3 - 3 - 4 Vegetation distribution survey

(1) Survey method

Vegetation distribution survey was executed at the same time of stream sediment survey. Vegetation of the survey area is very thick because the area belongs to tropical rain forest.

Based on existing vegetation map, vegetation distribution changes largely from east side to west side of the east of Sigatoka River. In this survey, a vegetation distribution map was made based on ASTER satellite image before ground truth survey (Appendix14).

(2) Image analysis

Optical sensor (VNIR) of ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) was used for the satellite image analysis to make the vegetation distribution map. In order to divide the vegetation distribution, 3 types of images; Natural Color Image (BGR= 321), False Color Image (BGR= 123) and Pseudo Color Image of band 2 were made (Fig.II-3-5-(1)-(3)).

A part of ASTER image were not acquired, therefore JERS- 1 /OPS data made up for this zone to make mosaic patching. Granule ID of ASTER images and Path/Row of JERS- 1 /OPS are indicated in Table II-3-8.

Table II-3-8 Satellite images for interpretation

Sensor	Granule ID	Level	Acquisition Date
ASTER	ASTL1A_0011072243420011230304B	Level 1B	2000.11.07
ASTER	ASTL1A_0101102242300101210621B	Level 1B	2001.01.10
ASTER	ASTL1A_0011072243510011230305B	Level 1B	2000.11.07
ASTER	ASTL1A_0101102242380101210622B	Level 1B	2001.01.10
JERS-1/OPS	Path632/ Row330	Level 2	1993.11.19
JERS-1/OPS	Path632/ Row330	Level 2	1993.11.19

(3) Picture decipherment of vegetation distribution

ASTER band 2 can observe spectrum wave length ranging 0.63 μm - 0.69 μm. This wave length band is known to reflects difference of vegetation distribution well. Therefore, digital value of band 2 data (0 - 255) were level sliced and expressed by pseudo color image Fig.II-3-5-(3).

Based on the pseudo color image, the vegetation ditribution of the area are classified to 5 territories such as ①Red purple, ②Red purple-dark blue, ③Blue, ④Yellow-green and ⑤White. Estimated vegetation distribution of each territory is shown in Table II-3-9.

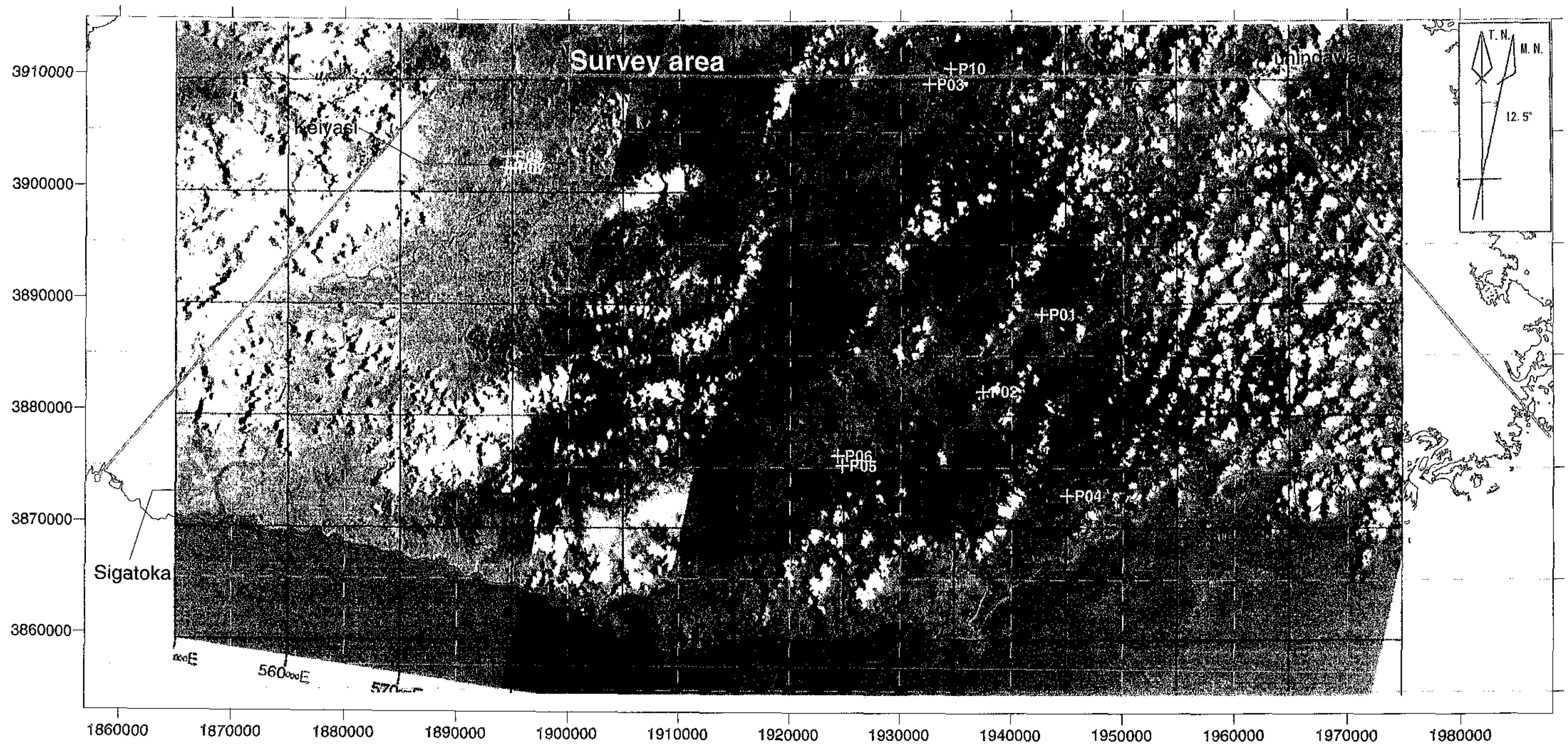


Fig.II-3-5-(1) Natural color image of the survey area (ASTER image by BGR=231). Scale 1:500,000

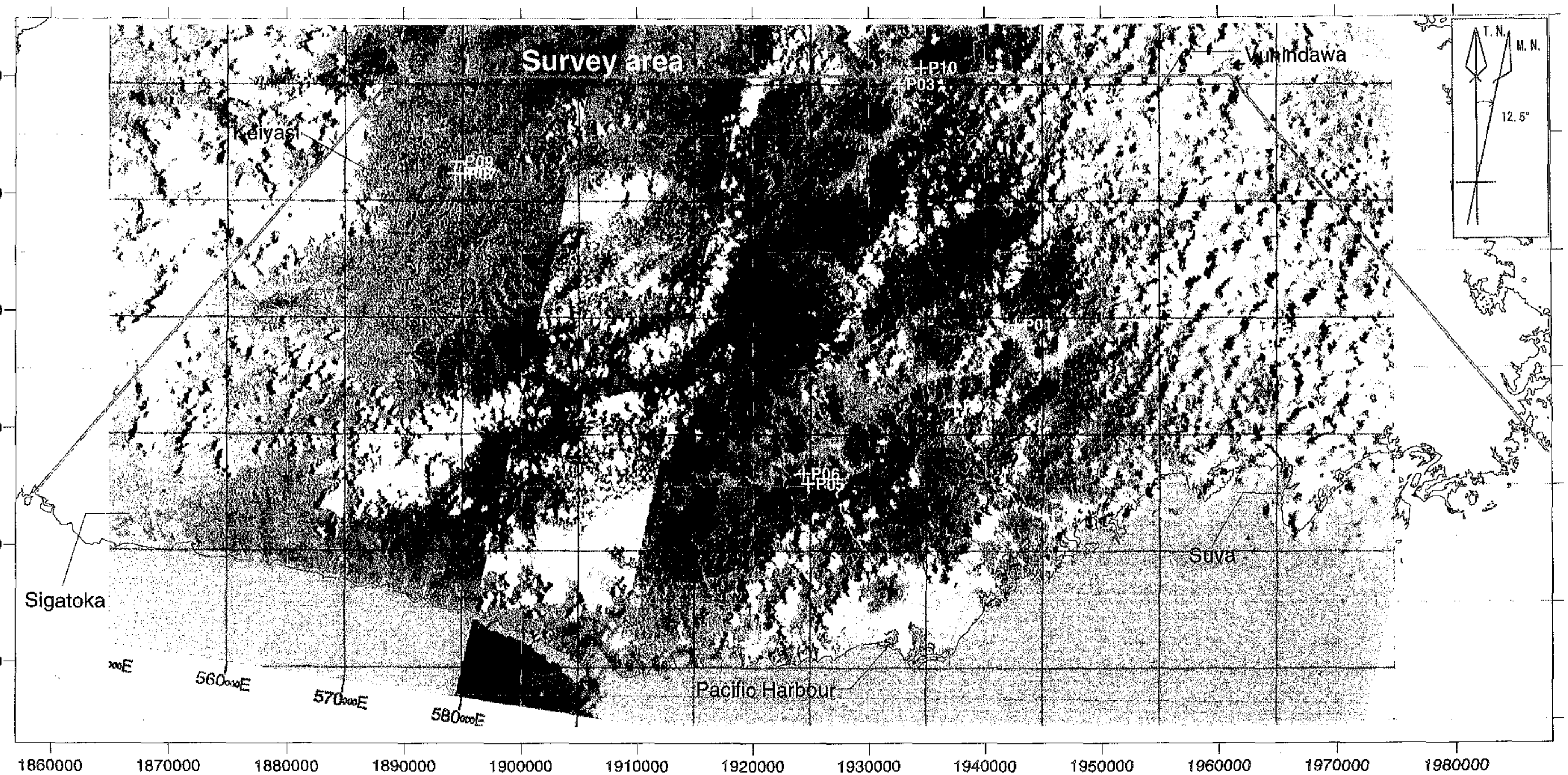


Fig.II-3-5-(2) False color image of the survey area (ASTER image by BGR=123). Scale 1:500,000

