

Integrated Water Resource Management

Hotspot Analysis Report

Republic of Vanuatu

May 2007



**Prepared on behalf of
Department of Geology, Mines and Water Resources, Vanuatu**

Table of Contents

Introduction.....	4
1.Integrated Water Resource Management Project.....	4
2.Scope of this Report.....	4
3.Hotspots and Sensitive Areas.....	5
4.National Water Resources Advisory Committee.....	6
5.Consultation Workshop.....	6
6.Methodology.....	7
7.Results.....	9
8.Selected Hotspots.....	13
9.Selected Sensitive Areas.....	13
APPENDIX B: Site Information Sheets.....	15
APPENDIX C: Aggregated Scoring Tables.....	26

Introduction

Eighty percent of Ni-Vanuatu live in rural areas where a limited resource base, remote location, and rapidly growing population conspire to increase environmental vulnerability and limit sustainable development opportunities. When combined with limited, contaminated, or even absent water resources, and a lack of proper treatment outside of urban centers, the Vanuatu population is highly vulnerable. In addition, government offices related to water find their resources stretched to the limit by a large geographic area and the lack of funds to cover it. Given these challenges, more sustainable and integrated ways of manage water resources and stretch limited budgets are needed.

Recognizing this need on behalf of Vanuatu and other Small Island Developing States (SIDS), the Global Environment Fund, SOPAC, and the United Nations Environment Fund have supported a cross-cutting approach to water resource management that captures the relationship to other key focal areas such as land degradation, biodiversity and climate change. The result of the collaboration is the Sustainable Integrated Water Resources and Wastewater Management Project in Pacific Island Countries and a goal of assisting Pacific Island Countries in implementing applicable and effective integrated Water Resource Management (IWRM) and Water Use Efficiency (WUE) plans in the Pacific Region.

1. Integrated Water Resource Management Project

IWRM emphasizes an inter-linked approach to water resources management rather than the more traditional, and less collaborative, sectoral approach, and stresses the following principles:

- Consider all water resources
- Address water demand as well as water supply
- Address wastewater management as well as water supply
- Involve all sectors and civil society stakeholders
- Promote access and gender equality
- Recognize the economic, social, and environmental value of water.

To initiate the IWRM Project, participating SIDS were asked to prepare a Diagnostic Report, Hotspot Analysis, and demonstration project design related to the unique water resource needs of their country.

The Diagnostic Report for Vanuatu was completed in March 2007 and describes the water resource situation in Vanuatu, identifies issues and concerns for water resource conservation and management, and collates measure for integrated water resource management.

2. Scope of this Report

Within the IWRM Project, the Hotspot Analysis follows the Diagnostic Report, which describes the water resource situation in Vanuatu, and precedes the creation of a Demonstration Project paper, which details a pilot project for Vanuatu.

Specifically, the Hotspot Analysis discusses problem and sensitive areas throughout Vanuatu with the goal of prioritizing them for further development into a Demonstration Project. In order to accomplish this, with the assistance of a facilitator, a committee of knowledgeable stakeholders chooses sites and ranks them according to suggested criteria to come up with one final suggested pilot site within Vanuatu. The selected site will hopefully be the location of an example of IWRM at work in Vanuatu and a demonstration of the strategy's merits.

3. Hotspots and Sensitive Areas

As mentioned above, the object of Hotspot Analysis is to identify priority areas. There are two types of areas to be considered, environmental hotspots and sensitive areas.

According to the *Guidelines and Template for Hotspot Analysis*, an environmental hotspot is a geographically defined area, which may include the receiving coastal areas and other areas of the sea (IWRM recognizes ridge to reef linkages and management approaches), of national, regional, or global significance, where conditions are such as to adversely affect health, threaten ecosystem functioning, reduce biodiversity and/or compromise resources and amenities of economic importance in a manner that would appear to warrant priority management attention. A degraded area is said to display significant measurable environmental degradation.

A sensitive area, on the other hand, is characterized as a geographically defined area, of national, regional, or global significance, which, although not degraded at present, is threatened with future degradation either because of sensitivity of the receptor or the magnitude of the anthropogenic activity posing the threat.

According to GEF guidelines, a Hotspot (HS) or Sensitive Area (SA) should be identified based upon the following issues and concerns:

- Thematic – Not specific to a particular place. Ex. Saline intrusion, general deterioration, farming practices.
- Geographic – Specific to a locality that is perhaps affected by many activities.
Ex. Degradation of a particular watershed due to many causes.
- Institutional – Strengthening and/or reform of agencies involved in IWRM or an aspect of IWRM. Ex. Development of a river or aquifer management partnership.

