Sustainable Integrated Water Resources and Wastewater Management in Pacific Island Countries

National Integrated Water Resource Management Diagnostic Report

Vanuatu

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GLOBAL ENVIRONMENT FACILITY

UNDP

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UNEP

ACRONYMS

AUSAID	Australian International Aid Agency
BSAP	Biological Strategy and Action Plan
CIDA	Canadian International Development Agency
CHARM	Comprehensive Hazard and Risk Management
COLP	Code of Logging Practice
CRP	Comprehensive Reform Program
DGMWR	Department of Geology, Mines and Water Resources
FSP	Foundation of the Peoples of the South Pacific
GEF	Global Environment Facility
GIP	Government Investment Program
HELP	Hydrology Environment and Life Policy program
HYCOS	Hydrological Cycle Observing System
IAS - USP	Institute of Applied Science (University of the South Pacific)
IWRM	Integrated Water Resource Management
LDC	Least Developed Country
LUPO	Land Use Planning Project Office
MEA	Multilateral Environmental Agreements
MLNR	Ministry of Lands and Natural Resources
MTEF	Medium Term Expenditure Framework
NACCC	National Advisory Committee on Climate Change
NAPA	National Adaptation Plan of Action
NGO	Non Government Organisation
NIWA	National Institute for Water and Atmospheric Research Limited New Zealand
NWRMAC	National Water Resource Management Advisory Committee
NZAID	New Zealand Agency for International Development
ORSTOM	Institut De Recherché Pour Le Development (now IRD)
PAA	Priorities and Action Agenda
RAP	Regional Action Programme
REDI	Rural Economic Development Initiative
SAP	Strategic Action Programme
SIDS	Small Island Developing States
SOPAC	Pacific Islands Applied Geoscience Commission
SPREP	South Pacific Regional Environment Program
TRMC	Tagabe River Management Committee
UNDP	United Nations Development Programme

VANRIS	Vanuatu Natural Resources Information System
VCCAP	Vanuatu Climate Change Adaptation Project
VRDTCA	Vanuatu Rural development Training Centre Association
VIBA	Vanuatu Island Bungalows Association
VIP	Ventilated Improved Pit
WHO	World Health Organization
WMO	World Meteorological Organisation
WMP	Water Management Plan
WSP	Water Safety Plan
WSSD	World Summit on Sustainable Development
WUE	Water Use Efficiency

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EXECUTIVE SUMMARY

Introduction

Water has been high on the agenda at international sustainability forums for over a decade. During the World Summit on Sustainable Development in 2002 the international community re-confirmed support for the United Nations Millennium Development Goals. By 2015:

- To half the number of people without access to basic sanitation
- To half the proportion of people without sustainable access to safe drinking water.

These goals are a big challenge to small Pacific Islands Countries with their small land masses, remote locations and small but rapidly growing populations making them vulnerable. Vanuatu shares these and other challenges to sustainable development. In Vanuatu real GDP per capita is still lower than in the 1980s, infrastructure is poorly developed, the population is rapidly growing at 2.6% per year, water resources are declining and in many places contaminated, and household water supplies are inadequate or absent. The country's capital and human resources are stretched and a better forward is needed.

To achieve the millennium development goals, international forums recognise a need for reform and capacity building focusing on the development of a cross-cutting approach to water resource management. A sustainable water and waste water management program for Pacific Island Countries has been developed with the long term objective of assisting them to implement applicable and effective integrated Water Resource Management (IWRM) and Water Use Efficiency (WUE) plans.

Water Resource Management

The more than 80 islands of the archipelago of Vanuatu are heterogeneous such that some of the larger more mountainous islands have good ground and surface water resources whilst others have either ground or surface water or rely entirely on rainwater catchment. Water reuse has not been considered and desalination has been important after natural disasters destroyed water sources. Several makes of bottled water are commonly available in supermarkets.

Urban (Port Vila) water supply is provided by a private company, UNELCO, from a shallow aquifer. Provincial (Luganville, Lakatoro, Isangel) water supplies are provided by the Public Works Department (PWD) from local bores. Water quality is generally good with chlorine the only treatment. Rural water supplies are all donor-funded and community operated and managed, being either hand pump, well, or water catchment.

Concerns about water resources focus on the lack of planned methodical water resource assessment and monitoring from which to establish good management practices. Infrequent monitoring and anecdotal evidence focuses concern on:

- Lack of information on sectoral demand;
- Declining ground water levels in areas of high density use with competing demands such as Tagabe River catchment in Port Vila;
- Contamination of ground and surface water in areas of high density living, septic tank use and cattle grazing , e.g. Tagabe River Catchment;
- Decline in coastal water quality where septic tanks are used in high density along the coast such as Mele Bay and Erakor Lagoon;
- Several point sources of pollution go unchecked;

- Water resource surveillance and monitoring is poor, severely under resourced and there is only one private lab capable of reliable water quality testing; and
- Information on water resources is not easily available or shared with other policy makers, managers or users.

Measures to manage impacts and concerns:

- Water Protection Zones for all provincial water supplies to be gazetted – use the Tagabe Watershed Model.
- Water conservation advocacy and awareness material to be developed and distributed.
- Water Safety Plans and Water Quality Monitoring plans to be pursued inter-sectorally and coordinated by the National Water Resource Management Advisory Committee (NWRMAC).
- Develop a structured strategic approach to establishing a national network for water resource assessment and monitoring, including a database and GIS mapping (VANRIS) of water resources and watersheds.
- Cross-sectoral sharing of water resource information for strategic and specific planning.
- Policies and plans to implement the Water Resources Act and Environment and Conservation Act to support water resource conservation and protection.
- Application and enforcement of the Water Resource Management Act, Environment and Conservation Act, and Public Health Act would provide an adequate basis for water resource management.

Island Vulnerability

Vanuatu is situated on the Ring of Fire making it prone to numerous and severe earthquakes, and is in the centre of the South Pacific's Cyclone Alley. It is the most disaster prone country in the South Pacific and the fourth most disaster prone country in the world. Vanuatu's population is concentrated along the coastal environment that plays a vital role in the subsistence and commercial life of ni-Vanuatu. Increased human activity in this coastal environment is placing greater pressure on sensitive areas such as beaches, coral reefs and mangroves. Plus, atolls, low-lying islands, and low-lying coastal areas of Vanuatu are particularly susceptible to erosion, flooding and inundation during storm surges, high seas, sea level rise and periods of intense rainfall. The social and economic costs of these disasters are significant. The cost of cyclone Uma (1987) alone was US$25 million, and the earthquake in 2002 US$2.5 million.

Vanuatu is poorly prepared for such disasters. This lack of preparation is exacerbated by poor infrastructure nation wide making communication and access to outer islands difficult either in implementing a warning or in providing assistance after a disaster.

