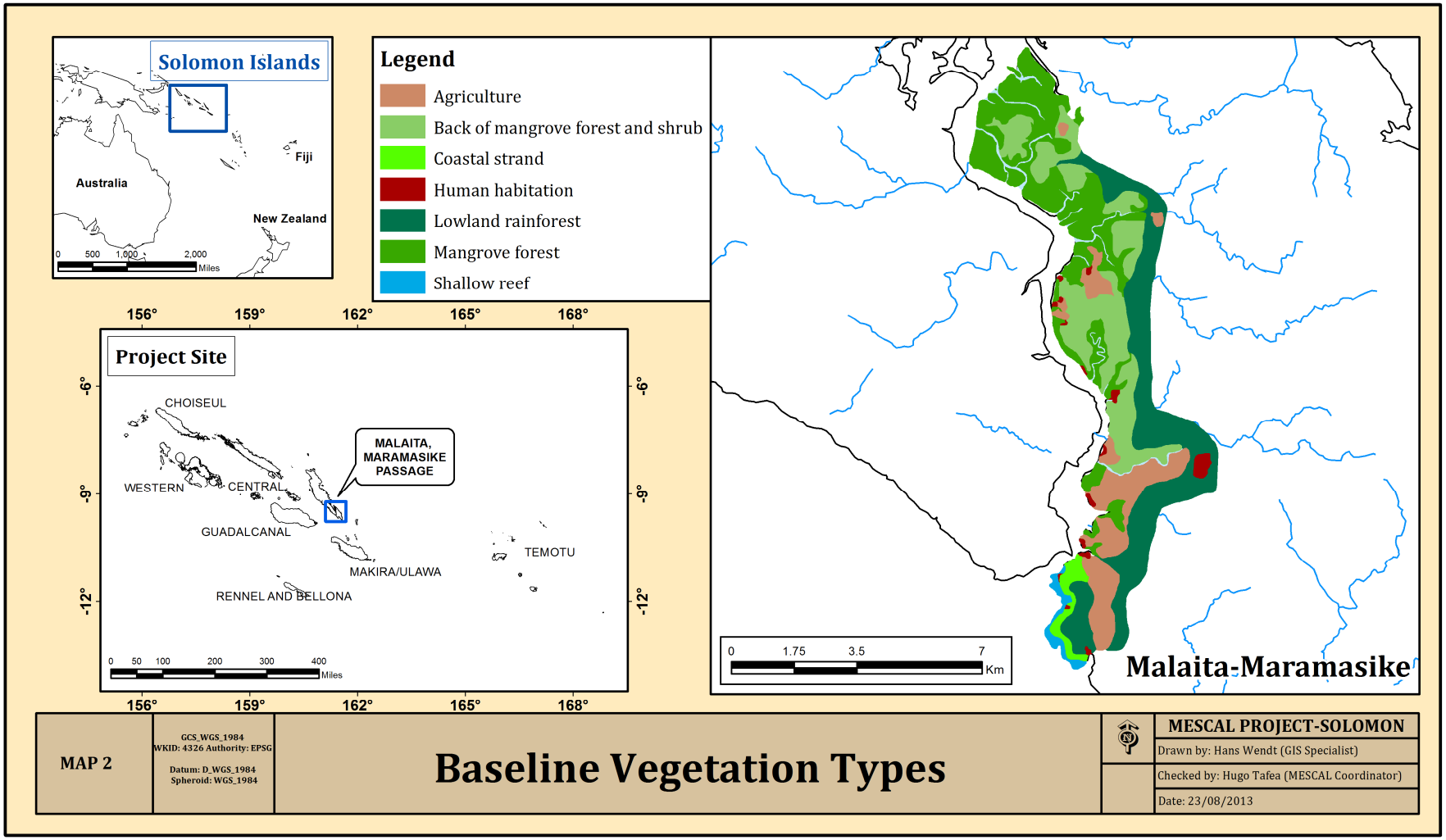

Figure 2: Baseline Vegetation types of the mapped area in the Maramasike Passage in the Malaita Province, Solomon Islands

Through GIS analyses, the area of each vegetation type was also calculated (Figure 3). Results revealed that the total mapped area was 41 km^2. Lowland rainforest and Mangrove forest were the vegetation types that had the largest area covered of 11.9 km^2 (29%) and 11.8 km^2 (28%) respectively. The back of mangrove forest and shrub vegetation type and agriculture also covered a significant area of 9.5 km^2 (22%) and 6 km^2 (14%) respectively. The other three vegetation types, human habitation, coastal strand vegetation and the marine component of the mapped area (shallow reef) all covered less than 1 km^2 of area (Figure 3).