- Policy and Legislation – Reform and development of the policy and/or regulatory regime to improve integrated planning and management. Ex. Move toward planning on a natural scale such as watersheds.
- Socio-Economic – An affected community of livelihood. Ex. Addressing the vulnerability of a community to inadequate IWRM through education and awareness encouraging more sustainable land use.

The Committee selecting Vanuatu’s priority areas did so though use of these definitions and guidelines.

4. National Water Resources Advisory Committee

The National Water Resources Advisory Committee (the Committee) is responsible for oversight of freshwater and marine resources throughout Vanuatu and includes permanent members from the departments of Geology, Mines, and Rural Water Supply, Meteorology, Forestry, Public Works, and Health as well as regular invitees from provincial governments, NGOs, and UNELCO, a private sector utility. With the depth and breadth of knowledge available through this committee, it was a natural choice for consultation throughout the IWRM Project process. The Committee had already demonstrated commitment to the project; members were consulted throughout the planning process and participated in interviews to inform the creation of Vanuatu’s Diagnostic Report.

Therefore, when the time came to complete the Hotspot Analysis (HSA) portion of the IWRM Project, it seemed natural to call upon the Committee once again. As part of the process to create Vanuatu’s Diagnostic Report, a Consultant had already begun the hotspot brainstorming process with a discussion of what sectors and/or geographic areas might constitute a hotspot, but these nebulous ideas needed to be honed further and, as recommended by SOPAC, given geographic bounds.

5. Consultation Workshop

A day-long consultative workshop was held on May 23, 2007 with the goal of completing the HSA and setting the framework for a Demonstration Concept Paper for Vanuatu. While an ambitious task for a single day, the Committee’s familiarity with the IWRM Project, and previous consultations that set the groundwork made it achievable.

The Director of Geology, Mines, and Rural Water Supply, Chris Iaon, introduced and opened the HSA Workshop. So as to acquire a well-rounded discussion, the Workshop was planned for a time when there would be many representatives from provincial governments in the capital. In a country as geographically expansive as Vanuatu, national consultations are often cost and distance prohibitive, but the timing of the

Workshop was such that it was well attended and voices from the furthest reaches of the country were heard. A list of participants can be found in Appendix A.

6. Methodology

After a reminder of the goals and priorities of IWRM and GEF, the Committee began to build upon previous discussion and broke into smaller working groups to discuss Hotspots and Sensitive Areas throughout Vanuatu. The groups were reminded of the definitions of “environmental hotspot” and “sensitive area” and instructed to use their knowledge of Vanuatu water resources to write out as many of these areas in Vanuatu as possible. Brainstorming session results were compiled into lists as follows:

Hotspots

Luganville Water Source

Tagabe Water Source

Isangel Water Source

Tegua – Sea Level Rise

Saratamata Water Source

Mataso Aquifer

Mele Water Source/Catchment

Sarakata Catchment

Teoma Catchment

Sensitive Areas

Lakatoro Water source

Sarakata Catchment

Tagabe Catchment

Mele Flood Plain

Sola HQ Catchment Area

Aot River

Adsone Catchment

Several sites were chosen by different groups as both a sensitive area AND a hotspot, prompting discussion as to how much degradation is required to move a site from the sensitive area to the hotspot category. It was determined that hotspots are likely to be sensitive areas (were they not sensitive they would not be degraded to the current point) and sensitive areas are merely hotspots in the making. Once this type of hierarchy was established, several sites were re-labeled. After much discussion by the entire Committee, three hotspots and three sensitive areas were chosen to go forward in the process.

As the Committee included many provincial authorities with a more regional breadth of knowledge, information sharing was a crucial part of the HSA process. To this end, the Committee broke into groups to collect information to inform the rating process. An effort was made to include each provincial Committee member in a group discussing sites in his or her geographic area of expertise.

Each of the working groups was given one hotspot and one sensitive area to discuss and requested to note human activities related to the site, natural conditions/natural disasters related to the site, the nature and extent of threats, and sources of pollution, if any. Working groups were also asked to discuss the local, national, and regional significance of the sites with respect to environmental, social, and economic matters and to complete the provided table of major issues and concerns related to the sites. Information gathered during this process can be found in Appendix B.



Figure 1. Participants in a working group

Once the information was collected within each group it was presented to the Committee at large. The committee was instructed to listen closely to this information, as it would be used to rate the six sites.



