

Hot Spot Analyses

and

Selection of focus for Demonstration Project for Tuvalu

Table of Contents

1.Introduction and Summary.....	3
2.Participants in the HSA.....	3
3.Role of the Hot Spot Analysis in the IWRM project.....	4
4.Defining, weighting and prioritizing issues.....	5
5.Descriptions of hot spots, sensitive areas and/or overriding issues.....	6
<i>A.Poor Sanitation (Hot Spot).....</i>	<i>6</i>
<i>B.Insufficient water storage and risk of pollution of existing supplies (Hot spot).....</i>	<i>7</i>
<i>C.No sludge collection or treatment (Hot Spot).....</i>	<i>8</i>
<i>D.Lack of Institutional support (Sensitive Issue).....</i>	<i>9</i>
<i>E.Un-coordinated multi-level management of water and waste water(Sensitive Issue)</i>	<i>10</i>
<i>F.Unsustainable, unrealistic attitudes.....</i>	<i>11</i>
6.Aggregated Scoring Table for Hot-Spot areas.....	12
7.Aggregated Scoring Table for Sensitive Areas.....	14
8.Conclusion: Summary Table of Prioritized Hot-Spots and Sensitive Areas.....	16

Hot Spot Analyses and Selection of focus for Demonstration Project for Tuvalu

1. Introduction and Summary

The hot spot analysis (HSA) is intended to follow the country Diagnostic Report which reviewed national water and wastewater management and its linkages to other sectors, and identified barriers to IWRM and how to overcome them.

The HSA is an assessment of the national and/or local priority issues that ideally should be addressed as soon as possible. The HSA was conducted with the input of members of the Water and Sanitation Committee on Funafuti in Tuvalu over several days from July 5, 2007.

The Committee considered that three issues were Hot Spots (as defined by GEF) ie where conditions are already damaged or deteriorated:

1. insufficient water storage nationally, and risk of pollution of existing supplies; and
2. poor sanitation with subsequent pollution of groundwater and Funafuti Lagoon
3. no collection or treatment facility for sludge from septic tanks on Funafuti. (This was considered to be a major single issue by some members of the Water and Sanitation Committee. Other members saw it as a symptom of a broader problem with sanitation in general).

Additionally three thematic issues were identified as weaknesses that were likely to further deteriorate and cause increasing problems in the future ie Sensitive Issues:

1. lack of supportive legislation and building codes for management of water resources and wastewater, and;
2. the complex array of individual families, government and communal factions that have roles managing water issues; and
3. deeply ingrained beliefs/perception about our water resource: abundant despite shortages; should be free despite high cost of management/delivery; responsibility for clean water lies solely with government.

These hot-spot and sensitive issues are described in **Section 5**.

The tables in **Sections 6 and 7** show how these priority issues (Hotspots and sensitive areas) are ranked using certain selection criteria

On the basis of the HSA ranking, the national stakeholders were then able to agree to a prioritised list from which to develop a Demonstration Project concept.

2. Participants in the HSA

The following personnel participated in the HSA

- Ms Annie Homasi OBE Director of TANGO (Tuvalu Association of NGOs)
- Dr Nese Ituaso Conway. Director of the Ministry of Health

- Ms Hellani Tumua Secretary for the Kaupule
- Mr Enate E Taua. Director of Environment (Acting)
- Mr Kelesoma Saloa, Private Secretary to the Prime Minister
- Ms Misalaima P Nelesone, Secretary of Ministry of Works and Energy and Chairperson of the National Water and Sanitation Committee
- Mr Ampelosa Tehulu, Director of Public Works Department (Acting)
- Ms Susan Tuplaga, Waste Management Co-ordinator (Acting)
- Mr Uale Taleni Secretary to the Ministry of Natural Resources and Environment.
- Mr Tauala Ketea Director of Meteorology Department (Acting).

Tragically, the National IWRM Focal Point Mr Filopo Taulima died in June 2007. Arrangements were made to undertake the HSA and continue the IWRM preparation process on his behalf. Mr Taulima was a passionate advocate for sustainable water and wastewater management and his death is a great loss to Tuvalu and his friends and colleagues throughout the region.

The input from the Water and Sanitation Committee was facilitated by a representative from the Department of Natural Resources Ms Loia Tausi with the assistance of Dr Leonie Crennan, Water and Sanitation Strategist, under the supervision of the Chair of the Water and Sanitation Committee and Secretary to the Ministry of Works and Energy, Ms Misalaima Panapasi.