Measures to manage impacts and concerns:

- Develop plans and actions for implementing the National Adaptation strategy;
- Greater cross-sectoral sharing of information and approaches;
- Mapped information on water resources and island vulnerability to hazards;
- Improved communications services and early warning systems to outer islands; and
- Greater involvement and contribution by communities in understanding the risks, and planning and preparing for disasters.

Awareness and Advocacy

There are numerous initiatives in Vanuatu to increase awareness and knowledge of water resources and efficient water resource use and management. A few are delivered through government agencies such as the DGMWR, Public Health, and Environment Unit - most of which are donor funded. By far the majority of awareness campaigns are delivered through NGOs - all of which are donor funded. UNELCO, a private water distributor also provides water conservation and education materials for schools.

Concerns regarding awareness and advocacy focus on:

- Government programmes being infrequent and sector based;
- The lack of a coordinated approach between government and NGOs;
- The need and difficulty of being women inclusive;
- Conflicts with custom land tenure and resource ownership; and
- The enormous difficulty of reaching outer islands on a regular basis;

Measures to manage impacts and concerns:

- Integrate community education and awareness into core government business;
- Establish awareness and advocacy high on government agenda;
- Collaborate effectively with NGO and private sector in a coordinated manner to work towards a common purpose; and
- Use the NWRMAC as a form to coordinate this.

Technology

Water supply in Vanuatu is divided between urban and rural supplies with responsibilities delegated to two government departments – PWD and DGMWR respectively. Government focus has however been on the urban centre of Port Vila where water supply delivery is privatised under concession to a French operating company UNELCO until 2032.

The Rural Water Supply (RWS) Section of the DGMWR has responsibility for rural water supply system delivery countrywide. These comprise wells, boreholes, surface water collection, and rainwater catchments. Many water sources are unprotected and affected by pollution, and in some cases contaminated by volcanic ash and gas emissions, and increasingly, saline intrusion to groundwater. Desalination, provided in the past as emergency relief only, is now being donor-funded for Ra Island in the northern Banks group and Aniwa in the south. Water supplies are operated and managed by community committees. RWS estimate 65% of the rural population is covered with adequate water supplies.

In Vanuatu there is still no direct legislation or regulations governing sanitation. No government department or local authority therefore takes direct responsible and no country statistics on sanitation facilities are available through the Government Statistics Office. Yet the Municipal and Provincial Councils have responsibilities in the general area of health and sanitation and the Health Department has more explicit responsibilities for sanitation and waste disposal through the Public Health Act.

Septic tanks are used for all formal developments in urban areas along with VIP and water seal type pit latrines. Non-formal housing areas have very poor sanitation services causing ground and water pollution and danger to human health. Rural areas generally have very poor sanitation facilities mostly comprising pit latrines or bush toilets.

Hotels and the Port Vila hospital have wastewater treatment plants that are mostly operating beyond capacity. The hospital and some hotel plants are monitored by UNLECO. Storm water is poorly managed in urban and provincial centres and solid waste collection is in response to need (and often not meeting need) rather than according to a plan.

Concerns regarding technology include:

- Water supply does not meet demand in either urban or rural areas;
- The omission to regulate and manage sanitation requires urgent attention;
- In high-density living areas, poor waste management is impacting both human and environmental health; and
- All government and municipal water supply providers are severely constrained by limited human and financial resources.

Measures to manage impacts and concerns:

- Focus on implementing the Priorities and Action Agenda (PAA);
- Develop regulations and standards to manage sanitation;
- Develop a solid waste management plan; and
- Develop awareness and education material for water conservation.

Institutional arrangements

Until recently most Vanuatu government programmes and policies were sectoral in approach, lacked strategic vision and tended to be reactive rather than proactive. The Priorities and Action Agenda (PAA) 2006-2015 is a high-level set of priorities and strategies with a ten-year timeframe giving the vision for Vanuatu as "An Educated, Healthy & Wealthy Vanuatu". The Government believes that raising the welfare of the people of Vanuatu will be achieved through: higher sustainable economic growth to create jobs and raise incomes while conserving resources for future generations; ensuring macroeconomic stability to create a stable investment climate; and raising standards of service delivery particularly to rural and outer regions to improve access to basic health and primary education services while lowering costs of internal trade. The main PAA reference to the water sector is to state as an overarching strategic priority "the provision of better basic services; especially in rural areas".

The Ministry of Lands and Natural Resources comprises a large number of departments and the challenge is to integrate the different sectors and establish a long-term strategic approach and policies within the one Ministry that is proactive rather than reactive. The Ministry is currently undertaking a strategic planning exercise and working on a National Water Strategy. The draft goal of the strategy is "*Sustainable access to safe water for the people of Vanuatu to support improved public health and promote economic development".*

There are several pieces of legislation that if implemented and enforced would provide an excellent basis for managing Vanuatu's water resources. Yet much of it is not activated. Policies tend to be reactive rather than proactive and implicit or inferred rather than explicit.

The NWRMAC is a forum for inter-sectoral collaboration, debate and policy and planning development. To date it has been reactive rather than proactive and developed little in terms of policy advice and planning with the exception of the Tagabe Catchment Management Committee and protection of the Tagabe River and water supply. This is an excellent example to be modelled.

Major issues and concerns:

- Sectoral planning has not met resource management needs, and failed to address customary land tenure and resource ownership issues;
- The lack of capacity to interpret, implement and enforce existing legislation;
- NWRMAC has been reactive and needs to refocus on inter-sectoral policy development;
- All departments are seriously short of human and financial resources;
- Lack of sustainability and coordination of external interventions; and
- There is a serious lack of information.

Measures to manage impacts and concerns:

- Focus on developing Ministerial and Departmental plans to implement the PAA;
- Further analysis required to establish reasons for non-compliance with legislation so that these issues are addressed before establishing compliance and enforcement rules and regulations and methods to enforce them.
- Develop standards for water quality, delivery and service and systems for ensuring compliance.
- Digitise information systems and make them available to other sectors in a useable format. This has begun in the Ministry of Lands and Natural Resources.
- Develop a central system for holding government publications in a way that makes them available to others to use e.g. update this facility in the National Library.
- Focus on human resource development.

Financing

Rural water supplies are donor-funded and managed and operated by communities, and urban water supplies are funded by fees and tariffs with prices set according to government agreements. UNELCO provides a working model for privatised service delivery whereas PWD is subsidised by government even though operating under the same fee and tariff structure.

Concerns

- Constraints and challenges in providing adequate and efficient infrastructure, utilities and supporting services are both physical and structural;
- The requirement for communities to operate and manage their own water supplies when they are mostly subsistence farmers is onerous; and
- All departments are seriously under resourced.