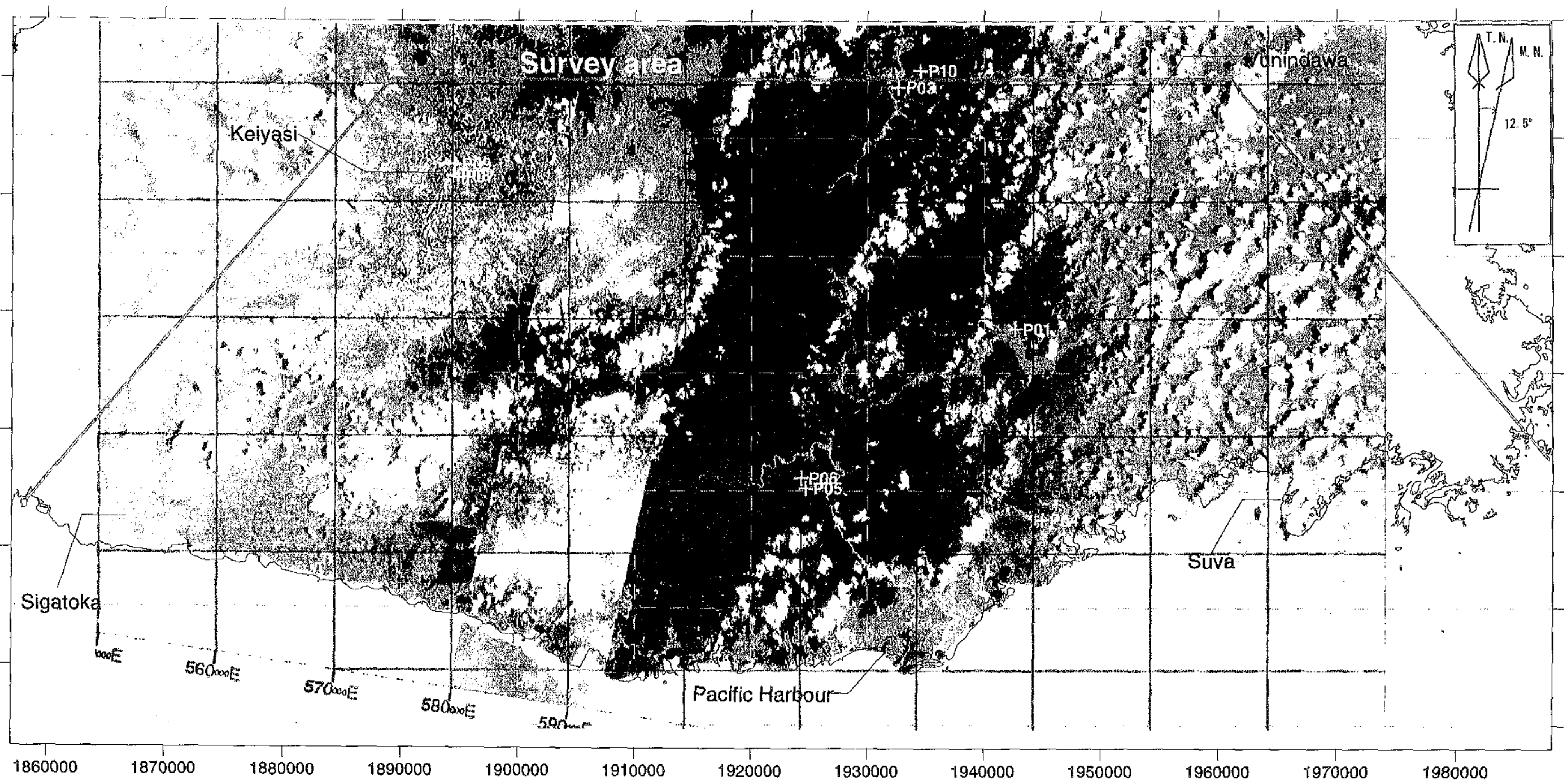


Fig.II-3-5-(3) Pseudo color image of the survey area (ASTER band 2). Scale 1:500,000

Table II-3-9 Interpretation of vegetation based on satellite image

Area	**Remarks**
Red purple	High concentration tropical forest
Red purple -Dark blue	Middle – low concentration forest
Blue	Flat plain
Yellow -Green	Flat plain along river
White	Cloud

Red-Purple territory was presumed to correspond to high mountain zone that distributes Upland rain forest and Cloud forest or part of Tropical rain forest. Red-Purple - Dark blue territory was presumed to correspond to mountain hillside zone that distributes Lowland rain forest. Blue territory was presumed to correspond to topographically gentle land that distributes part of Grassland vegetation. Green-Yellow territory presumed to correspond to glassy plain along rivers and swamp where distributes part of Grassland vegetation and Freshwater wetland vegetation. White territory was presumed to correspond to cloud.

(4) Result

Location of the ground truth survey is shown in Fig.II-3-5. The result of the vegetation distribution survey is shown in TableII-3-10. Photographs of the ground truth survey are shown in PH- 4.

Table II-3-10 Result of vegetation ground truth survey

Location	X(Easting)	Y(Northing)	Date	Aster image(pseudo)	Vegetation	Humidity	Soil or geology	Memo
P01	1942643	3888761	2002/10/8	blue, yellow～green	few	wet	laterite	Flat plain along a river, low grass and some woods, and farm
P02	1937387	3881807	2002/12/6	red, blue	thick	wet	laterite	Along a road, low grass and tropical rain forest beside Wainikatama Camp
P03	1932631	3909348	2002/10/4	blue (yellow～green)	middle	middle	?	From a road along a river, low grass and riverside bush
P04	1944990	3872515	2002/12/6	blue	middle	wet	laterite	Along Namosi Road, low grass and tropical rain forest
P05	1924700	3875215	2002/10/22	dark red	thick	middle	laterite	reclaimed area, tropical rain forest
P06	1924300	3876070	2002/10/22	red	thick	middle	laterite	Tropical reain forest along a road
P07	1894773	3901693	2002/11/18	yellow, white	few	dry	yellow-brown soil	Farm inside a village, farm plants and low grass and dried soil
P08	1894376	3901772	2002/11/18	blue	middle	dry	yellow-brown soil	Small woods beside a village, without short grass
P09	1894498	3902764	2002/11/18	white	few	dry	yellow-brown soil	Grass land, dried soil is exposed in some places
P10	1934511	3910748	2002/9/24	red	thick	wet	?	Tropical reain forest along a road

As a result of the ground truth survey, the estimation of vegetation distribution, which is based on the pseudo color image of the ASTER optical sensor, was well concordant with the result of ground truth survey. Therefore the vegetation distribution based on the pseudo color image reflects real vegetation distribution.

3 - 4 discussions

Fauna and flora survey consists of fauna survey, sampling and chemical analysis of fishes & benthos, flora survey and vegetation distribution survey.

As for inland Vertebrate, Birds are most abundant, approximately 150 species, and Reptiles, and Amphibians follow after the Birds. Fauna in the South East Viti Levu that represents the survey area coverd by tropical rain forest consists of total 84 species including introduced species. Birds have 51 species, Mammals have 11 species, Reptiles have 19 species and Amphibians have 3 species. During the field survey in the tropical rain forest, 34 species of birds were recognized including Pink-billed parrotfinch which is worldwide rare species. The area is not disturbed as to biodiversity of birds. As for Reptiles, *Emoia mokosariniveikau*, which is a kind of Skink that was detected only in Vanua Levu Island, was discovered in the field suvey.

As for the sampling and chemical analysis of fishes & benthos, 26 samples were collected (corbicula: 21, eel: 5) and chemically analyzed (28 elements). The feature of each element concentration in fishes and shellfishes shows almost same tendency, but fishes tend to concentrate Ca, Mg, Na, K and as trace elements B and Sr, the other hand, shellfishes concentrate As, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Ti and V. Among the trace elements, As (arsenic) value of the fishes, As (arsenic) and Cd (cadmium) values of the shellfish are relatively high.

Flora of the survey area is classified characteristically to 8 ecosystems according to the topography & the climate. The most widely distributed ecosystem is Lowland rain forest (tropical rain forest). Upland rain forest and Cloud forest wich should be protected are distributed in the inland ravine area. Coastal vegetation is widely distributed along the coastal line and Grassland vegetation is widely distributed in Sigatoka area.

As for vascular bundle plant, approximately 1028 genus and approximately 2530 species are recorded. These species consist of 301 species of Ferns (Pteridophyte) and 2225 species of Seed plants (Spermatophyte). Total 81 of rare and endangered species of vascular bundle plant are distributed in the Viti Levu South Area that hosts the tropical rain forest. In the field survey of the tropical rain forest, almost 100% (173 species) of the plants are native species and 60% among them (104 species) are endemic species. The ratio of endemic species is high. 9 rare and endangered species such as *Agathis macrophylla* - dakua or epiphytic orchid are distributed in the area. The area is rich in the biodiversity of plants.

The vegetation distribution map based on the pseudo color image that acquired from the optical sensor of ASTER was well concordant with the vegetation distribution confirmed in the field survey. The vegetation distribution of the survey area is classified largely to 5 vegetation territories from the image interpretation. Red-Purple territory corresponds to high mountain zone that distributes Upland rain forest and Cloud forest or part of Tropical rain forest. Red-Purple - Dark blue territory corresponds to mountain hillside zone that distributes Lowland rain forest. Blue territory corresponds to topographically gentle land that distributes part of Grassland vegetation. Green-Yellow territory corresponds to glassy plain along rivers and swamp where distributes part of Grassland vegetation and Freshwater wetland vegetation. White territory corresponds to cloud.

Outline about fauna, flora and vegetation distribution of the Viti Levu South area were grasped through this survey. Modeling this field survey, Environmental Impact Assessment (FS) will be necessary to the area that is expected to be developed in the future. At that time, aquatic animal survey must be added. Periodical survey is necessary for plant considering seasonal variance.

Chapter 4 Soil bacteria survey

4 - 1 Objectives

In order to examine the possibility that applicable microbes which can be used for the bacteria leaching and the biological mine wastewater treatment in the survey area where a new metal mining development is expected, 5 soil samples were collected from Namosi region. These samples were screened primarily for the detection of useful microbes.

4 - 2 Survey methods

4 - 2 - 1 Sampling location

The sampling location is shown in Fig.II-4-1. Characteristic condition of the soil samples is indicated in TableII-4-1.

Table II-4-1 Characteristics of the soil samples for bacteria

Sampling point	Characteristics of soil	Note
A	Brown gray silt-clay (wet)	Waisoi-Wainitotoyeuyeu river junction
B	Light brown silt-clay (dry)	Waisoi-Wainitotoyeuyeu river junction
C	Brown gray silt-clay (wet)	Waivaka-Wainavuga river junction
D	Brown gray silt-clay (wet)	Near Wainavuga drilling site (in water)
E	Brown silt-clay (dry)	Near Wainavuga drilling site

Remark: Colors of the soil surfaces were changed into red-brown in sample A, C, D.

4 - 2 - 2 Target microbes

(1) Bacteria leaching applicable microbe

- Iron oxidative bacteria (*Thiobacillus ferroxidans*)
- Sulfur oxidative bacteria (*Thiobacillus thiooxidans*)

(2) Mine wastewater treatment applicable microbe

- Iron oxidative bacteria
- Sulfate-reductive bacteria
- Heavy-metal tolerant filamentous fungi
- Heavy-metal tolerant yeast

4 - 2 - 3 Microbial sampling and culture methods

Type of screening culture medium is shown in Table II-4-2.