The HSA process also drew upon previous consultations including those undertaken during the International Waters Programme, and referred to the challenges highlighted in the draft Integrated Water Resources Management Plan which was prepared by Mr Kelesoma Saloa with the assistance of Mr Taulima and the Water and Sanitation Committee.

3. Role of the Hot Spot Analysis in the IWRM project

IWRM is a move away from sectoral planning and implementation to an inter-linked approach. But like all long term reforms, which require both political support and institutional commitment, it requires the stakeholders to see the benefits of changing their existing way of working.

It is therefore ideal to be able to demonstrate the benefits of IWRM in a particular area or for a particular issue as soon as possible, rather than just wait for a long term national IWRM approach to achieve this *e.g.* through long term planning. These short term benefits can be economic (*e.g.* less flooding damage), social (*e.g.* improved drinking water quality) and/or environmental (*e.g.* improved reef habitat), but it is important that they are all tangible and demonstrate the improvement resulting from introducing or strengthening IWRM.

The role therefore of the demonstration project (as selected from the HSA) is to strengthen the national IWRM process, give it credibility, and catalyse further political and stakeholder commitment. The use of agreed

priority issues to form the HSA and therefore demonstration project clearly reinforces the value of the demonstration project to the IWRM process.

In this regional project, the demonstration projects have an additional role which is to pilot IWRM approaches and activities which can then be replicated nationally and regionally across the Pacific. The above considerations were taken into account during the HSA process and the subsequent selection of the demonstration project.

4. Defining, weighting and prioritizing issues

Six Identification Sheets were prepared to provide a brief description of the three Hot Spots and the three Sensitive Issues. **Please see Section 5 (i-vi)**

The Hot Spots and Sensitive Issues were then weighted and ranked to allow a decision to be made as to which is of the highest priority, so that the demonstration Project could be designed to address this concern. It was possible to select a Hot Spot or a Sensitive Issue as the focus for the demonstration project.

In regards to the Hot Spots the issue of water shortage received the highest ranking. However the Water and Sanitation Committee took into account additional considerations (other than those in the tabled selection criteria) when making their final selection for the demonstration project. One consideration was that there are a number of water projects planned for Tuvalu which will be providing rainwater harvesting systems on a national, communal and household level. This will increase the amount of water available, and also increase the amount of water that will be used and require safe disposal. There are no other programs planned that will be addressing sanitation/wastewater management in an integrated way, especially for Funafuti. Improving sanitation, as well as water supply, is also a key challenge referred to in Te Kakeega 11, the Tuvalu National Strategy for Sustainable Development 2006-2015

Secondly, by including the trial of dry sanitation technology, (as well as improving technology and management of waterborne toilet systems), it is possible to address the concern of water shortage from a demand management perspective, ie reducing the amount of freshwater being used to flush toilets.

Thirdly some of the Sensitive Issues that were selected can be incorporated into the design of the sanitation project which involves addressing complex socio-economic and behavioural challenges. It is apparent on viewing the summary table at Section 8 that all these issues (Hot-spot and Sensitive) are inter-related. The emphasis on one aspect or another came from the particular perspective which committee members have in relation to their own field of work.

In addition the Water and Sanitation committee was made aware that Mr Taulima had announced at the second SIWRSM steering committee in Fiji in June 2007 that Tuvalu would be focusing on sanitation, and that it was one of the few countries in the regional program that was specifically tackling this issue.

The consensus decision of the Water and Sanitation Committee to focus on sanitation is supported by many reviews, reports and background papers that have been written about water management over the last 20 years

for Tuvalu. Many of these documents also recommended that some kind of alternative technology be trialed in order to address the consumption of rainwater for flushing toilets and also the pollution of groundwater and coastal waters by inappropriate waterborne systems.

A small number of composting toilets have been trialed in Tuvalu; four in the AusAID Waste Management Project and one during the International Waters Programme. The two systems that have been successfully used and maintained are in family homes (not public toilets). However few people know about the successful domestic installations. More people knew about the abandoned public composting toilets. There was not sufficient exposure to the technology to have any impact on attitudes. In the process of conducting the Hot-Spot Analysis, concerns about alternative sanitation and problems with acceptance were discussed. However by the end of the process most of the members of the Water and Sanitation Committee volunteered to be part of the trial and have a system installed in their home to use and monitor. It is a constructive step to have senior members of the community as participants in a demonstration project of this nature. The proposed demonstration project was also discussed with Mr Panapasi Nelesone, Secretary to Government, who pointed out that a 2005 Cost Benefit Analysis indicated that dry sanitation options were the most cost effective solution for Tuvalu, and it was necessary that this approach be rigorously and strategically marketed to achieve acceptance.