Measures to manage impacts and concerns:

- UNELCO provides a model for urban water supply delivery and benchmark PWD efficiencies and systems;
- Learn from other working models of community water supply operation and management;
- Establish a utilities board or further privatise water supply delivery in urban and provincial centres.
- Private public partnerships for water supply delivery and sanitation services deserve further investigation.

- Fulfil the obligations under the Health Act and encompass sanitation and water supply as a health policy. Capacity within the Public Health Department needs developing to undertake this.
- IWRM is an opportunity to gain cross-sectoral commitment to water resource management and gain efficiencies through collaboration and working towards a common purpose.

Linkages to other areas

Vanuatu is an agriculture-based largely subsistence economy. It lacks a national landuse policy and any impacts on water resources or watersheds currently need to be managed within other existing policies.

There are seventeen protected areas with primary threats to them being lack of research and ecological knowledge and poor knowledge and involvement of communities in establishing and managing the reserves.

Scabies, skin diseases and malaria are three of the most common health issues in Vanuatu with a consequent reduction in the wellbeing and productive capacity of the people. Epidemics of malaria can occur during both the dry and wet season, with outbreaks occurring when rainfall, floods, and poor drainage and waste management provide pools of water that are favourable breeding sites for the mosquito. Unfortunately statistical health data was not available during the preparation of this report.

Increased human pressures on coastal environments are increasing vulnerability of coastal areas to erosion, sedimentation, pollution, and climate and sea-level variations and change. Much of Vanuatu's significant infrastructure has been developed within metres of the shoreline. Pollution in Port Vila Harbour from land-based activities and water-borne pollutants in particular has been highlighted for over a decade with no real action to date. Throughout Vanuatu, coastal fisheries on which many islanders depend are declining due to a combination of overfishing, pollution from chemicals and animal and human waste, in-fill, sedimentation, and climate change. Outside the system of reserves, no formal sectoral linkages are currently known to plan for or manage coastal development or the impacts of land based activities on waterways and coastal ecosystems.

Stakeholder engagement

Consulting with stakeholders and ensuring their contribution is a fundamental building block of inter-sectoral sustainability at all stages of planning, implementation, monitoring reflection and learning.

Unfortunately, this report was prepared at short notice prohibiting extensive stakeholder engagement. NWRMAC was the main forum for dialogue and collaboration plus extensive departmental interviews. A significant issue that emerged during consultation for this report was an overriding concern from all consulted that they had not had adequate involvement in developing IWRM concept and to date were unsure of how Vanuatu would participate, what would be involved, and how it fits with existing programmes, responsibilities and plans. There is therefore little understanding of IWRM and little ownership of the process or outcome within Vanuatu.

Other programmes related to IWRM

There are a significant number of other programmes and activities that are related to or impact IWRM.

Capacity needs for removing barriers

Capacity is the most limiting factor in implementing IWRM and significant opportunity exists here to provide rewarding improvements through training, secondments, and new approaches. Most importantly, the first requirement for capacity development targeted to implementing IWRM is for the water resource sector in Vanuatu to review the information, outcomes and recommendations of this report, to use it as the basis for developing their own set of capacity development needs and IWRM approaches. It would be important that this is a facilitated process with the intention of developing this outcome. This report is a resource for this process not a definitive statement.

It is recommended that as far as possible training should be delivered on a regional basis, which provides the opportunity to develop networks or communities of practice so that people may share their questions, reflections and learning regionally and provide support and encouragement. Regional training would ensure that communities of practice share a common understanding and language.

Training will focus on: leadership; policy development; technical capabilities; awareness participation facilitation and information sharing.

Vanuatu is encouraged to continue to address the need for a regulatory authority and the need for regulation and management of sanitation services. The best option here is to seek advice from Vanuatu on what, if any, assistance they may want or need to progress these issues.

Integrated approach towards barrier removal

Integrated water resources planning and management aims to take appropriate account of important physical, social, economic and cultural linkages within a water resources system, such as:

- physical linkages between land use and surface and groundwater quantity and quality;
- economic linkages between various, and sometimes competing water uses;
- social linkages between water development schemes and potential beneficiaries or those adversely affected; and
- institutional linkages, both horizontally and vertically, among various formal and non-formal stakeholder institutions.

Integration and inclusion of cross-sectoral resource management and planning as well as institutional planning and integration would logically be facilitated by NWRMAC. In order to achieve this, the composition of the committee will need to be reviewed and the committee receive strategic planning and management, and policy development training.

Most critically, IWRM must be a long-term commitment. Global, regional and local support agencies must be prepared to support this initiative into the foreseeable future. To withdraw or change direction substantially would be to hold countries into the donor-funded project cycle of design, implementation, withdraw, collapse which has created such dependency.

A strategy for developing an integrated approach to water resource management could be structured into four areas:

- Research
- Public Awareness
- Capacity Building
- Policy and Institutional Development

The following is proposed.

a. Research

Water resource data. Water resource assessment, identifying rivers, ground water levels, catchments, watersheds, needs to be undertaken systematically across the country and developed into an easily accessible and useable database that can be shared across sectors.

- Systematic water quality assessment is required nationally to determine water quality data for developing water quality standards.
- Water quality monitoring needs to be undertaken systematically for all water supplies developed across the country to protect human and environmental health.

These activities should be led by DGMWR and bring in other sectors using the NWRMAC as a working forum to discuss, design and implement plans.

Habitats and ecosystems. Habitats and ecosystems (including commercial and indigenous forests, wetlands, and endangered habitats) need to be characterised and defined nationally. This is the responsibility of the Environment Unit and Department of Forestry.

Health. Health data from across the country – which is currently held by Ministry of Health, could be mapped. Overlaying this with water resource data could be very revealing. Department of Health may need to review how their data is recorded and stored to make it available for use by others and particularly to include it in VANRIS.

Sanitation Research on appropriate sanitation systems based on water resource data and ecosystems could be used to develop a systematic approach to sanitation standards and guidelines across the country. This is a multi-sector responsibility that could also use the NWRMAC as a working forum.

Vulnerability. Work on identifying islands vulnerable to disaster, including climate change to continue and be mapped and included in VANRIS. Research by the Meteorological service to be continued and entered into the VANRIS maps.

*Impact assessments***.** Impact assessments of activities such as agriculture and forestry on watersheds needs to be undertaken systematically to provide base data for policy development.

- Further research required on economic impacts of disasters to provide information to drive policy decisions. To be driven by Environment Unit and National Disaster Management Office.

*Information management***.** Information management needs to be developed and digitised across all sectors.