Figure 2. Participants listening to group presentations

After the presentations, the Committee sat down together to complete the Hotspot and Sensitive Area rating tables as a group. A vast majority of the rating numbers were quickly agreed upon. When there was dissension, experts from the provincial areas containing the sites in question were called upon to provide further information.

The final scores were then calculated using the Aggregated Hotspot Scoring table and Aggregated Sensitive Area Scoring table. Aggregated Scoring Tables can be found in Appendix C.

7. Results

The six sites chosen through group discussion represent a wide range of locations, degrees of development, and issues. That all are water supplies is not surprising considering the limited (or even absent) freshwater resources in many areas of Vanuatu. It is interesting to note that the hotspots are in more accessible areas while the sensitive areas are more remote, suggesting that, despite Vanuatu's rather extreme natural conditions, the more pressing water quality issues are anthropogenic in nature.

Hotspots

Sarakata Catchment (Santo)

Tagabe Catchment (Efate)

Mele Catchment (Efate)

Sensitive Areas

Lakatoro/Norsup Catchment (Malekula)

Aot River (Vanua Lava)

Saratamata Water Source (Ambae)

Half of the chosen areas are provincial centers. Vanuatu has six provinces, the provincial seat areas of four are listed here, and one is very close. The Sarakata catchment is the water source for the Sanma provincial headquarters in Luganville, the Tagabe catchment provides all the water for Port Vila, including Shefa's headquarters, the Lakatoro/Norsup catchment includes Malampa's provincial seat, and the Saratamata Water Source supplies Penama's provincial headquarters. The Aot River is also close to the water source in Sola, Torba's provincial capital. Two other provincial water sources/catchments were removed from the original list when the committee was reminded that this was to be a pilot project and could be replicated in an area even if it does not end up as the final selection at the Workshop. Before such a decision, Tafea's Lenakal and Isangel and Torba's Sola were suggested as problem areas. These are the more highly populated areas in a country that remains 80% rural, again suggesting that Vanuatu's water resources problems are anthropogenic. Vanuatu has two municipal areas, Port Vila and Luganville; both areas were quickly added to the list and never, in any discussion, considered for removal.

Contrary to the other sites, Mele is not a provincial headquarters, although it is close to Port Vila. Mele is in the unique position of being the largest village in Vanuatu. Boasting over 3000 people within a relatively small area, water quality and quantity are increasingly important issues.

Vanuatu



Figure 3. Map of Vanuatu with selected sites. Hotspot sites are shown in red and Sensitive Area sites are shown in yellow.

The rating exercise was completed with the entire Committee, and most ranks were decided upon fairly quickly and unanimously, with only the occasional question being posed to a provincial authority where further information was needed. Results as follows:

8. Selected Hotspots			
	Title	Score	Priority Issues
Hotspot 1	Sarataka Catchment	89%	Watershed degradation and Pollution (Microbiological, Chemical)
Hotspot 2	Tagabe Catchment	87%	Watershed degradation and Pollution (Microbiological, Chemical)
Hotspot 3	Mele Catchment	67%	Freshwater shortage and Pollution (microbiological)
9. Selected Sensitive Areas			
	Title	Score	Priority Issue
Sensitive Area 1	Lakatoro/Norsup Catchment	88%	Freshwater shortage and Global Change
Sensitive Area 2	Saratamata Catchment	83%	Sea Level Change and Pollution (suspended solids)
Sensitive Area 3	Aot River	73%	Pollution (chemical and mining wastes) and Global Change

Figure 4. Summary Table of Prioritized Hotspots and Sensitive Areas

With a score of 89%, the final site chosen for use in the next step, the Demonstration Concept Paper, was the Sarataka Catchment, the water source for the municipality of Luganville, on Espiritu Santo Island. Having extreme amounts of watershed degradation, pollution with various causes, and affecting many people through being the water supply for one of Vanuatu's two municipalities, the Sarataka Catchment is an excellent candidate for a water resources project.