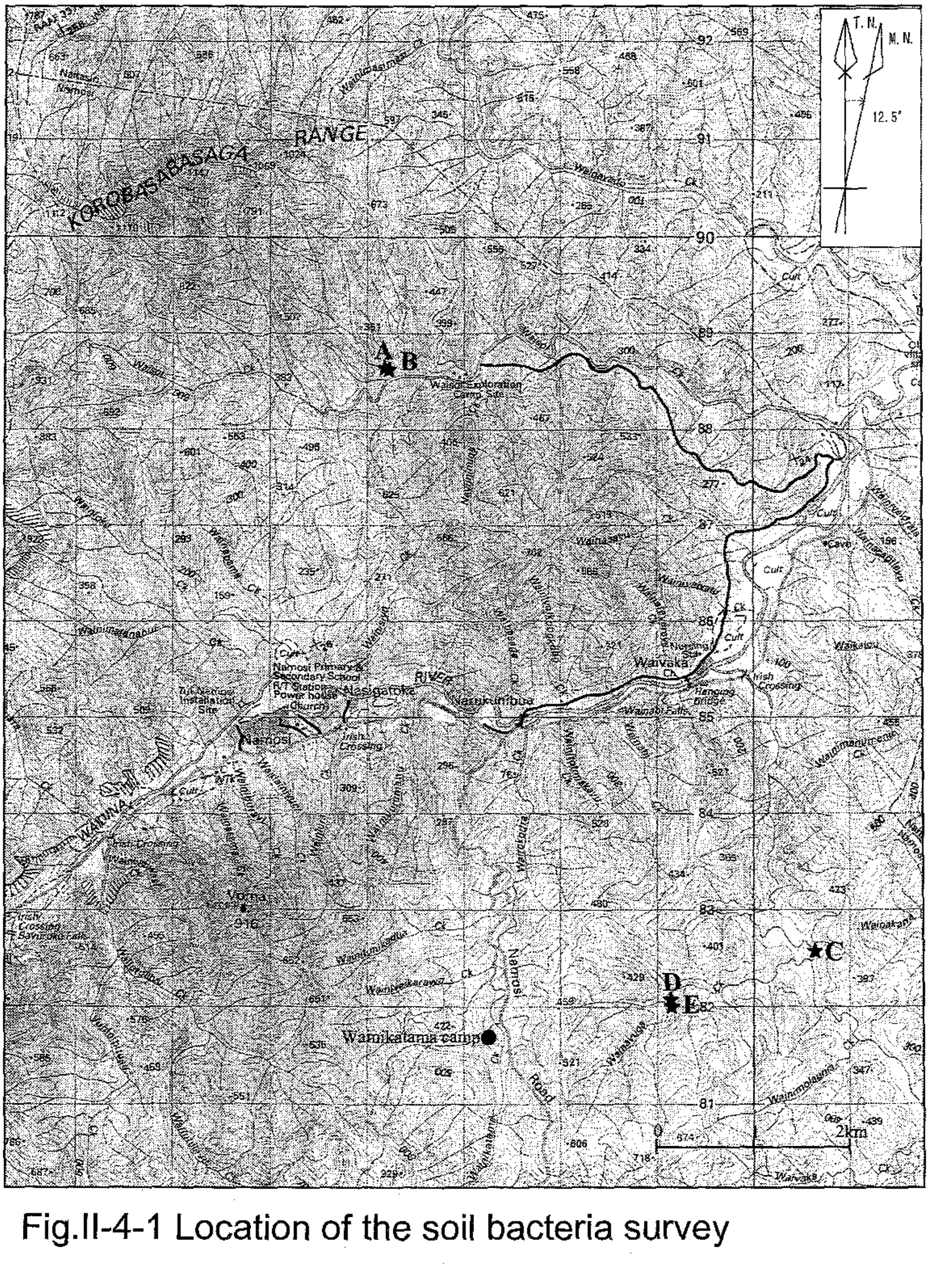


Fig.II-4-1 Location of the soil bacteria survey

Table II-4-2 Types of the culture mediums for screening

Target microbes	Name of the culture medium for screening	Culture medium	Culture temp. (℃)
①Sulfate-reductive bacteria	B	High agar	20
②Sulfur-oxidative bacteria	Wakaman-Starkey	Liquid	30
③Iron-oxidative bacteria	9K	Liquid	30
④Heavy-metal tolerant filamentous fungi	Czapek-Dox	Semifluid agar	20
⑤Heavy-metal tolerant yeast	Czapek-Dox	Semifluid agar	20

Furthermore, in order to examine pH and heavy-metal tolerance of microbe, primary screening was done under the culture medium condition shown in TableII-4-3.

Table II-4-3 Condition of the culture mediums

Culture condition	Items	Conditioin of pH and added heavy-metal						Number of sampling points	Total number of test samples
	pH	2.0	5.0	6.0	7.0				
	Heavy-metal	-	-	-	-	Cu	Pb		
	Content of metal (mg/l)	-	-	-	-	1.0	1.0		
Target microbe	①Sulfate-reductive bacteria		○		○	○	○	5	20
	②Sulfur-oxidative bacteria	○		○				5	10
	③Iron-oxidative bacteria	○		○				5	10
	④Heavy-metal tolerant filamentous fungi	○		○		○	○	5	20
	⑤Heavy-metal tolerant yeast	○		○		○	○	5	20

Remark1: "-" in the table means without adding heavy-metal .

Remark2: Cu and Pb were added up to 1mg/l in discussion of background content.

Remark3: Screening were executed only under the condition of "○" in the table.

4 - 3 Results

4 - 3 - 1 Sulfate-reductive bacteria

Table II-4-4 Result of screening sulfate-reductive bacteria

Condition of culture mediums	No. of culture mediums	Sampling point	Results of screening	Note
pH5	1	A	-	
	2	B	-	
	3	C	-	
	4	D	-	
	5	E	-	
pH7	7	A	-	
	8	B	-	
	9	C	-	
	10	D	-	
	11	E	-	
Add Cu (pH7)	13	A	-	
	14	B	-	
	15	C	-	
	16	D	-	
	17	E	-	
Add Pb (pH7)	19	A	-	
	20	B	-	
	21	C	-	
	22	D	-	
	23	E	-	

Remarks: "-" in the table means no detected multiplication of sulfate-reductive bacteria.

4 - 3 - 2 Sulfur oxidative bacteria

Table II-4-5 Result of screening sulfur-oxidative bacteria

Condition of culture mediums	No. of culture mediums	Sampling point	Results of screening (unit: cell/ml) *	Note
pH2	25	A	1.70×10^6	
	26	B	1.91×10^6	
	27	C	1.27×10^6	
	28	D	3.19×10^7	
	29	E	2.10×10^5	
pH6	31	A	4.20×10^5	
	32	B	1.70×10^5	
	33	C	8.00×10^4	
	34	D	6.00×10^5	
	35	E	2.30×10^5	

*Remarks: The number of microbes multiplied in 1ml liquid culture mediums.

4 - 3 - 3 Iron oxidative bacteria

Table II-4-6 Result of screening iron-oxidative bacteria

Condition of culture mediums	No. of culture mediums	Sampling point	Results of screening (unit: cell/ml) *1	Color of the culture mediums (precipitation, (ml))
PH2	37	A	2.00×10^4	Weak yellowish-brown (0.1)
	38	B	-	No change (0.2)
	39	C	4.00×10^4	Light yellowish-brown (0.5)
	40	D	8.00×10^4	Light yellowish-brown (0.6)
	41	E	-	Weak yellowish-brown (0.2)
PH6	43	A	-	Strong yellowish-brown (1.2)
	44	B	-	Strong yellowish-brown (0.9)
	45	C	-	Strong yellowish-brown (1.4)
	46	D	-	Strong yellowish-brown (1.3)
	47	E	-	Strong yellowish-brown (1.3)

Remark*1: The number of microbes identified in 1ml liquid culture mediums.
Remark 2: "-" in the table means no detected microbe cells.

4 - 3 - 4 pH and heavy-metal tolerant filamentous fungi

TableII-4-7 Result of screening heavy-metal -tolerant filamentous fungi

Condition of culture mediums	No. of culture mediums	Sampling point	Results of screening	Note
pH2	51	A	-	
	52	B	-	
	53	C	-	
	54	D	-	
	55	E	-	
pH6	57	A	+++	
	58	B	+	Many bacteria mixing
	59	C	-	
	60	D	-	
	61	E	+	
Add Cu (pH7)	63	A	+	
	64	B	+	
	65	C	-	
	66	D	-	
	67	E	+	
Add Pb (pH7)	69	A	-	
	70	B	++	Many bacteria mixing
	71	C	-	
	72	D	-	
	73	E	++	Many bacteria mixing

Remark1: + : Few hyphas of filamentous fugi

++ : Some hyphas of filamentous fugi

+++ : Many hyphas of filamentous fugi

Remark2: "-" in the table means no detected filamentous fungi.

4 - 3 - 5 pH and heavy-metal tolerant yeasts

TableII-4-8 Result of screening heavy-metal -tolerant yeast

Condition of culture mediums	No. of culture mediums	Sampling point	Results of screening (unit: cells/ml)*1	Note
pH2	Y51	A	-	
	Y52	B	-	
	Y53	C	-	
	Y54	D	-	
	Y55	E	1.34×10^7	
pH6	Y57	A	4.00×10^4	
	Y58	B	-	
	Y59	C	-	
	Y60	D	-	
	Y61	E	-	
Add Cu (pH7)	Y63	A	-	
	Y64	B	-	
	Y65	C	4.00×10^4	
	Y66	D	-	
	Y67	E	-	
Add Pb (pH7)	Y69	A	-	
	Y70	B	-	
	Y71	C	-	
	Y72	D	-	
	Y73	E	2.00×10^4	

Remark*1: The number of cells multiplied in 5ml semi-fluid high culture mediums.

Remark2: "-" in the table means no detected yeast cells.

4 - 4 Discussions

4 - 4 - 1 Microbe applicable to bacteria leaching

In the culture medium which discriminately cultivates sulfur oxidative bacteria, microbe cells were recognized from all samples. In addition, culture medium with pH2 has a tendency where more microbes were observed than that of pH6. Especially, the sample from point D indicated 10 times microbe as that of other points.

Usual bacteria leaching technology utilizes the microbe that produces sulfate ion with its propagation and can live under low pH condition (pH2) similarly to sulfur oxidative bacteria. The microbes that have above function were detected by primary screening from soil samples of the survey area. Therefore, there are possibilities of bacteria leaching using the microbes of the survey area.

4 - 4 - 2 Microbe applicable to mine wastewater treatment

(1) Possibility of the mine wastewater treatment which uses chemosynthesis bacterium

On one hand, propagation of sulfate-reductive bacteria was not recognized from the samples of this survey.

On the other hand, as a result of primary screening for iron oxidative bacteria, 2～8 x 10^4 of microbe cells per 1 ml culture medium were recognized in the samples of point A, C and D under the condition of pH2. In addition, these culture media indicated color changing to yellow-brown. This yellow-brown color suggests iron hydroxide owing to propagation of iron oxidative bacteria. The microbes that have the same function as iron oxidative bacteria were detected by primary screening from soil samples of the survey area. Therefore, there are possibilities of mine wastewater treatment using the microbes of the survey area.

(2) Possibility of the mine wastewater treatment which uses metal adsorption type microbe

Propagation of filamentous fungi and yeasts were detected in the culture media with Cu and Pb. The metal adsorption abilities of these microbes are not clarified. However, it is certain that heavy metal tolerant microbes inhabit the survey area.

It is not uncertain whether these microbes can be used for actual bacteria leaching or mine wastewater treatment without detailed examination concerning pH tolerance, heavy-metal tolerance, heavy-metal absorbability and propagation ability under the low nutritional condition. However, there is potential of microbes applicable to these technologies in the survey area.

Chapter 5 Archaeological survey

5 - 1 Objectives

The objectives of archaeological survey are to obtain data concerning existence and condition of cultural assets by collecting existing literatures concerning the historical relics or cultural assets in the survey area. In addition, another objective is to acquire information relating to its legal regulation.

5 - 2 Survey methods

In regard to the historic relics or cultural assets in the survey area, literatures, databases and oral histories, which are retained in the archaeological department of FIJI museum, were referred to compile data such as name, location, type and present condition of known cultural assets. A Scholar of the archaeological department of FIJI museum was entrusted with the survey.

5 – 3 Results

There are settlement relics so-called early Lapita (earliest human settlement relics before approximately 3000 years) and fortress and village relics of late prehistorical age (before approximately 1000 years) and late historical age in the survey area.

As for the legal regulation concerning designation, survey and protection of the cultural assets, 2 laws exist in Fiji.