- Accurate and reliable records are required for all the above research activities.
- The existing VANRIS mapping system is excellent, if incomplete. It is critical that these records continue to be developed and information from the above research activities recorded in VANRIS.
- Most importantly, the information in VANRIS needs to be accessible to all policy makers across the sectors.
- The existing rural waster supply database is good. It needs updating and improving so that it is can be compared with Vanuatu Statistics.

This is across all departments and sectors.

b. Public awareness

Water is a multi-stakeholder issue, and partnerships of all interested and affected parties are a viable mechanism to translate IWRM into practice. There is a need to closely examine participation based on economic status, age, gender, religion and indigenous/cultural status to ensure inclusiveness.

Public awareness is being addressed in a multi-faceted way.

- Support in terms of resources and information could be provided to NGOs who are already delivering community awareness programmes to ensure that a unified approach to IWRM is being applied across the country.
- Government departments to integrate community awareness into their core responsibilities and look to NGOs or other private sector assistance to deliver these programmes where appropriate.

c. Capacity building

Leadership. One of the most critical issues in Vanuatu is leadership at all levels of government and civil society.

- Strategic thinking and planning is critical to Vanuatu developing Ministerial plans and scenarios to implement the well thought through PAA.
- Research and information needs to be translated into meaningful and enforceable policy across all sectors.
- Develop capacity of national coordinating bodies such as the NWRMAC to coordinate activities and address policy and inter-sectoral issues.

Technical. Training to develop water assessment programmes (quantity and quality) and to record and analyse data.

- Technical capacity across sectors to understand and use the VANRIS data for a variety of different applications.
- Technical capabilities to design and build appropriate sanitation is required.

d. Policy and institutional development

The PAA 2006-2015 and the National Adaptation Plan of Action (NAPA) have both identified an intended strategic way forward. Policies and institutional developments must focus on medium term expenditure framework (MTEF). Actions could include:

- Policies, regulations, standards and actions to implement existing legislation e.g. Water Resource Management Act, Environment and Conservation Act.
- With respect to the above a decision needs to be made on determining whether government or private enterprise will provide water quality monitoring activities.
- Continue the review of land policy to address ongoing land ownership issues.
- Gaps in government responsibilities to be addressed such as providing for the regulation of wastewater and sanitation. Standards and delivery could be provided by PWD and surveillance by Ministry of Health.
- Polices for corporatisation of utilities and services and privatisation where feasible.
- Establishing a Regulatory Authority for delivery of utilities and services to set a standard of delivery and keep tariffs at a reasonable level.

- Tariffs for service delivery should fully recover capital and operating costs, or if there are social obligations, they should be determined and funded in a transparent manner through government subsidies.
- Ensure all regional intervention programmes such as Water Safety Plan (WSP) and Water Management Plan (WMP), Biodiversity, etc are compatible with IWRM so that a unified approach is being delivered.

1. INTRODUCTION

1.1 The Need for an integrated approach to water resource management

Small Island Development States including Pacific Island Countries share many environmental and economic challenges to sustainable development. Their small land masses, remote locations and small but rapidly growing populations make them vulnerable. Vanuatu shares these challenges with real GDP per capita still lower than in the 1980s,[1] poorly developed infrastructure, a rapidly growing population, water resources declining and in many places contaminated, and household water supplies inadequate or absent in other than the main centres. The country's capital and human resources are stretched and better coordination and cooperation would encourage greater efficiency and effectiveness.

In 1997 the Strategic Action Program (SAP) for the International Waters of the Pacific Islands identified these trans-boundary concerns for Pacific Island International Waters:

- Pollution of marine and freshwater (including groundwater) from land-based activities
- Physical, ecological and hydrological modification of critical habitats
- Unsustainable exploitation of living and nonliving resources

The SAP proposed Integrated Coastal and Watershed Management, and Oceanic Fisheries Management as strategies to address these concerns.

In 2002 the World Summit on Sustainable Development (WSSD) placed Small Island Developing States (SIDS) high on the agenda and identified the need to urgently assist them to remove barriers to sustainable development. In particular, the WSSD adopted the following requirements relevant to an integrated approach to water resource management:

- The need to provide support for the development and implementation of freshwater programmes
- The need to provide support to reduce and manage waste and pollution
- The need to build capacity for maintenance and management of water delivery systems and sanitation services.

During the WSSD the international community re-confirmed support for the United Nations Millennium Development Goals to:

- half by 2015 the number of people without access to basic sanitation
- half by 2015 the proportion of people without sustainable access to safe drinking water.

To help achieve these goals the WSSD supported the Integrated Water Resource Management (IWRM) and Water Use Efficiency (WUE) plans.

In January 2005 the Mauritius Strategy highlighted that SIDS now continuously face water access and management challenges and focused in particular on those challenges associated with:

- Deficiencies in water availability (many islands have no surface or groundwater)
- Water catchment and storage (many villages yet to adequately catch and store water)
- Pollution of surface and groundwater as well as coasts and lagoons
- Saline intrusion into ground water
- Leakage in water distribution

[1] Government of Vanuatu. 2006. Priorities and Action Agenda 2006-2015 "An educated Healthy Wealthy Vanuatu" Department of Economic and Sector Planning, Ministry of Finance and Economic Management June 2006

The Mauritius Strategy is supported by the Global Environment Fund (GEF) Business Plan which recognises the urgency of assisting SIDS to address:

- Water scarcity (and associated need for efficiency of water resource use) and
- A more integrated approach to the management of ground and surface water supplies.

The GEF Plan further recognises a need for reform and capacity building focusing on the development of a cross-cutting approach to water resource management that captures the relationship to other key GEF focal areas such as land degradation, biodiversity and climate change, particularly adaptation.

The 3rd World Water Forum 2003 identified that in addressing the challenge of balancing increasing human requirements for adequate water supplies and improved health and sanitation with food production, transportation, energy and environmental needs, most countries will require more effective governance, improved capacity and adequate financing. Inclusive, community level public participation is fundamental to achieving these goals. Our common basic requirement for water is an opportunity for cooperation and peace. The Pacific Regional Action Plan, which has now been ratified by 18 Pacific Island countries, includes commitments for development of several national water sector actions, and for the refocusing of donor assistance on the critical issues of hydrology, water loss reduction, governance and awareness.