5. Descriptions of hot spots, sensitive areas and/or overriding issues

A. Poor Sanitation (Hot Spot)

Location: *Funafuti*

Surface area: *Funafuti: 270 hectares. Main settlement: Fongafale 142 hectares*

Context of the site:

a. Main human activity(ies) related to the site: *Residential, government, raising pigs, fishing in the lagoon, main island of Tuvalu where half the population live*

b. Natural conditions/phenomenon related to the site: *shallow groundwater, porous soil, saltwater intrusion in high tides*

Nature of threats and extent of threats (human and natural): *severe pollution of groundwater and lagoon due to malfunctioning and inappropriate sanitation systems, eutrophication of lagoon and growth of shoreline algae, destruction of coral and fish habitat, common waterborne disease especially in young children, rainwater used to flush toilets increases demand by 25-40%*

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Pollution from pig pens, septic tanks, pour flush latrines, waste oil from light industry (garages), solid waste leachate, household and medical chemicals.

Reports with Relevant Data:

Falkland T 1999. Water Management for Funafuti, Tuvalu AusAID

International Waters Project. 2005. Communications Strategy

Lal P, Saloa, S and Uili F.2006 Economics of Liquid Waste Management on Funafuti

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	high
Socio-economic significance	high	high	high

B. Insufficient water storage and risk of pollution of existing supplies (Hot spot)

Location: *Tuvalu - all island settlements*

Surface area: *26 sq km over 1.3 mill sq km of ocean*

Context of the site:

- a. Main human activities related to the site: *Residential, government, subsistence agriculture, raising pigs, fishing*
- b. Natural conditions/phenomenon related to the site/issue: *Tuvalu has average rainfall of 3500mm per year and rainwater harvesting is the primary water source.*

Nature of threats and extent of threats (human and natural):

Tuvalu has average rainfall of 3500mm per year, and this is primary water source. Groundwater has historically been used as secondary source where salinity is not prohibitive. However groundwater in Funafuti is now unfit for human use. During drought polluted saline water has been used for household needs. Poorly constructed and maintained rainwater harvesting systems and inadequate storage can result in a shortage of water after just a week without rain. People then turn to the government reserves for delivered water which can take some days

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Rainwater tanks can be polluted from dust and animal and bird droppings on roof and catchment areas. The Health Department recommends boiling rainwater before drinking. This is an energy demand and not always observed. For those that can afford it, bottled water from Fiji is now often preferred rather than taking the effort to boil it. Ministry of Health wants rainwater tanks to be chlorinated as a precautionary measure. Others disagree because of taste and possible health effects. Would be difficult to control and ensure correct procedure even in government reserves.

Reports with Relevant Data:

An Integrated Approach to Rainwater Harvesting Analysis using GIS and Recommendations for Roof Catchment Legislation in Tuvalu. CUSCO

Tuvalu Country Briefing Paper.SOPAC

Falkland T 1999. Water Management for Funafuti, Tuvalu AusAID

White I, Pacific 2004 Vulnerability and Adaptation Project. Background Paper

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	low
Socio-economic significance	high	high	low

C. No sludge collection or treatment (Hot Spot)

Location: *Funafuti*

Surface area: *Funafuti: 270 hectares. Main settlement: Fongafale 142 hectares*

Context of the site:

a. Main human activity(ies) related to the site: *Residential, government, raising pigs, fishing in the lagoon, main island of Tuvalu where half the population live*

b. Natural conditions/phenomenon related to the site: *shallow groundwater, porous soil, saltwater intrusion in high tides, limited land*

Nature of threats and extent of threats (human and natural): *threat to human health from handling raw sludge by emptying of tanks by hand and disposing of it in holes dug next to tank on house site, particular risk to children and environmental and health threat from septic tanks being full and not being emptied resulting in pollution of groundwater and lagoon.*

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Pollution from full septic tank overflow and not functioning properly, and disposal of sludge into holes dug into porous soil and water table on house site.

Reports with Relevant Data:

Falkland T 1999. Water Management for Funafuti, Tuvalu AusAID

International Waters Project. 2005. Communications Strategy

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	high
Socio-economic significance	high	high	low

D. Lack of Institutional support (Sensitive Issue)

Location: Tuvalu - all island settlements

Surface area: 26 sq km over 1.3 mill sq km of ocean

Context of the site:

- a. Main human activities related to the site: Residential, government, subsistence agriculture, raising pigs, fishing, small business, maritime training
- b. Natural conditions/phenomenon related to the site/issue:

There is no national plan in place for the management of water resources in Tuvalu. There was a ten-year master plan developed in 1992 which was shelved until recently when it was used to develop the draft Integrated Water Resource Management Plan, (which has not been endorsed by government) Only the Fisheries Act exists to manage marine water resources and protect inshore waters from vessel discharges.