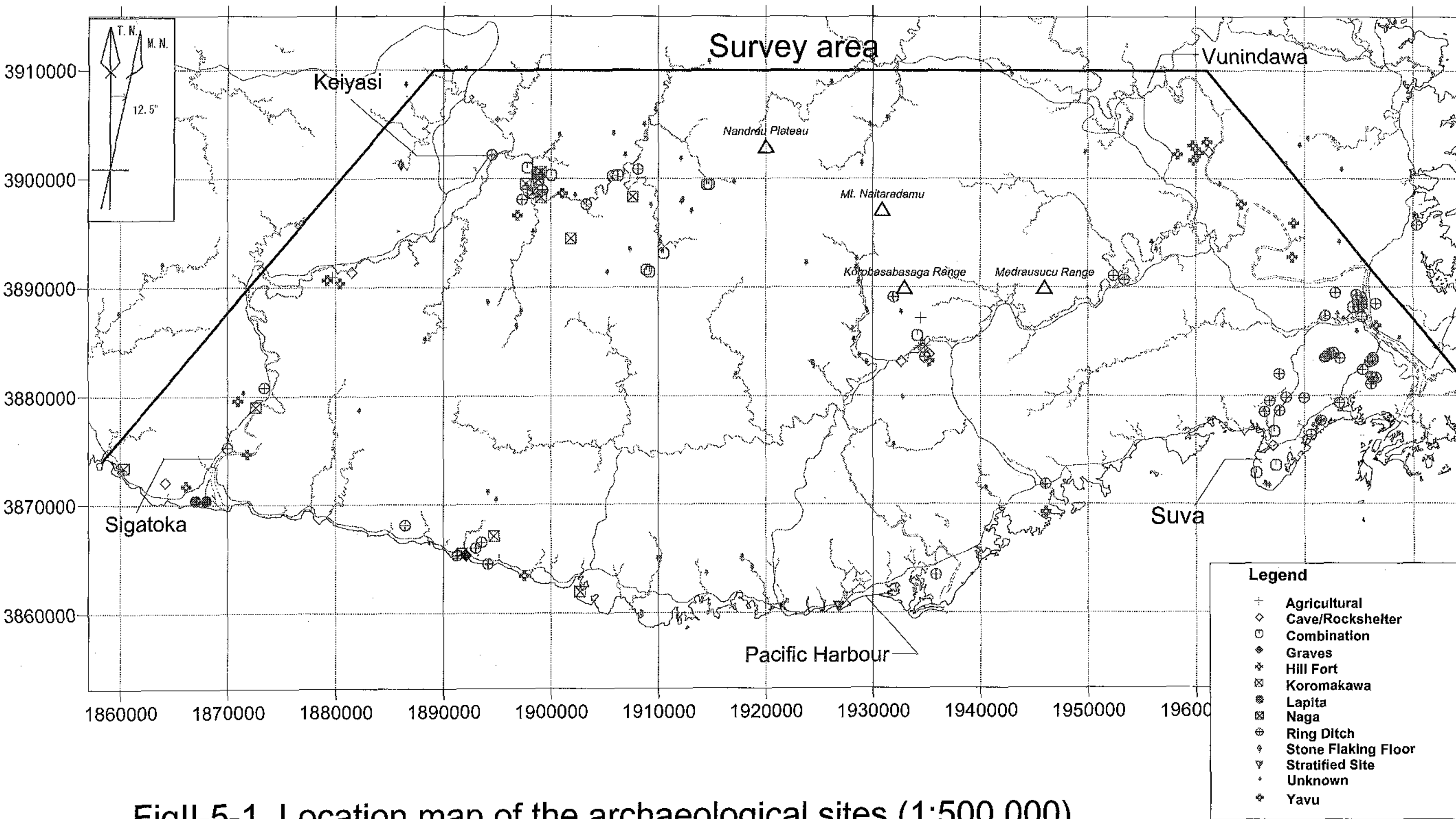
- Preservation of Objectives of Archaeological and Palaeontological Interest Act
- National Trust for Fiji Act and Amendment Act

Fiji Museum is engaging in survey, protection and management as to archaeology which is based on "Preservation of Objectives of Archaeological and Palaeontological Interest Act "

As a result of the archaeological survey, it has been clarified that 213 cases of historical relics or cultural assets are distributed in the survey area. Location of historical relics or cultural assets is shown in Fig.II-5-1. List of historical relics or cultural assets is indicated in Appendix 12. Photographs and illustrations of typical historic relics are shown in PH- 5.

As for historic relics and cultural assets, 12 types are recognized based on its features. The principal relics are ring structure and fortress relics that are called Ring dintch and Hill fort and village and settlement relics that are called Koromakawa, Naga and Yavu. Relics whose details are unclear are many. Including Unknown, The number of types are 13.

- stratified site (stratified relics distributed in sandy beach and dune along coast)
- stone flaking floor site (house floor relics which utilizes flint pieces from mine mark)
- grave
- lapita (human settlement relics before approximately 3000 years)



FigII-5-1 Location map of the archaeological sites (1:500,000)

- naga (stone wall formation or enclosure)
- yavu (old house mound)
- cave/rock shelter
- agricultural (agricultural relics)
- koromakawa (old Fijian village relics)
- complex (compound relics of rock shelters and other relics)
- hill fort (fortification common in mountainous or hilly ridges)
- ring ditch (fortification built in low lying areas using a ring formation. This is particularly prevalent in damp, marshy areas.)
- unknown (unclear relics as for details)

Table II-5-1 indicates the number of historical relics and cultural assets classified by type in 7 areas of Sigatoka, Korolevu, Navua, Suva, Keiyasi, Namosi and Nausori (1/50,000 topographic maps).

Table II-5-1 Summary of Archaeological Sites

Site Type	Sigatoka	Korolevu	Navua	Suva	Keiyasi	Namosi	Nausori	total
stratified site			1					1
stone flaking floor site					1			1
grave		1						1
lapita	2							2
naga					4			4
yavu				3		2	1	6
cave/rock shelter	3		2	1		1	1	8
agricultural	1					5	2	8
koromakawa	3	3			5			11
complex				3	8	3	2	16
hill fort	4	1	3		3	2	4	17
ring ditch	2	5	3	11	5	3	23	52
unknown	4	4	10	7	20	25	16	86
total	19	14	19	25	46	41	49	213

Feature of the archaeological cultural historic site of each area is as follows.

(1) Sigatoka

Sigatoka has a range of physical features from river valleys to flat areas to rugged areas. Sigatoka's record show prolonged occupation by humans. They are prehistorical lapita in Sigatoka dune, hill fort and ring ditch (fortification) on hills. In the areas where limestones are distributed, many cave/rock shelters exist. Many earthenwares and shellfishes have been unearthed from caves.

(2) Korolevu

Cultural sites on Korolevu are found both on the coastal lands and the higher mountain ranges. The data analysis of Korolevu shows 3 koromakawa, 1 hillfort, 5 ring ditchws, 1 grave site and 4 unknown sites.

(3) Navua

Navua comprises of flat areas and rugged terrain. The known cultural sites in the Navua area are concentrated mainly on the flat areas and near the water sources (rivers). The sites are mainly ring ditch fortifications. The recorded sites from Navua include 2 cave/rock shelters, 3 hill forts, 3 ring ditches, 1 stratified site and 10 unknown sites.

(4) Suva

The Suva area is a range of flat and hilly coastal area. In this area, there is a large concentration of ring ditches and World War II sites. The recorded sites include 11 ring ditches, 1 cave/rock shelter, 3 complex sites, 3 house mounds (yavu) and 7 unknown sites.

(5) Keiyasi

Keiyasi is a mostly mountainous area with mainly prehistoric sites. This area is near the headwater of the Sigatoka River. The recorded sites include 4 naga sites, 3 hill forts, 5 ring ditches, 5 old village sites (koromakawa), 8 complex sites, 1 stone flaking floor site and 20 unknown sites.

(6) Namosi

Namosi is an area that has extremely rugged terrain with very steep mountain ranges and is covered by tropical forest. There is dense vegetation cover and this makes it difficult to traverse the site or locate sites. Recorded sites include 1 cave/rockshelter, 2 hill forts, 3 ring ditches, 3 complex sites, 2 yavu, 5 agricultural sites and 25 unknown sites.

(7) Nausori

Nausori is a mixture of flat and hilly areas. Within the flat areas of Nausori, there is a high concentration of ring ditches. Recorded sites include 1 cave/rockshelter, 4 hill forts, 23 ring ditches, 2 complex sites, 2 agricultural sites, 1 yavu and 16 unknown sites.

5 - 4 Discussions

213 cases of historical relics or cultural assets are distributed in the survey area. These are the settlement relics that are so-called early Lapita (earliest human settlement relics before approximately 3000 years), the late prehistorical sites (before approximately 1000 years) and the late historical sites. The principal relics are ring structure and fortress relics that are called Ring dintch and Hill fort and village and settlement relics that are called Koromakawa, Naga and Yavu. Many of the relics are distributed in the plains, the valleys and the adjacent hills such as Sigatoka, Keiyasi, Suva and Nausori.

Information about the existences of principal known historical relics and cultural assets could be collected. However in this survey, survey and appraisal in regard to archaeological cultural assets were not sufficient. Therefore, if a field survey is done, based on oral histories concerning movements and historical events of ancient people, meke (traditional chant), history about handicraft and yaqona ceremony, there is a possibility that historic relics and cultural assets will increase.

In addition, there are many historical relics and cultural assets whose details are unclear. Surveys concerning archaeological cultural assets are not sufficient. Therefore, Archaeological Impact Assessment: AIA) is necessary in every future industrial development.

Part III

Conclusion and Proposal for the Future Exploration

Part III Conclusion and Proposal

Chapter 1 Conclusion

This survey, which is a 1st phase of the environmaental baseline survey, consists of hydrological survey, stream sediment survey, fauna and flora suvey, soil bacteria survey and archaeological survey in the Viti Levu South area of the Republic of the Fiji Islands. The climate of the survey area is oceanic tropical climate under the inflence of south-east trade winds, and is divided to 2 seasons; dry season from May to October and rainy season from November to April. The 1st phase survey was executed from September - November 2002 (dry season). As for the hydrological survey, the field suvey was executed from January to February 2003 (rainy season) to get data of rainy season.

As for hydrological survey, field measurement of water flow, field measurement of water quality and water quality analysis were executed at the 80 points (88 samples) from 4 drainage systems: Rewa River, Navua River, Sigatoka River and the Coastal Rivers. The summarized feature of the river water quality is as follows. All 4 rivers drainage systems are characterized by dominant HCO_3 ion. Navua River drainage system and Sigatoka River drainage system are characterized by dominant Ca ion. Sigatoka River drainage system is characterized by high values in Ca and HCO_3 ion concentration, pH and electric conductivity in comparison with Rewa River drainage system. The cause, by which the water of Sigatoka River drainage system shows high concentration of Ca and HCO_3 ion, is due to influence of sedimentary rocks such as limestones, which exist inside this drainage system.

Although some component concentrations and component ratios somewhat differ inside the survey area, the general character of the river water of the survey area shows neutral pH, Ca as principal cation and HCO_3 as principal anion. The water, which has the quality of this kind of alkaline earths carbonate, is thought to be circulating free groundwater. Because Fiji Islands belongs to the climate of tropical rain forest, the air temperature is high and the precipitation is much, the peculiar characteristic condition had been expected. However the chemical component and concentration of the river water of the survey area showed the almost similar quality to the average river water of the world.

One weather station was set up inside the Namosi village elementary school to establish the weather observation system. In addition, meteorological data of the past 4 years, which had been observed at 6 points inside the survey area, were acquired from Fiji Meteorological Service, Nadi. This data are used as a database for the future hydrological survey.

In the stream sediment survey, total 905 samples (822 points + 83 duplicate samples) were chemically analyzed. As for geochemical characteristic of the stream sediments of each drainage system, Rewa River drainage system is the most strongly influenced by hydrothermal deposits and Cu, Zn, As, Cd, Sb and Au show anomalies. Navua River drainage system is also influenced by hydrothermal deposits after Rewa River drainage system and Zn, Cd, Sb and Au show anomallies. Sigatoka River drainage system is influenced by sedimentary rocks such as limestones and Ca and Mg show higher values than those of other drainage systems, though they are the crustal average levels. In Sigatoka River drainage system, Cd and Sb also show high values similarly to other drainage systems. As for Coastal rivers system, Mg, P, K, Ni, Sr and Ba show lower values than those of other drainage systems.

In all drainage systems, S,Ti,V,Cr,Mn,Fe,Zn,As,Cd,Sb and Au show higher compare with crustal average. The samples included magnetite of high concentration was found much. This reason can be considerd that the existences of V, Zn ,Mn and Cd in high concentration are due to high magnetite concentration in order that V,Zn,Mn and Cd are easy to coexist in magnetite.

Cd, Sb and Au show especially high values in comparison with the crustal average. The anomalies of Cd and Sb are scattered in all the survey area, therefore it is suggested that the background value itself is high and also the contents of these elements in igneous rocks nearby is high. On the other hand, Au shows more limited distribution of anomalies, such as Namosi region - upper stream of Waimanu river in Rewa River drainage system and Wainikovu River in Navua River drainage system, where exist influence of hydrothermal deposits. As (arsenic) anomly distribution is similar to that of Au. In all drainage systems, Be, Na, Al, P, K, Ni, Sr, Ba, Hg and Pb show lower values than the crustal average, especially P, K, Ni, Sr and Ba are low.