Core shared characteristics of Pacific Island countries that lead to these regional concerns and initiatives include:

Environmental

- Small, low-lying and isolated (and therefore vulnerable to climate change and associated storms, drought and sea-level rise)
- Globally significant biodiversity (rare and endemic species)
- High pollution levels (lack of infrastructure or storage options)
- Water availability unreliable (limited access to surface water, porous soils and rock)
- Absence of effective water storage and distribution
- High pressure on land use

Economic

- Small population sizes
- Limited human resources
- Limited natural resources
- Small GDPs
- Limited land areas

To halt the continuing decline in environmental, economic and social wellbeing of small Pacific Island countries the IWRM proposes:

- An assessment of existing water resources
- Improvement of national information capture and database capacities
- An enhanced system of information sharing and networking between SIDS
- Increased efforts at sensitisation and awareness across all sectors

- Capacity building and training in IWRM and WUE
- Development of appropriate IWRM and WUE plans on a national basis
- Model demonstrations of appropriate IWRM and WUE technologies and methodologies at both the national and local level (and their transfer and replication)
- The design and implementation of policy, legislative and institutional reform mechanisms relating to IWRM/WUE
- Assistance to adopt and implement IWRM Plans

An expected set of project components would include:

- A set of national IWRM and WUE Plans adopted and endorsed by each country with implementation plans
- A series of completed demonstrations of IWRM and WUE approaches and technologies that can be transferred and replicated to appropriate PICs scenarios
- Adoption and implementation of monitoring and evaluation programmes for each country focusing on appropriate indicators
- Effective networking, information and knowledge sharing between PICs and with other regional SIDS groups (e.g. Caribbean, Indian Ocean, etc).

1.2 Objectives of sustainable water resource and wastewater management project in Pacific Island countries

Long term objective of the sustainable water and waste water management project for Pacific Island countries is to assist PICs to implement applicable and effective IWRM and WUE plans in the Pacific region.

Targeted actions to be carried out during Phase B of project development include:

1. Develop or strengthen National Inter-sectoral Water Committees in each country
2. Develop demonstration projects
3. Produce a full brief through an extensive consultative process

Description of deliverables

1. National IWRM/WUE reports provide the necessary information that explains and justifies why there is a need for GEF assistance, and the foundation and background for then logically identifying the priority issues and areas in each country.
2. Hot spots Analyses follow on from the IWRM/WUE reports to identify and classify specific priority hot spots and sensitive areas for each country that will justify the proposed demonstrations.
3. Demonstration activities based on deliverables 1 and 2 are developed into full demonstration activities (national projects within the overall regional Project).

1.3 Scope of the Report

This report describes the water resource situation in Vanuatu, identifies issues and concerns for water resource conservation and management, and collates measures for integrated water resource management.

Section 2 provides a general overview with background information on Vanuatu. Section 3 describes integrated water resource management in six thematic areas; Water Resources Management; Island Vulnerability; Awareness and Advocacy; Technology; Institutional Arrangements; and Financing. Key messages under each theme are identified with supporting statements and priority actions for each theme area. Linkages to other areas that affect or are affected by water resources – landuse, agriculture, habitats and ecosystem management, health and hygiene, and watershed and coastal management are described in Section 4. Section 5 discusses stakeholder involvement in preparation of this diagnostic report. There are also other programmes in Vanuatu related to IWRM which are identified in Section 6. The final two Sections 7 and 8 discuss capacity development needs for removing barriers and options for introducing an integrated approach towards barrier removal respectively.

2. GENERAL OVERVIEW

2.1 Country Background[2]

Islands

Vanuatu is an archipelago of over 80 islands stretching 1,176 km from north to south in the Melanesian Southwest Pacific. Total land area is 12,281 km^2 with an expansive sea border comprising an Exclusive Economic Zone of 680,000 km^2. A map showing the Islands, main centres and location of Vanuatu in the South Pacific is provided overleaf.

There are six main island groups in the Republic comprising the country's six provinces – Malampa, Penama, Sanma, Shefa, Tafea and Torba. Only 12 islands are considered significant in terms of their economy and population. The largest is Espiritu Santo (4010 km^2), Malekula (2069 km^2), Efate (980 km^2), and Erromango (975 km^2). Santo also boasts the country's highest peak Mt. Tabwemasana at 1,879m.

Most islands are either mountainous or steeply undulating covered by tropical forest and secondary growth with coconut plantations and agriculture dominant on the narrow coastal plains.

Geology

Vanuatu emerged from the sea about 22 million years ago when a series of earth movements on the ocean floor forced huge underwater mountains to surface and create the northern islands. The southern islands are much younger emerging between about 5 and 11 million years ago.

Over the last 2 million years there has been continued slow uplift and the formation of fringing coral reefs. Today some areas of Vanuatu such as west Efate are being uplifted at 2 cm per year whilst other areas are subsiding. The islands are of raised limestone and/or volcanic origin.

Disasters

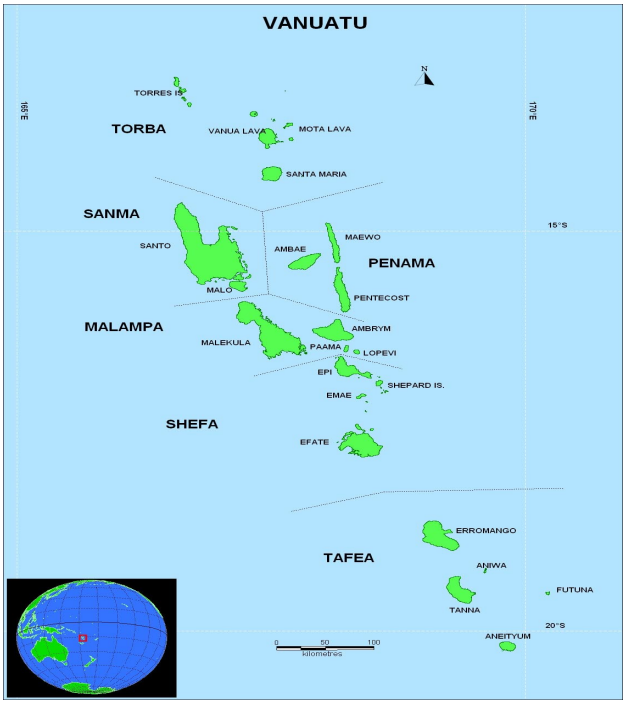
Vanuatu lies clearly on the Pacific Ring of Fire and on the edge of the Pacific tectonic plate which is being forced up and over the Indo-Australian tectonic plate to the west causing frequent earthquakes and volcanic eruptions. Vanuatu has nine active volcanoes with Mt. Yasur on Tanna island being the most famous and Mt. Garet on Gaua possibly the most dangerous.

Seismologists measure numerous earthquakes with one in 2002 rating over seven on the Richter scale and causing considerable damage. Tsunamis resulting from earthquakes are also dangers in Vanuatu and sea level rise is now causing the evacuation of some small coastal villages. Cyclones

[2] Statistics in this section come from the Statistical Year Book of Vanuatu 2002 unless otherwise stated.

can also be very destructive during December to April depositing heavy rain in mountainous areas (up to 1,000 mm can fall in 48 hours) and strong winds.