APPENDIX A: Workshop Participants

Chair: Chris Iaon (Director, Department of Geology, Mines, and Water Resources)

Co-Chair: Erickson Sammy (DGMWR)

Secretary: Nelly Ham Moru (Environmental Health)

Facilitator: Amy Lynch (Peace Corps Volunteer, Shefa Province)

Attendees

Obed Tabi (Community Development Officer, DGMWR)

Morris Stephen (Water Technician, DGMWR)

Rosette Kalmet (Hydrogeologist, DGMWR)

Robson Tigona Sailas (Department of Meteorology)

Urafo Nafuki (Department of Public Works)

Molisa Vatu (Live & Learn Environment, NGO)

Amos Kalo (Live & Learn Environment, NGO)

Ann Marie Sariset (Department of Forestry)

Peter Lulu (Provincial Rural Water Supply Officer, Sanma Province)

Jonathan Bani (PRWSO, Penama Province)

Abet Daniel (PRWSO, Shefa Province)

Morris Cliff (PRWSO, Tafea Province)

Graham Rovea (PRWSO, Malampa Province)

Salathial Nava (PRWSO, Torba Province)

APPENDIX B: Site Information Sheets

Hotspot Site Name: Sarakata Catchment (Santo)

1) Context of the site

a. Human activities related to the site:

- i. Water Supply Sources – Luganville water supply, Pepsi hand dug wells as well as others - Fanafo, Stone Hill, Butmas, Ballon, and Monix Hill water supplies.
- ii. Industrial Activities – Timber, Iron roof, Nails, PWD, Workshops, Copra Mill, Soap Factories, Butcheries.
- iii. Sand Mining
- iv. Gardening/agriculture, logging, fish farming, fishing, livestock
- v. Recreational Activities
- vi. Residential Irrigation
- vii. Ship Dumping

b. Natural conditions or natural disasters related to the site:

- i. Cyclones – flooding
- ii. Earthquakes – landslides
- iii. Drought

2) Nature and extent of threats

a. Human:

- i. Toilet and Septic Systems
- ii. Cattle Grazing
- iii. Subdivisions
- iv. Logging - sedimentation and lower water level
- v. Agriculture – fertilizer
- vi. Industrial Waste – oil
- vii. Storm Water - runoff

- b. Natural:
 - i. Flooding
 - ii. Landslides
 - iii. Sedimentation
 - iv. Drought – water shortage
- 3) If there is pollution, list the sources:
- a. Industry
 - b. Agriculture, Logging, and Livestock Waste
 - c. Residential Areas – septic systems
 - d. Sand Mining
 - e. Road Construction – materials and vehicle fumes
- 4) Major Concerns and Issues from Table 3:
- a. Freshwater Shortage (pollution of existing supplies)
 - b. Pollution (Microbiological, Chemical, Suspended Solids, Mining Wastes, Solid Wastes, Oil Spills)
 - c. Habitat and Community Modification (loss of ecosystems or ecotones – removal of mangroves, modification of ecosystems or ecotones)
 - d. Unsustainable exploitation... (over-exploitation, impact on biological and genetic diversity)
 - e. Global Change (Changes in hydrological cycle including droughts and cyclonic flooding and damage, i.e. climate variability, sea level change, changes in ocean CO2 source/sink function – cattle and coconut)
 - f. Other (n/a)
- 5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
Environmental Significance	High	High	Medium
Social/Economic Significance	High	High	High

Hotspot Site Name: Tagabe Water Catchment (Efate)

1) Context of the site

a. Human activities related to the site:

- i. UNELCO activities – pumping and water delivery
- ii. Industrial Activities – Timber, Car Washes, Fiberglass, Auto shops, Brewery.
- iii. Sand and Limestone Mining
- iv. Gardening/agriculture, logging, fish farming, fishing, livestock
- v. Recreational Activities
- vi. Residential Irrigation
- vii. Tourism

b. Natural conditions or natural disasters related to the site:

- i. Cyclones – flooding
- ii. Earthquakes – landslides
- iii. Drought

2) Nature and extent of threats

c. Human:

- i. Toilet and Septic Systems
- ii. Cattle Grazing
- iii. Subdivisions
- iv. Logging - sedimentation and lower water level
- v. Agriculture – fertilizer, runoff due to land clearing
- vi. Industrial Waste – oil, runoff from carwashes, brewery effluent
- vii. Storm Water - runoff

d. Natural:

- i. Flooding
- ii. Landslides

- iii. Sedimentation
- iv. Drought – water shortage

3) If there is pollution, list the sources:

- 1. Industry
- 2. Agriculture, Logging, and Livestock Waste - runoff
- 3. Residential Areas – septic systems
- 4. Sand and Limestone Mining
- 5. Direct Use of the River – bathing and washing.