Fauna and flora survey consists of fauna survey, sampling and chemical analysis of fishes & benthos, flora survey and vegetation distribution survey. Fauna of the survey area consists of total 84 species of animals, which are mainly comosed of Birds. In the field survey of the tropical rain forest, 34 species of birds including Pink-billed parrotfinch were recognized, which is worldwide rare species. The area is almost not disturbed as to biodiversity of birds. As for Reptile, *Emoia mokosariniveikau* that is a family of Skink, which had been detected only in Vanua Levu Island, was recognized.

Flora of the survey area is divided characteristically to 8 ecosystems according to the topography & the climate. The most widely distributed ecosystem is Lowland rain forest (tropical rain forest). Upland rain forest and Cloud forest wich should be protected are distributed in the inland ravine area. Coastal vegetation is widely distributed along the coastal line and Grassland vegetation is widely distributed in Sigatoka area.

Total 81 of rare and endangered species of vascular bundle plant are distributed in the Viti Levu South Area that hosts the tropical rain forest. In the field survey of the tropical rain forest, almost 100% (173 species) of the plants are native species and 60% among them (104 species) are endemic species. The ratio of endemic species is high. 9 rare and endangered species such as *Agathis macrophylla* - dakua or epiphytic orchid are distributed in the area. The area is rich in the biodiversity of plants.

The vegetation distribution, which is based on the pseudo color image of the ASTER optical sensor, is well concordant with the floras, which are verified in the ground truth survey. From interpretation of the ASTER images, it has been found out that the flora in the survey area is divided largely to 5 floras.

As for the survey regarding fishes & benthos, 26 samples of the typical eel and shellfishes (corbicula) were sampled and chemically analysed. Among the trace elements, As (arsenic) value of the fishes, As (arsenic) and Cd (cadmium) values of the shellfish are relatively high.

In the soil bacteria survey, 5 soil samples were collected from Namosi region. These samples were screened primarily for the detection of useful microbes. Microbes, which may possess the function similar to sulphur oxidative bacteria, iron oxidative bacteria, heavy-metal tolerant filamentous fungi and yeast, were detected in the sample of this suvey. This suggests the potential of microbes applicable to bacteria leaching and mine wastewater treatment.

As a result of archaeological survey, it has been clarified that 213 cases of historical relics or cultural assets are distributed in the survey area. These are the settlement ruins that are so-called early Lapita (earlist human settlement ruins before approximately 3000 years), the late prehistorical sites (before approximately 1000 years) and the late historical sites. The principal ruins are ring structure and fortress ruins that are called Ring dintch and Hill fort and village and settlement ruins that are called Koromakawa, Naga and Yavu. Many of the ruins are distributed in the plains, the valleys and the adjacent hills such as Sigatoka, Keiyasi, Suva and Nausori.

The central to south side of the Viti Levu South area breeds the well-developed tropical rain forest and the biodiversified Birds. Croplands and pastures are distributed along the Queens Road, the plain along Rewa River between Suva - Nausori - Vunidawa and relatively cultivated hill and plain along Sigatoka to Keiyasi. Village and urban district are developing in these areas. In the meanwhile, the environment load, for example the deforestation accompanied with inhabitant life improvement, the household wastewater and the wastes of chemical substances such as battery etc, is estimated to increase along each river draingae system where human activities widely influences. It is important to collect and arrange the environmental basic data in the early stage because the legal regulation as to the environment of the Republic of the Fiji Islands has just been prepared recently. A great deal of data, which were acquired from this survey, are concluded to be useful for the environmental assessment for the future industrial developments.

Chapter 2 Propsal for the 2nd phase survey

The following items of 2nd phase survey are proposed based on the results of 1st phase survey. The objective of the survey is to collect and integrate the background data concerning the natural environment fields and to make the report of Environmental Baseline Study that will serve the basic data for the future industrial development.

(1) Stream sediment survey

The stream sediment survey in the same way as the 1st phase is proposed for 2nd phase in the upper stream of each drainage system, especially in the upperstream of Rewa River such as Sovi Basin, Waidina River and Waimanu River and the upperstream of Navua River where the 1st phase survey has missed. In addition, various types of rocks, which represent geological basements, should be chemically analyzed for comparison and examination with the analysis data of the stream sediment samples.

(2) Synthetical analysis

It is desired to samle and to analyze the river water, the stream sediment, the soil, the rock and the animal at the same point in order to analyze synthetically the data of the 1st phase survey (water quality analysis, stream sediment analysis, fishes and shellfishes analysis). The verification of mutual comparison and examination and reappearance of the analysis data is necessary.

As for hydrological survey of the 1st phase, analysis of the data is based only on the data of dry season. In addition, synthetical analysis of the river water that considers seasonal variation is desired in addition to the annual meteorological data.

References

Anderson, A and Worthy, T. (1999): Research on the CBirds of Viti Levu, Fiji, June 1997 – October 1998. Unpublished report – Research School of Pacific and Asian Studies – Australian National University.

Ash, J. (1992): Vegetation ecology of Fiji: Past, present, and future perspective, Pacific Science,46, pp 111-127.

Ash, J. and Ash, W. (1984): Freshwater wetland vegetation of Viti Levu, Fiji, New Zealand J. Bot. 22, pp 377-391.

Baillie, J. and Groombridge, B. (1996): IUCN red list of threatened animals, IUCN, Gland Switzerland.

Balgooy, M. van. (1971): Plant geography of the Pacific. Blumea Supplement, 6, pp1-222.

Berry, M. J. and Howard, W. J. (1973): Fiji Forest Inventory, Vol. 1. The environment and forest types. Land resources study 12. Land Resources Division, Surrey, London, pp98.

Biodiversity strategic and action plan (BSAP) – Technical group 3 (TG3) Report (1998): Fiji Department of Environment. Suva, Fiji, pp127.

Biodiversity strategic and action plan (BSAP) – Technical group 7 (TG7) Report (1998): Fiji Department of Environment. Suva, Fiji, pp37.

Biran, A. (1994): Genesis, Development and Current Evolution of the Sigatoka Sand Dunes and Surrounding Areas, South Western Viti Levu, Fiji Islands. Unpublished PhD Proposal.

Birks, L. (1973): Archaeological Surveys at Sigatoka Dune Site, Fiji. Bulletin of the Fiji Museum No. 1. Fiji Times and Herald Limited, Fiji Islands.

Brownlie, G. (1977): The Pteridophyte flora of Fiji, Nova Hedwigia, heft, 55, pp397.

Burley, D. (1997): Archaeological Research Sigatoka Dune National Park June 1996. Unpublished report – Department of Archaeology, Simon Fraser University.

Burley, D and Shortland, R. (1999): Report on the 1998 Field Work Activities; Sigatoka Sand Dunes National Park, Viti Levu, Fiji. Unpublished report – Department of Archaeology, Simon Fraser University.

Cabaniuk et al (1995): Integrating Conservation and Development – A future for the Sovi Basin, Waimaro. Unpublished report – Native Land Trust Board.

Colley, H. (1976): Mineral Deposits of FIJI (Metallic Deposits), FIJI Mineral Resources Division Memoir No.1, pp123

Colley, H. and Flint, D. J. (1995): Metallic mineral Deposits of FIJI, FIJI Mineral Resources Departmen Memoir No.4, pp198.

Crosby, A (1991): Further Burials at the Sigatoka Sand Dunes (Site VL 16/1). Unpublished report – Fiji Museum.

Cochrane, G. R. (1969): Problems of vegetation change in western Viti Levu, Fiji, pp115-146 in F. Gale and G. H. Lawton (eds.), Settlement and encounter: Geographical studies presented to Sir Grenfell Price. Oxford Univ. Press, Melbourne, Aust.

Dahl, A.L. (1980): Review of the protected areas systems in Oceania, ENEP & IUCN Commission on National Parks and Protected Areas, Gland, Switzerland.

Doyle, M. F. (1998): (in press) Gymnosperms of Fiji, Part 1, Endemic and nativ species: annotated checklist, key, changes in nomenclature, and discussion. Harvard papers in Botany 3.

Fuller, D. (1997): (unpublished). M. Sc. Thesis. Conservation status, diversity and systematics of the native palms of Fiji. Biology Department, SPAS, University of the South Pacific, Suva, Fiji. pp152.

IUCN. (1997): IUCN red list of threatened plants. IUCN, Gland, Switzerland.

Kirkpatrick, J. B. and Hassal, D. C. (1985): The vegetation and flora along an altitudinal transect through the tropical forest at Mount Korobaba, Fiji, New Zealand J. Bot. 23, pp33-46.

Miller, J. M. (1988): A new species of Degeneria (Degeneriaceae) from the Fiji Islands. J. Arnold Arbor. Harv. Univ 9, pp231-236.

Morita, S. et al. (2002): Copper exploration project of Namosi region in the Republic of FijIIaland, Resource Geology, No.52(1), pp19-35

Mueller-Dombois, D. and Ellenberg, H. (1974): Aims and methods of vegetation ecology. John Wiley & Sons, Sydney, pp139-297.

Mueller-Dombois, D. and Fosberg, F. R. (1998): Vegetation of the tropical Pacific Islands. Springer-Verlag, New York, pp108-136.

Parham, B. E. V. (1953): An historical account of botanical survey in Fiji. Transaction and proceedings of the Fiji Society of Science and Industry, 2, pp235-253.

Parham, J. W. (1972): Plants of the FijIIsland, edition 2. Government Printer, Suva, Fiji, pp462.

Parry, J. T. (1977): Ring Ditch Fortifications. Bulletin of the Fiji Museum No.3. Fiji Times and Herald Limited, Fiji Islands.

Parry, J. T. (1981): Ring Ditch Fortifications II. Bulletin of the Fiji Museum No.7. Fiji Times and Herald Limited, Fiji Islands.

Parry, J.T. (1987): The Sigatoka Valley -Pathway into Prehistory. Bulletin of the Fiji Museum No.9. Fiji Times and Herald Limited, Fiji Islands.

Richmond, T.de A. and Ackerman, J.M. (1975): Fauna and flora of mangrove Formations in Viti Levua nd Vanua Levu, FijIIn: Walsh, G.E., Snedekar, S.C. & Teas, M.J. (eds), Proceedings of the International Symposium on Biology and Managemernt of Mangroves: pp174-152, University of Florida, USA.

Ryan, P. (2000): Fiji's Natural Heritage, EXISLE Publishing, pp288.

Seemann, B. (1865-1873): Flora Vitiensis: A description of the plants of the Viti or Fiji Islands, with an account of their history, uses, and properties. London, ppv-xvII.

Smith, A. C. (1979): Flora Vitiensis Nova -A new flora of Fiji (Spermatophytes only). 1, pp495, Pacific Tropical Botanical Garden, Lawai, Kauai, HawaII.

Smith, A. C. (1981): Flora Vitiensis Nova -A new flora of Fiji (Spermatophytes only). Vol. 2, Pacific Tropical Botanical Garden, Lawai, Kauai, HawaII.

Smith, A. C. (1985): Flora Vitiensis Nova -A new flora of Fiji (Spermatophytes only). Vol. 3, Pacific Tropical Botanical Garden, Lawai, Kauai, HawaII.

Smith, A. C. (1988): Flora Vitiensis Nova -A new flora of Fiji (Spermatophytes only). Vol. 4, Pacific Tropical Botanical Garden, Lawai, Kauai, HawaII.

Smith, A. C. (1991): Flora Vitiensis Nova -A new flora of Fiji (Spermatophytes only). Vol. 5, Pacific Tropical Botanical Garden, Lawai, Kauai, HawaII.

TCSP (1990): Guidelines for the integration of tourism development and environmental protection in the South Pacific, Tourism Council of the South Pacific, Suva, Fiji.