Map showing the Republic of Vanuatu



Source? *'Off the Interner'*

Climate

Vanuatu's climate varies from wet tropical in the north to subtropical in the south with drier rainshadows in between.

From May through September a fresh southeasterly breeze gives fine sunny days and cooler nights. November to April is the wet season with higher temperatures, heavy rain and occasional cyclones. Heaviest rain falls January to March. Average temperatures range in Port Vila from 27 degrees Celsius in February to 22 degrees Celsius in July. Rainfall is also affected by latitude and altitude. The northern higher islands in the Banks and Torres groups receive an annual average of 4,000 mm rainfall whilst the southern lower islands may receive only half that.

Vegetation

Vanuatu has an exceptional mixture of flora ranging from dense tropical forests on Santo, Malekula and Efate to grass-covered plateau on Tanna and green fertile plains along the sea. About 75 percent of the country is covered with natural vegetation including rainforest, secondary growth and

grasslands. Although much of the forest has been disturbed by cyclone, logging and farming there still remain over 1,500 species of flowers, ferns, shrubs, vines and trees. Vanuatu is listed as one of the five oceanic countries important for their biodiversity, yet little is known of the extensive biodiversity of the islands[3].

Soils/agriculture /forestry

Vanuatu has soils suitable for agriculture, forestry and timber production. It is still an agriculture based economy with copra, cocoa, kava and cattle continuing to dominate the sector and contributing about 80 percent of total exports in 2002.

Agriculture activity falls into three main categories. Subsistence farming reflects the soul of Melanesian society and is mainly for household consumption. Small holding complements the subsistence sector and provides a source of income. This sector provides about 80 percent of copra and cocoa exports. The plantation sector began with the arrival of European traders in the 19th century who planted large areas of fertile land with coconuts, cocoa and coffee.

Commercialisation of the small holder has been slow while many former colonial plantations were broken up at independence. Since 2003 Agriculture has grown at an annual rate of 3.3 percent compared to 2.8 percent growth of the economy and an average population growth rate of 2.6 percent per annum. Agriculture, forestry and fishing sectors now account for around 15 percent of GDP and almost all of merchandise exports[4].

Forestry and timber development has yet to attract investors who are prepared to replant to ensure sustainable yield and mitigate impacts on the environment – soils, water and climate change. While a number of plantations have been established only 200 hectares is planted in sustainable timber and the values of exported sawn timber has declined in recent years.

Hydrology/hydrogeology

Vanuatu is a country of great heterogeneity amongst the numerous islands. Whilst some larger and more mountainous islands are well endowed with both ground and surface water supplies, some of the smaller islands have only surface water or neither. To date no countrywide assessment has been made of water resources. Neither has assessment been made of the capacity of the key water resources for urban water supplies in Port Vila or Luganville.

Urban water supply systems provided from shallow aquifers are found in Port Vila and Luganville, and from a bore in Isangel and Lakatoro. Outside these areas water supply is normally from groundwater via open wells and bores, from surface water sources, or rainwater collection with storage in ferro cement or polyethylene tanks. Demand for irrigated water is extremely low and limited to a few small horticultural sites.

Demography

The total population of Vanuatu is nearly 200,000 with an annual growth rate of 2.6 percent and a doubling time of 27 years (assuming a no change growth path). Nearly 80 percent of the population is rural with only two urban centres - Port Vila the capital (population 36,000) on the island of Efate in Shefa Province, and Luganville (population 12,000) on Vanuatu's largest island, Espiritu Santo in Sanma Province.

Until 1979 only a small percentage of the population was familiar with chronological age. In 1999 nearly 43 percent of the population was under 15 with 52 percent aged 15-59 and 5 percent over

[3] MSP Brief Facilitating biodiversity GEF 2004

[4] Priorities and Action Agenda 2006-2015. Department of Economic and Sector Planning. Ministry of Finance and Economic Management Government of Vanuatu. June 2006

60 years old. This large percent of the population entering the reproductive age will strongly influence population growth in forthcoming years.

Socio-economy

Some 69 islands are inhabited with rural populations generally found in coastal villages or near provincial centres. Housing is a fundamental essential for life. The 1999 census enumerated 42,344 "housing units" with an average of 5 people per household. Of these units 22 percent were permanent, 45 percent were traditional houses and 8 percent temporary dwellings. It is estimated that 30-40 percent of Port Vila's population lives in temporary dwellings in squatter settlements. The formal urban housing sector also faces difficulty in finding suitable land for housing development. Home ownership rate is Vanuatu is not yet established.

Formal unemployment in Vanuatu is 1.7 percent but this bears no resemblance to the considerable "visible" unemployed in urban nor captures the underemployed or those employed in subsistence livelihoods in rural and urban areas. However the census has calculated that 5.3 percent of the economically active population does not have work.

Information on health status is still patchy although improving with assistance from AusAID. Life expectancy for men has improved from 61 to 65 years and for women from 64 to 69 years since 1989, and the under-five mortality rate has reduced to 27 per 1000 births, about a third of the recorded rate in the 1970s. The five most common diseases are scabies and other skin diseases, low weight, acute respiratory infection, malaria and influenza; and the five most common causes of death to be circulatory system disease, neonatal conditions, respiratory disease and cancer.

Education is the key to wellbeing, good health and development. Vanuatu's education goal is to provide universal primary schooling and equitable access to secondary education. This goal must be achieved with schools which are scattered over 60 islands, high population growth rates and urban drift, and the highest concentration of languages per head of population in the world. There are at least 105 vernacular languages as well as the widely spoken English, French and Bislama. The low level of formal education for most adults results in very low adult literacy. Slowly the formal education sector is closing the gap between the standard of rural and urban education. Considerable non-formal education is also provided by the NGO sector.

3. INTEGRATED WATER RESOURCE MANAGEMENT SITUATION FOR VANUATU

3.1 Water resource management

3.1.1 Types of fresh water resources

Vanuatu is a group of islands stretching from 14 to 22 degrees south latitude creating great diversity in conditions. There is generally abundant rainfall (from <100 mm per month in July to >400mm per month in January) although this varies from north to south of the country and high mountainous islands create rainshadows on their leeward side. In 2006 the northern islands received 20 to 30 percent more than average rain whilst the southern islands received 20 to 40 percent less rain than average[5]. Graphs showing average rainfall in 2006 compared with the last 30 years recorded at seven meteorological sites in Vanuatu are provided in Appendix 3.

All larger islands have groundwater and many also have surface water resources. Some smaller islands such Mataso and Buninga in the Shepherd's Group, all of Torres Group, and small islands off Malekula and Santo have neither ground nor surface water.