4) Major Concerns and Issues from Table 3:

- 1. Freshwater Shortage (reduction in stream flow of quality and pollution of existing supplies)
- 2. Pollution (Microbiological, Chemical - Tusker/Switee, Suspended Solids, Solid Wastes, Oil Spills (car wash, garage, airport.)
- 3. Habitat and Community Modification (loss of ecosystems or ecotones)
- 4. Unsustainable exploitation... (Over-exploitation)
- 5. Global Change (Changes in hydrological cycle including droughts and cyclonic flooding and damage, i.e. climate variability)
- 6. Other (Over-exploitation of water resources – causing sink holes, increase in number of water born diseases)

5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
Environmental Significance	High	High	High
Social/Economic Significance	High	High	Medium

Hotspot Site Name: Mele Water Catchment (Efate)

1) Context of the site

- a. Human activities related to the site:

- i. Residential
- ii. Industrial
- iii. Gardening
- iv. Tourism
- v. Swimming
- vi. Farming
- vii. Mining

b. Natural conditions or natural disasters related to the site:

- i. Flooding
- ii. Earthquakes
- iii. Drought
- iv. Tsunami
- v. Cyclones - landslides

2) Nature and extent of threats

c. Human:

- i. Residential – bathing in river by humans, animals, washing
- ii. Gardening – soil erosion into river, fertilizers
- iii. Deforestation
- iv. Tourism – deforestation
- v. Livestock – contaminate water source/catchment
- vi. Mining
- vii. Infrastructure (road/bridge) – stormwater runoff!

d. Natural:

- a. Flooding
- b. Drought
- c. Cyclone
- d. Landslide

e. Earthquake

f. Tsunami

3) If there is pollution, list the sources:

1. Fertilizers from Gardening/Farming
2. Animal/human waste
3. Vehicles – oil and fuel spillage

4) Major Concerns and Issues from Table 3:

1. Freshwater Shortage (reduction in stream flow of quality and pollution of existing supplies)
2. Pollution (Microbiological, Eutrophication, Chemical, Suspended Solids, Solid Wastes, Oil Spills)
3. Habitat and Community Modification (n/a)
4. Unsustainable exploitation... (over-exploitation, impact on biological and genetic diversity)
5. Global Change (Changes in hydrological cycle including droughts and cyclonic flooding and damage, i.e. climate variability, sea level change)
6. Other (n/a)

5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
Environmental Significance	High	High	Medium
Social/Economic Significance	High	High	Medium

Sensitive Area Site Name: Lakatoro/Norsup Catchment (Malekula)

1) Context of the site

- a. Human activities related to the site:
 - i. Industrial – UNELCO
 - ii. Residential

- iii. Logging
- iv. Gardening
- v. Livestock
- vi. Sand Mining

b. Natural conditions or natural disasters related to the site:

- i. Flooding
- ii. Drought
- iii. Earthquake
- iv. Cyclone

2) Nature and extent of threats

a. Human:

- i. Industrial
- ii. Residential
- iii. Livestock
- iv. Logging
- v. Gardening
- vi. Sand Mining

b. Natural:

- i. Flooding
- ii. Drought
- iii. Earthquake
- iv. Cyclone

3) If there is pollution, list the sources:

- a. Livestock - animal Waste

4) Major Concerns and Issues from Table 3:

- 1. Freshwater Shortage (reduction in stream flow of quality, pollution of existing supplies, salinization of groundwater)

2. Pollution (microbiological)
 3. Habitat and Community Modification (n/a)
 4. Unsustainable exploitation... (n/a)
 5. Global Change (Changes in hydrological cycle including droughts and cyclonic flooding and damage, i.e. climate variability, sea level change)
 6. Other (n/a)
- 5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
Environmental Significance	High	High	Medium
Social/Economic Significance	High	High	Medium

Sensitive Area Site Name: Aot Riva (Vanua Lava)

- 1) Context of the site
 - a. Human activities related to the site:
 - i. Settlements – up river
 - ii. Toilet
 - iii. Gardening
 - iv. Fishing
 - v. Livestock – cattle, wild pig
 - vi. Dumping – washing in the river
 - b. Natural conditions or natural disasters related to the site:
 - i. Landslides
 - ii. Earthquakes
 - iii. Cyclones – flooding
 - iv. Drought
- 2) Nature and extent of threats

- a. Human:
 - i. Pit toilets
 - ii. Detergent
 - iii. Livestock Waste
- b. Natural:
 - i. Water lilies
 - ii. Flooding – land slides
 - iii. Sedimentation
 - iv. Drought – water shortage

3) If there is pollution, list the sources:

- 1. Toilets
- 2. Cattle Grazing
- 3. Detergent from Washing
- 4. Pig Pens
- 5. Poultry

4) Major Concerns and Issues from Table 3:

- 1. Freshwater Shortage (reduction in stream flow of quality and pollution of existing supplies)
- 2. Pollution (Chemical, Mining Wastes)
- 3. Habitat and Community Modification (n/a)
- 4. Unsustainable exploitation... (Over-exploitation)
- 5. Global Change (Changes in hydrological cycle including droughts and cyclonic flooding and damage, i.e. climate variability)
- 6. Other (n/a)

5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
-----------------------	-------	----------	------------------

Environmental Significance	High	Medium	Low
Social/Economic Significance	Medium	Low	Low

Sensitive Area Site Name: Saratamata Catchment (Ambae)

1) Context of the site

a. Human activities related to the site:

- i. Residential
- ii. Gardening/land clearing
- iii. Toilets
- iv. Fishing

b. Natural conditions or natural disasters related to the site:

- i. Earthquakes
- ii. Cyclones – flooding
- iii. Volcanic Activity
- iv. Drought

2) Nature and extent of threats

c. Human:

- i. Industrial
- ii. Residential
- iii. Livestock
- iv. Logging
- v. Gardening
- vi. Sand Mining

d. Natural:

- i. Earthquakes
- ii. Cyclones – flooding

- iii. Volcanic Activity - ash, etc. can affect water quality
- iv. Drought – water shortage

3) If there is pollution, list the sources:

- i. Toilets
- ii. Cattle Grazing
- iii. Pig Pens
- iv. Poultry

4) Major Concerns and Issues from Table 3:

- 1. Freshwater Shortage (pollution of existing supplies, salinization of groundwater)
- 2. Pollution (Suspended Solids)
- 3. Habitat and Community Modification (n/a)
- 4. Unsustainable exploitation... (n/a)
- 5. Global Change (Sea level change)
- 6. Other (n/a)

5) Fill out the chart with low, med, or high.

Significance of Site:	Local	National	Pacific/Regional
Environmental Significance	High	Medium	Medium
Social/Economic Significance	High	High	Low

APPENDIX C: Aggregated Scoring Tables

#	Criteria	Hotspot Number		
		1	2	3
1	Size of affected area (as percentage of total national area.)	1	1	2
2	Affected population (as percentage of total national area.)	12	6	9
3	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support the livelihood of local communities (e.g. subsistence or commercial farming, forestry, mining, tourism, fisheries.)	20	20	20
4	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support national development (e.g. subsistence or commercial farming, forestry, mining, tourism, fisheries.)	10	6	10
5	Extent to which the site is a recognized government priority (refer to official strategic action plans.)	15	9	15
6	Extent to which the site is of regional and/or global significance and priority (see WWF ecoregions, IUCN categories, UNESCO world heritage sites, etc.)	8	2	8
7	Degree of degradation at the site.	15	15	15
8	Extent of degradation on watershed/aquifer and any receiving coastal and marine resources and systems.	6	8	10
	Total Score (actual score with multiplications for weighting)	87	67	89
	Normalised Score (i.e. as a percentage of a possible top score of 100)	87	67	89

Figure 5. Hotspot Aggregated Scoring Table. Here 1 = Tagabe, 2 = Mele, and 3 = Sarakata

#	Criteria	Sensitive Area Number		
		1	2	3
1	Size of affected area (as percentage of total national area.)	2	2	2
2	Affected population (as percentage of total national area.)	6	3	3
3	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support the livelihood of local communities (e.g. subsistence or commercial farming, forestry, mining, tourism, fisheries.)	20	20	20
4	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support national development (e.g. subsistence or commercial farming, forestry, mining, tourism, fisheries.)	16	12	16
5	Extent to which the site is a recognized government priority (refer to official strategic action plans.)	12	6	12
6	Extent to which the site is of regional and/or global significance and priority (see WWF ecoregions, IUCN categories, UNESCO world heritage sites, etc.)	4	2	8
7	Biodiversity value of the site.	9	12	9
8	Cultural and public health value of the site.	10	8	10
9	Extent of involvement of communities in local management.	4	8	8
	Total Score (actual score with multiplications for weighting)	83	73	88
	Normalised Score (i.e. as a percentage of a possible top score of 100)	83	73	88

Figure 6. Sensitive Area Aggregated Scoring Table. Here 1 = Saratamata, 2 = Aot River, and 3 = Lakatoro/Norsup