Nature of threats and extent of threats (human and natural):

Lack of supportive legislation and building codes for management of water resources and wastewater ie rainwater harvesting systems, toilets etc. A draft Water Act requires revision and enactment. Community needs to understand necessity of building codes and be willing to apply them, as enforcement is difficult in small community where many people are related and intervention on private land is not appreciated.

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Reports with Relevant Data:

An Integrated Approach to Rainwater Harvesting Analysis using GIS and Recommendations for Roof Catchment Legislation in Tuvalu. CUSCO

Tuvalu Country Briefing Paper.SOPAC

Falkland T 1999. Water Management for Funafuti, Tuvalu AusAID

Saloa, S and Taulim F. Integrated Water Resources Management Plan 2006

White I, Pacific 2004 Vulnerability and Adaptation Project. Background Paper

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	low
Socio-economic significance	high	high	low

E. Un-coordinated multi-level management of water and waste water(*Sensitive Issue*)

Location: Tuvalu - all island settlements but most critical in Fongafale where population pressures exacerbate problems

Surface area: 26 sq km over 1.3 mill sq km of ocean

Context of the site:

a. Main human activities related to the site: *Residential, government, subsistence agriculture, raising pigs, fishing ,commerce*

b. Natural conditions/phenomenon related to the site/issue:

Conflicts relating to land use are common especially on Funafuti where conditions are crowded and many of the population are from the outer islands and do not have the same rights to access as the Funafuti landowners. Complex array of individual families, government and communal factions that have roles managing water issues. No water authority. No national water plan endorsed by government.

Nature of threats and extent of threats (human and natural):

Many levels of involvement with waters issues: government including overlapping roles (eg Ministry of Health and Ministry of Works and Energy and Waste Management Unit in Ministry of Home Affairs regarding sanitation), the Kaupule, individual families, land owners, tenants. Island development is controlled by the the Falekaupule and its executive arm the Kaupule On Funafuti there are some exceptions where government is providing facicities for its own use on land that it leases. Supervision of construction the Kaupule is virtually non existent so landowners do as they wish. Developments can result in negative impacts on public health and the environment. Difficult to resolve without everyone understanding consequence of threats, and much co-operation is needed between all the parties.

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Reports with Relevant Data:

An Integrated Approach to Rainwater Harvesting Analysis using GIS and Recommendations for Roof Catchment Legislation in Tuvalu. CUSCO

Tuvalu Country Briefing Paper.SOPAC

Falkland T 1999. Water Management for Funafuti, Tuvalu AusAID

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	low
Socio-economic significance	high	high	low

F. Unsustainable, unrealistic attitudes

Location: *Tuvalu - all island settlements but most critical in Fongafale where population pressures exacerbate problems*

Surface area: *26 sq km over 1.3 mill sq km of ocean*

Context of the site:

a. Main human activities related to the site: *Residential, government, subsistence agriculture, raising pigs, fishing*

b. Natural conditions/phenomenon related to the site/issue:

Tuvalu has average rainfall of 3500mm per year, and this is primary water source. Groundwater has historically been used as secondary source where salinity is not prohibitive, and is still the case on outer islands.

Nature of threats and extent of threats (human and natural):

Deeply ingrained beliefs/perception about our water resource: abundant despite shortages; should be free despite high cost of management/deliver; responsibility for clean water lies solely with government.

Guttering on households is often not maintained and it is generally recognised that people waste water. Groundwater in Funafuti is now unfit for human use. During drought polluted saline water has been used for household needs but there is little interest in taking the necessary steps to protect the groundwater so it can be used as a safe secondary source even in areas of low salinity, and there is limited interest by government in having groundwater comprehensively assessed. Some people commented that if everyone took care of their rainwater harvesting system there would be sufficient storage even now.

6. If heavy incidence of pollution, list the type of source (point, non point, diffuse) and pre-identify the exact source(s):

Reports with Relevant Data:

Value of the site:	Local	National	Regional/global
Environmental significance	high	high	low
Socio-economic significance	high	high	low

6. Aggregated Scoring Table for Hot-Spot areas

Once the various hot-spots and sensitive issues had been selected it was possible to rank and weight the issues using certain criteria of importance to GEF. The following table indicated the highest score being for water shortage.