Takhtajan, A. (1969): Flowering plants-origin and dispersal, Oliver and Boyd, Edinburgh, UK, pp310.

Tuiwawa, M. V. (1999): (unpublished) M. Sc. Thesis The Flora, Ecology and Conservation of the Botanical Biodiversity of Waisoi and the Southeastern Slopes of the Korobasabasaga Range in Namosi Province, Fiji. Biology Department, SPAS, University of the South Pacific, Suva, Fiji.

Twyford, I. T. and Wright, A. C. S. (1965): The soil resources of the Fiji Islands. Fiji Govt. Press. Suva, Fiji.

Walting, D. (2001): A Guide to the Birds of Fiji & Western Polynesia: including American samoa, Niue, Samoa, Tokelau, Tonga, Tuvalu and Wallis & Futuna, Environmental Consultants (FIJI) Ltd., pp272

Watkins, A. J. (1994): A Biogeographic database for seed plants of Fiji, A preliminary communication, South Pacific Journal of Natural Sciences. 14, pp75-96.

Kayana I.,(1991): New Method of Underground water based on giving examples, Sankaido.

Kitano Y.,(1969): The Science of Water. NHK.

Appendix

Appendix 1 Field data and chemical composition of the surface water

No.	Drainage	FMG		atoms.	water	pH	E.C.	DO	Turb.	Flow	E.C.	COD	TDS	Hard-	Ca	Mg	Na	K	CO3	HCO3	SO4	Cl	B	Fe	Se	Ag	Al	As	Ba	Cr	Cu	Mn	Mo	Ni	Pb	Sb	Zn	Hg	CN	F	N(NH3)	N(NO2)	N(NO3)	P	Sulphide
	System	Y	X	Temp.	Temp.					rate				ness																															
				°C	°C		S/cm	mg/l	mg/l	m3/S	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Rewa	3,892,214	1,954,272	25.2	24.7	7.65	6.5	14.20	0	10.4	66	5	72	18	4	2	7	<1	<1	27	3	4	<0.1	0.05	<0.01	<0.001	0.02	<0.0010	0.002	<0.001	0.001	0.009	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	0.001	<0.1	0.01	<0.01	0.01	<0.01	<0.1
2	Rewa	3,892,425	1,954,276	25.4	24.7	7.48	8.0	10.84	0	20	72	8	76	19	4	2	7	<1	<1	31	3	4	<0.1	0.07	<0.01	<0.001	0.02	<0.0010	0.004	<0.001	<0.001	0.018	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1
3	Rewa	3,890,645	1,954,189	26.1	24.5	7.37	7.5	13.11	0	10.1	83	30	88	28	7	3	8	<1	<1	34	5	5	<0.1	0.1	<0.01	<0.001	0.04	<0.0010	0.007	<0.001	0.001	0.031	<0.001	0.002	<0.001	<0.001	0.004	<0.0001	<0.001	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1
4	Rewa	3,890,596	1,950,874	27.7	22.0	7.43	4.6	13.92	1	0.26	45	13	48	11	2	1	5	<1	<1	16	1	5	<0.1	<0.01	<0.01	0.001	0.02	<0.0010	0.003	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	<0.01	<0.01	0.04	0.01	<0.1
5	Rewa	3,888,192	1,948,740	26.3	22.3	7.75	5.3	13.90	0	0.2	52	17	48	16	3	2	6	<1	<1	21	1	4	<0.1	<0.01	<0.01	<0.001	0.03	<0.0010	0.006	<0.001	0.001	0.002	<0.001	0.001	<0.001	<0.001	0.004	<0.0001	<0.001	<0.1	<0.01	<0.01	0.02	<0.01	<0.1
6	Rewa	3,885,749	1,945,070	29.4	26.3	7.63	10.4	7.40	0	1.33	98	5	68	30	8	2	8	<1	<1	35	6	7	<0.1	0.03	0.01	<0.001	0.03	<0.001	0.009	<0.001	0.001	0.01	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	<0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
7	Rewa	3,889,349	1,943,208	26.7	22.3	7.18	11.4	8.03	0	1.43	85	<1	51	31	9	2	7	<1	<1	32	4	6	<0.1	0.04	<0.01	<0.001	0.04	<0.001	0.003	<0.001	0.001	0.004	<0.001	0.001	<0.001	<0.001	0.012	<0.0001	0.002	<0.1	0.02	<0.01	0.02	<0.01	<0.1
8	Rewa	3,889,053	1,941,790	27.9	22.5	6.85	5.3	9.10	0	6.26	65	6	39	21	5	2	5	<1	<1	26	3	5	<0.1	0.04	<0.01	<0.001	0.04	0.002	0.002	<0.001	0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.016	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
9	Rewa	3,887,961	1,940,928	25.4	23.9	7.59	8.2	7.20	0	0.79	75	8	44	21	6	2	4	<1	<1	18	9	4	<0.1	0.05	0.01	<0.001	0.05	<0.001	0.005	<0.001	0.004	0.008	0.002	<0.001	<0.001	<0.001	0.034	<0.0001	<0.001	<0.1	0.02	<0.01	0.01	0.07	<0.1
10	Rewa	3,888,200	1,941,034	27.2	24.7	7.34	8.6	7.98	0	4.23	83	9	48	28	7	2	9	<1	<1	30	7	5	<0.1	0.05	0.01	<0.001	0.03	<0.001	0.007	<0.001	0.002	0.024	<0.001	<0.001	<0.001	<0.001	0.01	<0.0001	<0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
11	Rewa	3,885,345	1,939,950	24.3	24.1	7.53	9.2	9.63	0	1.42	95	<1	52	27	7	2	6	<1	<1	28	8	6	<0.1	0.07	0.02	<0.001	0.1	<0.001	0.007	<0.001	0.003	0.006	<0.001	0.001	<0.001	<0.001	0.015	<0.0001	<0.001	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1
12	Rewa	3,888,706	1,937,122	23.5	24.0	7.28	5.2	13.28	0	0.77	52	3	21	13	3	1	4	<1	<1	15	3	<1	<0.1	0.01	0.01	<0.001	0.03	<0.001	0.004	<0.001	0.007	0.002	<0.001	0.001	<0.001	<0.001	0.004	<0.0001	<0.001	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1
13	Rewa	3,885,375	1,935,248	24.1	25.1	7.78	8.7	13.45	0	0.49	79	3	64	22	6	2	8	<1	<1	30	6	5	<0.1	0.04	0.02	<0.001	0.03	<0.001	0.006	<0.001	0.002	0.004	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.02	<0.01	<0.01	<0.01	<0.1
14	Rewa	3,881,755	1,937,258	23.0	21.3	7.49	4.6	13.20	2	0.28	52	2	44	36	4	6	5	2	<1	28	20	2	<0.1	<0.01	<0.01	0.003	0.04	<0.0010	0.006	<0.001	0.002	0.002	<0.001	0.001	0.04	<0.001	0.008	<0.0001	<0.001	0.1	<0.01	<0.01	<0.01	<0.01	<0.1
15	Rewa	3,882,431	1,940,381	28.0	21.5	7.20	7.9	12.50	0	0.54	74	9	48	20	4	2	9	<1	<1	26	7	6	<0.1	0.02	<0.01	0.001	0.02	<0.0010	0.008	<0.001	0.001	0.009	<0.001	0.001	0.231	<0.001	0.004	<0.0001	<0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
16	Rewa	3,882,398	1,940,620	28.0	22.0	7.47	7.6	12.90	0	1.88	69	12	56	18	3	2	7	<1	<1	24	5	5	<0.1	<0.01	<0.01	<0.001	0.02	<0.0010	0.008	<0.001	0.001	0.004	<0.001	0.001	0.007	<0.001	0.006	<0.0001	<0.001	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1
17	Rewa	3,883,698	1,933,348	27.4	21.7	7.03	3.5	8.96	0	1.98	45	12	27	13	3	1	5	<1	<1	15	<1	5	<0.1	0.2	<0.01	<0.001	0.18	<0.001	0.009	<0.001	0.001	0.006	<0.001	<0.001	<0.001	<0.001	0.015	<0.0001	<0.001	<0.1	0.02	<0.01	0.05	<0.01	<0.1
18	Navua	3,886,046	1,927,954	27.4	24.4	8.04	9.7	8.09	0	0.66	92	11	55	31	7	3	8	<1	<1	38	5	3	<0.1	0.03	0.01	<0.001	0.03	<0.001	0.001	<0.001	0.002	0.005	<0.001	0.003	<0.001	<0.001	0.007	<0.0001	<0.001	0.1	0.02	<0.01	0.02	<0.01	<0.1
19	Navua	3,886,243	1,928,669	27.6	24.2	8.07	8.9	7.73	1	3.7	83	8	50	30	7	3	7	<1	<1	38	3	4	<0.1	0.03	0.01	<0.001	0.02	0.002	0.001	<0.001	0.001	0.003	<0.001	0.009	<0.001	<0.001	0.006	<0.0001	<0.001	0.1	0.02	<0.01	0.02	0.02	<0.1
20	Navua	3,893,103	1,927,728	24.5	25.5	8.20	8.7	8.43	0	2.12	99	5	59	39	11	3	8	<1	<1	46	3	4	<0.1	0.05	<0.01	<0.001	0.05	0.001	0.002	<0.001	0.002	0.003	<0.001	0.002	<0.001	<0.001	0.011	<0.0001	<0.001	0.1	0.02	<0.01	0.02	<0.01	<0.1
21	Navua	3,892,415	1,928,756	25.8	22.9	7.84	6.2	7.37	1	1.81	63	3	38	21	5	2	6	<1	<1	28	2	4	<0.1	0.05	<0.01	<0.001	0.05	0.001	0.001	<0.001	0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.009	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
22	Navua	3,884,630	1,928,238	24.3	25.2	8.40	8.8	7.81	0	5.47	82	2	49	28	7	3	7	<1	<1	36	3	2	<0.1	0.03	<0.01	<0.001	0.02	0.002	0.002	<0.001	0.001	0.003	<0.001	0.002	<0.001	<0.001	0.007	<0.0001	<0.001	0.1	0.02	<0.01	0.03	<0.01	<0.1
23	Navua	3,878,841	1,926,702	26.4	25.6	8.22	14.2	8.70	1	29.1	125	2	75	49	12	5	10	1	<1	58	3	5	<0.1	0.03	0.01	<0.001	0.01	<0.001	0.002	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.02	<0.01	0.03	<0.01	<0.1
24	Navua	3,878,359	1,927,346	26.4	24.7	8.28	9.6	8.45	0	43.7	126	<1	76	49	12	5	9	<1	<1	57	5	5	<0.1	0.05	<0.01	<0.001	0.41	0.002	0.003	<0.001	0.001	0.007	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.01	<0.01	<0.01	<0.01	<0.1
25	Navua	3,876,047	1,921,399	26.3	24.0	8.06	12.6	9.10	28	33.7	124	3	74	45	10	5	8	<1	<1	53	2	3	<0.1	0.3	<0.01	0.001	0.24	0.002	0.003	<0.001	0.003	0.016	<0.001	<0.001	<0.001	<0.001	0.017	<0.0001	<0.001	0.1	0.02	<0.01	0.02	<0.01	<0.1