[5] Vanuatu Meteorological Service 2006 Annual Climate Summary for Vanuatu

During times of national disaster such as cyclone damage to islands relying on rainwater catchment the National Disaster Management Office (NDMO) has provided a desalination plant as a temporary measure.

Bottled water is increasingly used in Port Vila and other urban areas. There are at least five types of imported bottled water on the supermarket shelves in Port Vila.

Wastewater reuse has been little discussed in Vanuatu.

Despite several attempts since independence to establish water resource monitoring in Vanuatu a water resource database does not yet exist.

3.1.2 Types of freshwater use

In Vanuatu, both ground and surface water are used for domestic purposes. In urban areas the main water source is shallow aquifers whereas in rural areas various sources are used such as bores, wells, springs, rivers and rainwater catchments. Urban water supplies are provided by UNELCO (a private company) in Port Vila and Public Works in Luganville, Isangel and Lakatoro. All rural supplies are donor-funded and designed and delivered by either the drilling section or rural water supply (within DGMWR). Rural water supplies are operated and managed by the local community. Refer Section 4.0.

The urban and rural tourism industry is serviced by the same water supplies as domestic users. Industry is not significantly developed in Vanuatu and large consumers comprise only two percent of all UNELCO customers in Part Vila. Agriculture is similarly underdeveloped. Water for livestock is from private bores that are unmonitored. Horticulture development is most advanced in Port Vila where there is easier access to markets. Water is supplied by unmonitored bores and by UNELCO through the reticulated Port Vila water supply.

There is no central record of water use in Vanuatu other than that held by UNELCO and Public Works as a record of water delivered and used through the reticulated supplies. These records are not currently available for analysis.

3.1.3 Major Issues and Concerns

Anecdotal evidence suggests that groundwater resources in some parts of Vanuatu such as around Port Vila are diminishing. Anecdotal evidence and sporadic water quality testing also indicate “hotspots” for water pollution. Infrequent testing programmes and poorly maintained records mean creating a comprehensive water resource picture is difficult, yet this situation speaks for itself in highlighting the need for improved monitoring, data recording, and management systems.

Demands and competing uses of water.

Where water extraction is monitored because it is provided as a reticulated supply, then there is some knowledge and observation of the aquifer. In both Port Vila and Luganville aquifers are under increasing pressure from housing, agriculture and other developments. Outside of the demands of the reticulated supply, no formal assessment has been made of demand or impacts of competing use.

Bore hole drilling is undertaken by DGMWR. Prior to the Water Resource Management Act No. 9 of 2002 no permits were required for drilling to take place, and no limits were placed on the volume of water extracted. Under the Water Resource Management Act 2002 a person must apply to the Director for the right to use water for any purpose that does not comply with customary or existing use rights[6]. The Environment and Conservation Act 2002 also requires a Preliminary Environmental Assessment (PEA) for any proposed development. Neither of these pieces of legislation has yet

[6] Water Resource Management Act No. 9 2002 S.6(1)

been activated to manage access to and extraction of water resources. Further, a private drilling company is just being established in Port Vila. This situation presents several issues:

- Existing legislation provides for allocation and management of the water resource although implementation procedures have yet to be activated and enforced.
- Monitoring and analysis of groundwater levels is required so that realistic water extraction levels can be established, monitored and enforced.
- Commercial drilling is not a governance role and yet if this activity is divested to private enterprise a significant revenue source will be lost to government.

Information on sectoral demand for water is only available for main urban centres by analysing records kept by UNELCO or Public Works Department, which are not available at this time.

Groundwater quality and quantity.

Information on ground water in Vanuatu is sporadic and mostly focused on Port Vila and Luganville. Groundwater quality in both urban centres of Port Vila and Luganville is generally good with only calcium hardness to note. Neither water supply currently requires treatment other than chlorination. However, in both cases aquifer levels are thought to be decreasing while pumping demands are increasing.

Water quality was tested in Port Vila by Depledge (1994)[7] and Hawkins (1995)[8] who reported that groundwater tested from a significant number of bores around Port Vila was good although slightly elevated in nitrogen in a few isolated locations such as at Klems Hill market garden, Fatumaru Bay downstream of the old Tebakor rubbish dump, and the restaurant bore hole at Pango. Other sites showed raised levels of faecal coliform bacteria especially Blacksands and other peri urban areas.

Surface water quality and quantity.

Surface water quality is deteriorating in many places yet there is little recorded data to support this statement except for the Tagabe River which is in the watershed for the Port Vila town water supply which pumps form the very shallow aquifer. Monthly monitoring of the Tagabe River by UNELCO (as a contribution to the community) shows high levels of bacteria from human waste, and high COD and nitrogens from industry and human waste. Results of water quality monitoring of Tagabe River are provided in Appendix 4. The Tagabe River is highlighted as a “hotspot” which resulted in the Tagabe River Management Committee and River Protection Action Group jointly implemented by DGMWR, SHEFA Province, UNELCO and several NGOs. The purpose of the Tagabe River Management Committee is to protect the watershed (surface and groundwater) by providing policies, education and monitoring.

UNELCO as provider of the Port Vila water supply is required under an agreement signed by the government of Vanuatu to provide water that *“shall at all times have the qualities required by standards in force in Vanuatu and, as far as possible, to the standards set by the World Health Organisation.”* Standards for water quality or monitoring are yet to be developed in Vanuatu[9] and World Health Organisation (WHO) standards are used by default. To meet these requirements UNELCO undertakes weekly water quality monitoring throughout their network. Tests for 2006 are shown in Table 1 below. All water distributed by UNELCO meets WHO standards (Water Manager oral com. 2007).

Table 1 Drinking Water Quality Analysis Port Vila Water Distribution Network[10]

[7] Depledge, Derrick 1994 Water resource management

[8] Hawkins, Mike 1995 Groundwater quality and hydrochemistry in the area around Port Vila, Vanuatu

[9] The Water Resource Management Act No.9 of 2002 S.37 (2)(e) provides for “*the establishment of water quality standards, guidelines and criteria, and prescriptions for testing and monitoring*”. These standards and guidelines have yet to be established.

Sampling	Number	Anomalies	Remarks
Production	20	3	Total coliforms above 10
Storage	20	0	
Distribution network	280	0	
Total	**320**	**3**	

Source UNELCO 2007
Parameters tested included: Total Coliforms, Faecal Coliforms, Streptococus, Total plate count (37°C and 22°C), pH, Turbidity

Coastal water quality.