The table below shows the Hot Spots weighted and ranked to allow prioritisation

	criteria	hot-spot	1	2	3
1	Size of affected area (as percentage of total national land area)		8	8	8
2	Affected population (as percentage of national population)		12	12	12
3	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support the livelihood of local communities (<i>e.g.</i> subsistence or commercial farming, forestry, mining, tourism, fisheries)		16	16	16
4	Extent to which the natural watershed or aquifer and any associated receiving coastal and marine waters support the national development (<i>e.g.</i> commercial farming, forestry, mining, tourism, fisheries)		8	8	8
5	Extent to which the site is a recognised government priority (refer to National Sustainable Development Strategy, or other strategic action plans <i>e.g.</i> NEAPs.		9	15	9
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.).	2	2	2
7	Degree of Degradation at the site (e.g. type of degradation)	12	12	9
8	Extent of degradation on watershed/aquifer and any receiving coastal and marine resources and systems	10	8	6
	TOTAL SCORE (actual score with multiplications for weighting)	77	81	72
	NORMALISED SCORE (i.e. as a percentage of a possible top score of 100)	77%	81%	72%

	Key issues relevant to the hot-spots:	<p>1- Microbiological pollution of groundwater and eutrophication of lagoon</p> <p>2- Freshwater shortage: insufficient storage, and poor maintenance of rainwater harvesting systems</p> <p>3. No collection or treatment of septic tank sludge: tanks not functioning and exposure to raw sludge while emptying</p>
--	---------------------------------------	---

7. Aggregated Scoring Table for Sensitive Areas

A similar process was conducted with the Sensitive Issues. These issues are not totally distinct from each other but were different enough to be considered as separate issues for the purposes of defining and ranking.

	<i>Criteria</i>	<i>sensitive area</i>	1	2	3
1	Size of area at risk		10	10	10
2	Population at risk (please define the population)		15	15	15
3	Extent to which the natural watershed and any associated coastal and marine resources support the livelihood of local communities (for instance, in the case of tourism, fisheries, etc)		8	8	8
4	Extent to which the natural watershed, and any associated coastal and marine resources support the national development (for instance, in the case of tourism, fisheries, etc)		16	16	16
5	Extent to which the site is a government priority (refer to NEAP or other strategic environmental action programme)		6	12	9
6	Extent to which the site is of regional and/or global significance and priority (see WWF ecoregions, IUCN categories, etc.).		6	4	4
7	Biodiversity value of the site		9	9	6
8	Cultural value of the site		8	8	8
9	Extent of involvement of communities in local management		4	10	2
	TOTAL SCORE (actual score multiplied by weighting)		82	92	78
	NORMALISED SCORE (percentage of possible top score of 125)		65%	73%	62%
	<u>Key issues</u> relevant to the sensitive area	1. lack of supportive legislation and building codes for management of water resources and wastewater ie			

		<p>rainwater harvesting systems, toilets etc</p> <p>2. complex array of individual families, government and communal factions that have roles managing water issues, thus causing poor management and negative impact on public health and environment.</p> <p>3. Deeply ingrained beliefs/perception about our water resource: abundant despite shortages; should be free despite high cost of management/delivery, responsibility for clean water lies solely with government</p>
--	--	---

8. Conclusion: Summary Table of Prioritized Hot-Spots and Sensitive Areas

Country: Tuvalu - Total population: 9561 (census 2002)

Major Integrated Water Resource and Wastewater Management Issues:

Selected Hot-Spots			
	Title	Score	Priority Issue
Hot-Spot 1	National freshwater shortage	81%	Insufficient storage and poor maintenance of rainwater harvesting systems.
Hot-Spot 2	Poor sanitation in Funafuti	77%	Microbiological pollution of groundwater and eutrophication of Funafuti lagoon
Hot-Spot 3	No collection or treatment of septic tank sludge	72%	Tanks not functioning because full, and health risk of exposure to raw sludge while emptying
Selected Sensitive Areas			
	Title	Score	Priority Issue
Sensitive Area/issue 1	Un-coordinated multi-level management of water and waste water	73%	complex array of individual families, government and communal factions that have roles managing water issues, thus causing poor management negative impact on public health and environment
Sensitive Area/issue 2	Lack of institutional support	65%	Lack of supportive legislation, management plan and building codes for management of water resources and wastewater ie rainwater harvesting systems, toilets etc
Sensitive Area/issue 3	Unsustainable attitudes	62%	Deeply ingrained beliefs/perception about our water resource: abundant despite shortages; should be free despite high cost of management/delivery; responsibility for clean water lies solely with government