26	Navua	3,875,605	1,920,615	26.6	23.8	7.30	9.2	?	3	9.39	111	5	67	42	10	4	7	<1	<1	53	2	2	<0.1	0.03	0.01	<0.001	0.03	0.002	0.002	<0.001	0.001	0.003	<0.001	0.001	<0.001	<0.001	0.006	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
27	Navua	3,875,583	1,920,560	26.8	24.1	7.26	10.4	7.80	6	23.9	122	5	73	47	11	5	8	<1	<1	56	2	4	<0.1	0.13	<0.01	<0.001	0.14	<0.001	0.002	<0.001	<0.001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.1	0.02	<0.01	0.06	0.02	<0.1
28	Navua	3,875,081	1,906,499	28.1	23.5	7.45	13.6	8.36	0	10.1	134	<1	80	59	13	6	9	1	<1	65	2	6	<0.1	0.02	0.02	<0.001	<0.01	0.001	0.002	<0.001	0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.1	0.02	0.03	<0.01	<0.01	<0.1
29	Navua	3,875,539	1,903,123	26.0	24.4	8.24	17.3	7.10	0	2.75	147	5	88	65	15	7	9	<1	<1	73	2	5	<0.1	0.02	<0.01	<0.001	<0.01	<0.001	0.002	<0.001	<0.001	0.005	<0.001	0.004	<0.001	<0.001	<0.001	<0.0001	<0.001	0.1	0.02	<0.01	0.03	<0.01	<0.1
30	Navua	3,872,884	1,903,918	25.5	23.6	7.66	12.8	7.13	0	0.29	110	<1	66	38	7	5	9	<1	<1	38	11	4	<0.1	0.01	<0.01	0.001	0.02	0.004	0.001	<0.001	0.003	0.003	<0.001	<0.001	<0.001	<0.001	0.013	<0.0001	<0.001	0.1	0.01	<0.01	<0.01	<0.01	<0.1
31	Navua	3,871,759	1,905,151	25.8	23.6	7.47	13.3	8.23	0	0.51	113	3	68	44	10	5	8	<1	<1	52	2	7	<0.1	0.05	<0.01	<0.001	<0.01	<0.001	0.001	<0.001	0.002	0.01	<0.001	<0.001	<0.001	<0.001	0.002	<0.0001	<0.001	0.1	0.01	<0.01	<0.01	<0.01	<0.1
32	Navua	3,877,342	1,891,581	25.8	24.8	8.01	19.1	8.50	1	0.36	175	5	105	75	18	7	11	1	<1	85	2	9	<0.1	0.01	<0.01	<0.001	0.01	<0.001	0.002	<0.001	<0.001	0.004	<0.001	0.002	<0.001	<0.001	0.001	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
33	Rewa	3,879,599	1,966,981	26.3	25.0	7.78	7.9	15.04	0	0.32	72	6	56	20	5	2	11	<1	<1	28	<1	10	<0.1	0.09	<0.01	<0.001	0.03	<0.001	0.002	<0.001	0.002	0.019	<0.001	<0.001	<0.001	<0.001	0.006	<0.0001	<0.001	<0.1	0.02	<0.01	<0.01	<0.01	<0.1
34	Rewa	3,885,778	1,976,587	28.3	26.7	7.12	10.1	11.71	1	339	99	3	64	31	8	3	11	1	<1	45	2	7	<0.1	0.09	<0.01	<0.001	0.04	<0.001	0.004	0.005	0.003	0.012	<0.001	0.004	<0.001	<0.001	0.005	<0.0001	<0.001	<0.1	0.03	<0.01	0.02	<0.01	<0.1
35	Rewa	3,887,613	1,975,253	24.6	26.8	7.67	13.0	11.23	2	24	98	2	72	33	8	3	11	1	<1	45	2	7	<0.1	0.08	0.02	<0.001	0.04	<0.001	0.004	0.005	0.002	0.015	<0.001	0.003	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.03	<0.01	<0.01	<0.01	<0.1
36	Rewa	3,888,120	1,975,735	25.7	26.8	7.39	10.8	10.39	1	52.1	100	3	80	33	8	3	12	1	<1	46	2	8	0.1	0.1	0.02	<0.001	0.05	<0.001	0.004	0.011	0.003	0.017	<0.001	0.008	0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.03	<0.01	0.01	<0.01	<0.1
37	Rewa	3,886,745	1,966,297	24.8	26.3	8.21	9.8	15.36	0	0.66	88	5	76	27	8	2	8	1	<1	33	3	8	<0.1	0.11	0.02	<0.001	0.06	<0.001	0.008	<0.001	0.007	0.021	<0.001	0.003	<0.001	<0.001	0.006	<0.0001	<0.001	<0.1	0.02	<0.01	<0.01	<0.01	<0.1
38	Rewa	3,888,068	1,962,534	25.3	24.5	7.58	7.8	12.56	0	7.73	76	6	56	22	5	2	8	<1	<1	32	1	7	<0.1	0.04	0.02	<0.001	0.03	<0.001	0.002	0.002	0.002	0.005	<0.001	0.002	<0.001	<0.001	0.002	<0.0001	<0.001	<0.1	0.02	<0.01	<0.01	<0.01	<0.1
39	Rewa	3,894,973	1,964,401	25.7	25.2	7.24	9.9	11.30	3	28.7	86	24	72	28	7	3	9	<1	<1	34	4	8	<0.1	0.12	<0.01	0.005	0.02	<0.0010	0.005	<0.001	0.001	0.02	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.02	<0.01	0.02	<0.01	<0.1
40	Rewa	3,898,919	1,963,468	24.8	24.2	7.45	10.4	11.35	5	92.4	101	13	76	33	8	3	14	<1	<1	50	2	9	<0.1	0.04	<0.01	0.002	0.02	<0.0010	0.004	<0.001	<0.001	0.01	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	<0.01	<0.01	0.03	<0.01	<0.1
41	Rewa	3,896,368	1,959,283	26.1	22.8	6.87	6.1	11.62	5	1.56	73	6	44	23	5	2	6	<1	<1	33	2	5	<0.1	0.58	<0.01	<0.001	0.45	<0.0010	0.011	<0.001	0.008	0.061	<0.001	0.005	0.002	<0.001	0.106	<0.0001	<0.001	<0.1	0.01	<0.01	0.03	<0.01	<0.1
42	Rewa	3,902,582	1,956,728	27.3	23.8	6.39	21.8	6.35	0	70	193	13	116	57	12	7	16	2	<1	74	16	4	<0.1	<0.01	<0.01	0.001	0.01	<0.0010	0.014	<0.001	<0.001	0.004	<0.001	0.002	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	<0.01	<0.01	0.05	<0.01	<0.1
43	Rewa	3,908,125	1,954,682	26.3	25.6	7.28	8.4	12.33	14	86.9	80	33	46	26	6	3	7	<1	<1	37	2	4	<0.1	0.06	<0.01	<0.001	0.07	<0.0010	0.004	<0.001	0.001	0.016	<0.001	0.005	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.03	<0.01	0.03	0.02	<0.1
44	Rewa	3,908,664	1,954,143	26.4	25.9	7.42	11.5	12.90	1	2.36	105	11	61	37	8	4	9	<1	<1	49	3	5	<0.1	0.08	<0.01	<0.001	0.02	<0.0010	0.003	<0.001	0.001	0.025	<0.001	0.027	<0.001	<0.001	0.004	<0.0001	<0.001	<0.1	0.01	<0.01	0.02	<0.01	<0.1
45	Rewa	3,906,537	1,947,071	27.3	21.7	7.82	10.1	13.14	0	0.03	97	11	68	34	7	4	9	<1	<1	45	3	4	<0.1	<0.01	<0.01	<0.001	0.01	<0.0010	0.003	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.01	<0.01	0.07	<0.01	<0.1
46	Rewa	3,906,540	1,948,056	30.0	23.7	7.84	9.7	14.63	0	1.61	85	13	84	28	6	3	9	<1	<1	37	4	5	<0.1	<0.01	<0.01	<0.001	0.02	<0.0010	0.002	<0.001	0.002	0.004	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.01	<0.01	0.03	<0.01	<0.1
47	Rewa	3,909,472	1,943,332	28.9	22.5	7.86	8.5	14.37	0	2.22	83	3	88	23	5	3	10	<1	<1	37	3	4	<0.1	0.09	<0.01	<0.001	0.02	<0.0010	0.002	<0.001	0.001	0.009	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
48	Rewa	3,910,275	1,932,073	27.8	23.6	8.01	8.4	13.60	0	11.4	80	51	68	25	6	2	8	<1	<1	37	3	4	<0.1	<0.01	<0.01	<0.001	0.02	<0.0010	0.002	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.01	<0.01	0.02	0.02	<0.1
49	Rewa	3,910,798	1,331,974	29.2	22.7	7.87	8.2	13.39	3	18.2	76	5	56	26	7	2	6	<1	<1	38	1	3	<0.1	<0.01	<0.01	<0.001	0.03	<0.0010	0.002	<0.001	0.001	0.002	<0.001	0.004	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.01	<0.01	0.06	<0.01	<0.1
50	Rewa	3,912,662	1,932,600	28.4	23.3	7.84	8.1	12.63	2	8.49	79	6	48	28	7	3	8	<1	<1	38	2	3	<0.1	<0.01	<0.01	<0.001	0.03	<0.0010	0.003	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.02	<0.01	0.04	<0.01	<0.1
51	Rewa	3,907,241	1,932,525	26.0	22.8	8.04	9.0	13.25		12.4	85	13	56	24	6	2	10	<1	<1	40	3	6	<0.1	<0.01	<0.01	0.005	0.02	<0.0010	0.003	<0.001	0.002	0.006	<0.001	0.024	<0.001	<0.001	0.009	<0.0001	0.005	0.1	0.02	<0.01	0.02	0.02	<0.1
52	Rewa	3,907,595	1,932,680	27.9	22.5	7.75	6.3	13.93	4	2.08	71	14	60	20	4	2	7	<1	<1	33	3	4	<0.1	<0.01	<0.01	0.002	0.02	<0.0010	0.002	<0.001	<0.001	0.002	<0.001	0.002	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.01	<0.01	0.07	0.01	<0.1
53	Sigatoka	3,873,485	1,868,781	24.9	23.9	8.03	2960.0	11.05	5	87.9	22900	739	17300	3030	211	619	5490	220	<1	117	1400	9710	2.2	0.01	<0.01	<0.001	0.02	<0.001	0.018	<0.001	0.006	0.07	0.006	0.004	<0.001	<0.001	0.007	<0.0001	<0.001	0.6	0.06	<0.01	0.01	0.03	<0.1
54	Sigatoka	3,877,221	1,869,935	26.8	25.4	8.08	20.4	13.37	0	0.05	188	5	112	59	12	7	21	<1	<1	89	4	11	<0.1	0.04	0.02	<0.001	0.04	<0.001	0.002	<0.001	0.002	0.006	0.001	<0.001	<0.001	<0.001	0.005	<0.0001	<0.001	0.2	0.01	<0.01	<0.01	<0.01	<0.1
55	Sigatoka	3,889,089	1,874,030	25.9	26.3	8.09	20.0	12.67	6	11.7	222	8	164	91	24	7	25	2	<1	101	13	22	<0.1	0.05	0.02	<0.001	0.05	<0.001	0.002	<0.001	0.002	0.013	<0.001	0.001	<0.001	<0.001	0.004	<0.0001	<0.001	0.2	0.02	<0.01	<0.01	<0.01	<0.1
56	Sigatoka	3,894,244	1,886,810	24.8	24.9	7.85	40.7	6.60	12	0	352	9	223	153	47	8	26	2	<1	195	5	8	<0.1	0.05	0.01	<0.001	0.06	<0.001	0.004	<0.001	0.002	0.071	<0.001	0.001	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.01	0.15	0.01	<0.01	<0.1
57	Sigatoka	3,896,754	1,889,865	24.0	26.3	8.12	40.0	12.43	0	0.11	315	5	208	138	41	8	22	1	<1	178	5	5	<0.1	0.04	0.01	<0.001	0.03	<0.001	0.002	<0.001	0.002	0.052	<0.001	<0.001	<0.001	<0.001	0.007	<0.0001	<0.001	0.2	0.02	<0.01	<0.01	<0.01	<0.1