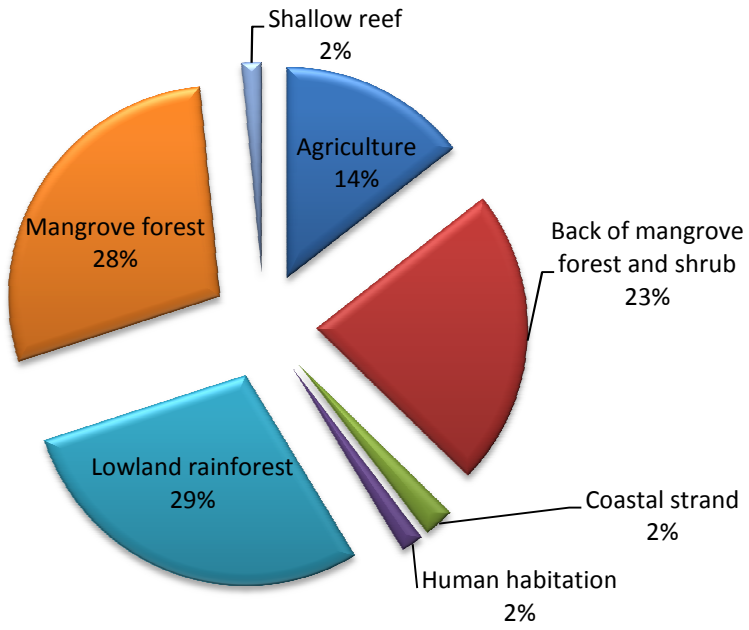

Figure 3: Percentage of vegetation coverage within the mapped area of the MESCAL Project demonstration site.

5. Recommendations for future work

Based on the results and discussions of this mapping work, the following general recommendations are suggested for future research on the site:

- Mapping of the demonstration to a much finer scale (different mangrove zones) is important for decision making and resource management.

- However high resolution imagery is needed to demarcate and map the various mangrove zones to species level.
- Otherwise extensive ground truthing survey of the different mangrove boundaries in the MESCAL demonstration site should be carried out for verification and mapping purposes.
- The current mangrove vegetation map can be updated as new information becomes available.

6. Reference

1. Anderson, J.R. (1996). Land use/land cover classification system for use with Remote sensor data uses professional paper 964, 45 Government Printing Office Washington, D.C.
2. Congalton, K.G, (1999). Assessing the accuracy of Remotely Sensed Data: Principles and Practices, New York, Lewis Publisher.
3. Ellison, C.J, (2007). Manual for Mangrove Monitoring in the Pacific Islands region, Monitoring Changes in Mangrove Condition.
4. Mueller-Dombois, D. and Fosberg, F.R, (1998). Vegetation of the Tropical Pacific Islands. Springer-Verlag, N.Y. Ecol. Studies Vol. 132. 773 pp.

7. Appendix

Name of vegetation type	Area (km^2)
Agriculture	6.0
Back of mangrove forest and shrub	9.5
Coastal strand	1.0
Human habitation	0.7
Lowland rainforest	11.9
Mangrove forest	11.8
Shallow reef	0.6

Appendix 1: Table of area covered calculated for the different vegetation types identified in the mapped area of the Project demonstration site.

8. Acknowledgements

The satellite base imagery used for this mapping work was available online on Google-Earth. Topographic and thematic maps were acquired from Mr. Hugo Tafea, MESCAL Solomon Islands and the Solomon Islands Lands Department. Other information related to the MESCAL demonstration site in the Solomon Islands was supplied by Mr. Viliame Waqalevu, MESCAL technical Officer, IUCN-Oceania.