58	Sigatoka	3,896,255	1,891,774	23.7	26.3	8.15	34.2	14.79	2	0.12	297	8	180	119	33	9	26	2	<1	167	4	6	<0.1	0.03	0.02	<0.001	0.02	<0.001	0.002	<0.001	0.002	0.055	<0.001	0.001	<0.001	<0.001	0.005	<0.0001	<0.001	0.2	0.03	<0.01	<0.01	0.01	<0.1
59	Sigatoka	3,897,364	1,903,577	24.5	24.0	8.08	27.5	15.19	0	0.44	240	8	164	89	21	9	19	1	<1	113	11	6	<0.1	0.05	0.02	<0.001	0.05	<0.001	0.002	<0.001	0.006	0.004	0.001	0.002	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	0.01	<0.1
60	Sigatoka	3,888,342	1,888,544	23.7	24.1	8.05	32.1	13.35	1	0.13	273	5	164	98	23	10	26	1	<1	143	4	9	<0.1	0.02	0.02	<0.001	0.02	<0.001	0.003	<0.001	0.003	0.024	<0.001	0.002	<0.001	<0.001	0.004	<0.0001	<0.001	0.2	0.03	<0.01	0.01	<0.01	<0.1
61	Sigatoka	3,907,671	1,891,945	22.9	26.6	8.09	23.1	13.50	1	0.83	207	6	136	80	23	6	13	2	<1	102	3	5	<0.1	0.02	0.02	<0.001	0.03	<0.001	0.002	0.007	0.027	0.008	<0.001	0.006	<0.001	<0.001	0.005	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	0.01	<0.1
62	Sigatoka	3,903,202	1,896,487	23.3	23.0	7.86	26.6	10.53	4	0.89	224	5	128	82	24	5	20	2	<1	116	3	8	<0.1	0.02	0.01	<0.001	0.01	<0.001	0.002	0.002	0.002	0.02	<0.001	0.001	0.004	<0.001	0.006	<0.0001	<0.001	0.1	0.03	<0.01	<0.01	<0.01	<0.1
63	Sigatoka	3,905,780	1,896,488	27.5	25.1	7.97	26.7	12.13	1	0.39	222	2	148	78	24	4	20	2	<1	107	5	10	<0.1	0.04	0.01	<0.001	0.03	<0.001	0.002	0.004	0.003	0.029	<0.001	0.003	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
64	Sigatoka	3,897,534	1,903,342	26.3	52.6	8.48	299.4	3.08	0	2080	1720	16	1280	465	186	<1	216	6	4	8	784	83	0.3	0.01	0.01	<0.001	0.03	0.01	0.005	<0.001	0.003	0.002	0.003	<0.001	<0.001	<0.001	0.005	<0.0001	<0.001	0.6	0.01	<0.01	<0.01	<0.01	0.1
65	Sigatoka	3,898,005	1,898,353	23.7	22.8	8.07	23.4	13.73	1	0.6	195	8	136	73	17	7	16	<1	<1	97	5	8	<0.1	0.03	0.02	<0.001	0.03	<0.001	0.002	0.001	0.002	0.012	<0.001	0.002	<0.001	<0.001	0.005	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
66	Sigatoka	3,894,997	1,898,522	23.0	22.2	8.27	19.2	12.04	0	0.72	190	8	132	71	16	8	16	<1	<1	94	5	8	<0.1	0.01	0.01	<0.001	0.02	<0.001	0.002	<0.001	0.002	0.006	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
67	Sigatoka	3,897,932	1,902,670	26.4	26.4	8.03	19.0	14.79	4	7.16	169	14	108	61	18	4	13	2	<1	77	10	5	<0.1	0.02	0.01	<0.001	0.03	<0.001	0.001	<0.001	0.002	0.011	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	0.02	<0.1
68	Sigatoka	3,897,657	1,903,193	25.9	27.2	8.40	33.4	14.82	1	0.33	285	25	156	99	26	8	22	2	6	101	35	8	<0.1	0.01	0.01	<0.001	0.02	<0.001	0.002	<0.001	0.004	0.003	0.001	0.002	<0.001	<0.001	0.003	<0.0001	<0.001	0.2	0.01	<0.01	<0.01	0.02	<0.1
69	Sigatoka	3,900,553	1,907,087	26.9	24.6	8.32	17.4	6.95	0	0.94	142	5	96	49	13	4	14	1	<1	71	3	6	<0.1	0.03	0.03	<0.001	0.02	<0.001	0.001	0.005	0.002	0.007	<0.001	0.004	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
70	Sigatoka	3,905,717	1,909,059	28.3	24.0	8.29	15.1	13.45	0	3.55	134	2	96	47	13	3	10	2	<1	67	1	4	<0.1	0.02	0.02	<0.001	0.03	<0.001	0.002	0.007	0.004	0.004	<0.001	0.007	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
71	Sigatoka	3,904,866	1,909,184	28.0	23.0	8.10	17.1	8.23	0	1.02	154	5	120	52	15	3	13	1	<1	62	12	6	<0.1	0.01	0.01	<0.001	0.03	<0.001	0.002	0.002	0.002	0.002	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.02	<0.01	0.03	<0.01	<0.1
72	Coastal	3,869,818	1,879,928	30.8	30.6	8.43	27.1	8.94	8	0.39	228	9	137	98	22	10	15	1	<1	115	3	13	<0.1	0.14	<0.01	<0.001	0.08	0.002	0.002	<0.001	0.004	0.052	<0.001	<0.001	<0.001	<0.001	0.029	<0.0001	<0.001	0.2	0.02	0.09	<0.01	0.03	<0.1
73	Coastal	3,866,449	1,891,904	29.7	25.6	7.30	13.5	10.68	0	1.04	120	14	96	33	6	5	14	<1	<1	49	5	9	<0.1	0.2	<0.01	<0.001	0.03	<0.0010	0.003	<0.001	0.001	0.045	<0.001	0.008	<0.001	<0.001	0.004	<0.0001	<0.001	0.1	0.01	<0.01	0.12	<0.01	<0.1
74	Coastal	3,863,399	1,899,884	29.0	25.1	7.01	10.6	11.79	0	0.53	99	16	76	24	4	3	12	<1	<1	39	2	8	<0.1	0.11	<0.01	<0.001	0.05	<0.0010	0.003	<0.001	0.004	0.024	<0.001	0.011	0.002	<0.001	0.008	<0.0001	<0.001	<0.1	0.01	<0.01	0.01	<0.01	<0.1
75	Coastal	3,864,005	1,920,903	28.9	24.2	7.32	8.9	8.61	0	1.27	80	3	48	20	5	2	8	<1	<1	29	1	5	<0.1	0.04	<0.01	<0.001	0.13	<0.001	0.001	<0.001	0.001	0.01	<0.001	<0.001	<0.001	<0.001	0.004	<0.0001	0.006	0.1	0.01	<0.01	<0.01	<0.01	<0.1
76	Coastal	3,862,243	1,919,939	23.0	24.5	7.15	10.5	8.96	0	0.71	93	6	56	28	7	3	10	<1	<1	36	1	7	<0.1	0.09	<0.01	<0.001	0.03	0.002	0.001	<0.001	<0.001	0.027	<0.001	0.002	<0.001	<0.001	<0.001	<0.0001	0.002	0.1	0.01	<0.01	<0.01	<0.01	<0.1
77	Coastal	3,867,883	1,932,767	23.5	24.7	8.02	12.2	4.78	2	41.4	111	3	67	40	10	4	8	<1	<1	49	2	2	<0.1	0.04	<0.01	<0.001	0.02	0.002	0.002	<0.001	0.001	0.007	<0.001	0.002	<0.001	<0.001	0.005	<0.0001	<0.001	0.1	0.01	<0.01	<0.01	<0.01	<0.1
78	Coastal	3,873,315	1,943,964	28.0	24.4	7.23	8.0	7.82	0	0.39	70	11	42	21	5	2	7	<1	<1	27	2	7	<0.1	<0.01	<0.01	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	0.003	<0.0001	<0.001	0.1	0.03	<0.01	0.01	<0.01	<0.1
79	Coastal	3,873,577	1,947,137	30.9	24.6	7.74	10.2	8.44	6	1.04	92	<1	55	32	8	3	8	<1	<1	37	2	9	<0.1	0.08	<0.01	<0.001	<0.01	0.002	<0.001	<0.001	<0.001	0.035	<0.001	<0.001	<0.001	<0.001	0.002	<0.0001	<0.001	<0.1	0.01	<0.01	0.04	0.04	<0.1
80	Coastal	3,874,349	1,951,524	28.8	25.1	7.32	8.0	9.17	1	0.68	76	11	45	23	6	2	8	<1	<1	30	2	8	<0.1	0.1	<0.01	<0.001	0.02	0.002	0.001	<0.001	0.001	0.033	<0.001	<0.001	<0.001	<0.001	0.006	<0.0001	<0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
81	Rewa	3,888,192	1,948,740	26.3	22.5	7.73	5.2	14.02	0	0.2	53	16	72	14	3	2	6	<1	<1	22	1	6	<0.1	<0.01	<0.01	<0.001	0.03	<0.0010	0.007	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.003	<0.0001	<0.001	<0.1	0.01	<0.01	0.03	<0.01	<0.1
82	Sigatoka	3,897,534	1,903,342	26.3	53.3	8.45	297.6	3.64	0	2080	1730	20	1260	454	182	<1	223	6	4	8	769	86	0.2	<0.01	0.01	<0.001	0.03	0.01	0.004	0.012	0.003	0.002	0.003	<0.001	<0.001	<0.001	0.006	<0.0001	<0.001	0.6	0.01	<0.01	<0.01	<0.01	0.1
83	Sigatoka	3,873,485	1,868,781	24.9	24.1	8.02	27.7	11.13	5	87.9	23600	668	16200	2950	205	592	5160	215	<1	116	1360	9130	2.1	<0.01	0.02	<0.001	0.03	<0.001	0.017	<0.001	0.007	0.078	0.006	0.005	<0.001	<0.001	0.006	<0.0001	<0.001	0.6	0.05	<0.01	0.01	0.01	<0.1
84	Rewa	3,885,749	1,945,070	29.4	26.5	7.7	10.4	7.60	0	1.33	103	2	52	32	9	3	7	<1	<1	34	8	3	<0.1	0.06	0.02	<0.001	0.05	<0.001	0.01	<0.001	0.002	0.011	<0.001	<0.001	<0.001	<0.001	0.026	<0.0001	<0.001	<0.1	0.01	<0.01	<0.01	<0.01	<0.1
85	Rewa	3,883,698	1,933,348	27.4	21.8	7.07	3.7	8.75	0	1.98	45	11	27	13	3	1	4	<1	<1	16	<1	4	<0.1	0.05	<0.01	<0.001	0.05	<0.001	0.008	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.01	<0.0001	<0.001	<0.1	0.02	<0.01	0.03	<0.01	<0.1
86	Navua	3,884,630	1,928,238	24.3	25.2	8.44	8.9	7.93	0	5.47	82	6	49	28	7	2	6	<1	<1	36	3	3	<0.1	0.03	<0.01	<0.001	0.03	0.003	0.002	<0.001	<0.001	0.003	<0.001	0.008	<0.001	<0.001	<0.001	<0.0001	0.006	0.1	0.02	<0.01	0.02	0.02	<0.1
87	Navua	3,878,841	1,926,702	26.4	25.8	8.17	13.7	8.82	1	29.1	121	<1	73	52	12	5	8	<1	<1	59	2	4	<0.1	0.04	<0.01	<0.001	0.01	<0.001	0.001	<0.001	<0.001	0.004	<0.001	<0.001	0.004	<0.001	0.001	<0.0001	<0.001	0.1	0.02	<0.01	<0.01	<0.01	<0.1
88	Navua	3,877,342	1,891,581	25.8	24.5	7.95	18.8	8.75	1	0.36	176	6	106	75	18	7	11	1	<1	87	2	11	<0.1	0.02	<0.01	<0.001	0.02	0.003	0.002	<0.001	0.001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.001	0.1	0.02	0.08	0.04	0.03	<0.1