Coastal water monitoring in Port Vila Harbour and Erakor Lagoon undertaken by Abbott (1991) showed that there are specific "hotspots" where pit latrines and septic tanks are located in significant numbers close to the coast such as Mele Bay and Erakor Lagoon. At present uncontrolled nutrient discharges; nitrates and phosphates from sewage, septic outflows, siltation, industrial waste combined with poor natural flushing are more serious than bacterial contamination, which is reaching the limits of world standards.[11] Erakor Lagoon is now considered one of Vanuatu's most serious environmental problems requiring urgent attention.

Hawkins (1995) also carried out crude modelling of the effects of septic tank discharges on groundwater (in terms of nitrogen concentrations) and concluded that, because nitrogen levels were much lower then predicted, "dilution of septic tank and other waste with groundwater flowing from hills behind Port Vila may be critical in limiting the impact of groundwater bacteria and nutrient levels on coastal water quality where septic tanks and pit latrines are not in such high concentrations.

The sanitation Master Plan (1998)[12] concluded that there is no evidence to support the contention that generally septic tank discharges to ground are having an adverse effect on the quality of groundwater or adjacent water bodies. Land treatment can be very effective and continue but location and rate of application be controlled. Despite this, coastal pollution in Port Vila Harbour and the lagoons is considered a serious problem.

The Hydrology Section DGMWR has more recent data on water quality in marine areas of Port Vila and Efate, but these are stored in an unusable format.

Major sources of pollution.

The following sites are noted as major sources of ground and surface water and coastal pollution although no recent monitoring data is at hand.

- BOUFFA Landfill (Teouma, Efate island)
- Hotel discharges
- Pit latrines and septic tanks near coastal areas and surface water
- Animals grazing and roaming in water supplies
- Blacksands/Mele Bay due to overcrowding and poor sanitation and waste facilities
- Industry discharge (e.g. Tusker factory) into the Tagabe River
- Timber factories

[10] Data Provided by UNELCO March 2007
[11] Kingstone P.A. 2004. Surveillance of Drinking Water Quality in the Pacific Islands: Situation Analysis and Needs Assessment Country Reports
[12] Sanitation Master Plan for Port Vila 1998 Prepared by Royds Consulting for ADB

- Oil from power generation plants

In Port Vila management of solid waste is undertaken by Port Vila Municipality who ensure that dumping sites do not pose a risk to environment or public health. The Port Vila Hospital sewage treatment plant is monitored by UNELCO and effluent is treated before being discharged to the lagoon. Monitoring data were not available.[13] UNELCO also monitor discharge from some of the large hotels on request and no data was available from them. Anecdotal evidence suggests that the treatment plants for some hotels are overloaded.

The safe disposal of solid waste is a major issue for many communities. In north Ambae for example solid waste is disposed of into a coastal lake where it damages the environment and where water is also drawn for the community. Addressing these solid waste disposal issues is becoming a high priority as ongoing environmental and health hazards from waste is a growing concern.

Water resource surveillance and monitoring.

Water monitoring activities are poor in Vanuatu. There is no defined monitoring system and no overall review or evaluation of data. Quality standards do not exist and no surveillance authority has been appointed. Various departments and non-government organisations take responsibility in a somewhat ad hoc and infrequent manner.

Following independence DGMWR monitored the country's water resources. During the 1980's, with support provided by the French Government, the Department operated nineteen water level recording stations and sixteen rainfall recording stations were established to gather information on water resources. Unfortunately, due to withdrawal of project funding, organisational and government instability, and damage caused by natural hazards (most notably cyclone Uma) the network established in the 1980's has been completely destroyed.

From 1993 to 1998 the Department had no active water level monitoring stations. In 1999, with the support provided by the Australian Government, the Department established four stations to gather baseline hydrological data in areas of high mining prospects on Santo. On project completion, the Vanuatu Government was not able to sustain all four stations due to high maintenance and repair cost. In 2002 and 2004, three water level recording stations were established at Fanafo (Santo), Talise (Maewo), and Epule (Efate). And in 2005, two water level recording stations were established as part of the environmental studies for the Sarakata hydropower (Santo). The current network provides inadequate water resource data to effectively manage the country's water resources.

In the last couple of years DGMWR has undertaken water quality assessments in several locations including Tanna (2005) and Paama (2006) which show increasing concentrations of bacteria. Water quality data has also been collected for Ambae, where a volcano erupted in December 2005 and for Tongoa and Epi, in the Shepherds Group. This data has not yet been entered into a database or analyzed, and is not available.

The Public Health Act No. 22 of 1994 ensures that water intended for human consumption must be protected from contamination; however enforcement measures are yet to be put in place. There are currently no drinking water quality guidelines for Vanuatu although the Public Health Act includes provision for regulations under the Act for standards, quality and adequacy of water for domestic purposes.

There are five water quality testing laboratories in Vanuatu; all except the UNELCO laboratory are no longer functional. (Refer Table 2 below).

[13] UNELCO has a very good working relationship with the hospital and wanted confirmation from the Hospital Board before releasing monitoring data. The DG Ministry of Health could not be contacted in the time available.

Table 2 Water Testing Laboratories in Vanuatu

Organisation	Water Quality Monitoring Role
DGMWR	Surface water, coastal water, rainwater tanks (occasionally). (DGMWR has also previously tested groundwater)
UNELCO	Piped water supply for Port Vila (and others on request)
PWD	Provincial headquarters (urban water supply)
Ministry of Health	Surveillance role
Hospital labs	Assist with making H2S test kits

UNELCO as a private water concessionaire is required to ensure that the drinking water quality meets Vanuatu standards. UNELCO undertakes a variety of water quality test for protection of their water supply from the Tagabe Rive, and on a regular basis for discharges from the Port Vila Hospital and Le Méridien Hotel (on Erakor lagoon), and occasionally as requested by others. The variety of customers requesting water quality tests by UNELCO in 2006 are shown below.

Table 3 Water Quality Tests Undertaken by UNELCO in 2006

Customer	Number of samples
Abattoir Vila	24
Toa Farm	14
Hôtel le Méridien	24
Bellevue	10
Public works (Island)	13
Public works (Santo)	15
Abattoir Santo	2
Hotel Le Lagon	3
Other	17
Total	**122**

Source: UNELCO Port Vila March 2007

Each year in March, Vanuatu celebrates World Water Day on an island in a different province. After the initial World Water Day celebrations, the water technicians travel around the island that hosts the Day doing water sampling and testing. Tanna hosted in 2005, prompting the Tanna Water Quality Assessment, Ambae hosted in 2006 (3 months after the volcano eruption), and Malekula is hosting in 2007.

Other NGOs also participate in water quality testing such as Live & Learn who use H2S kits and involve the community in their River Care program.

Most recently, the Water Resource Management Act No. 9 of 2002 makes provision for National Water Resources Management Policy and National Water Resources Management Plan neither of which have yet been developed. Administering the Act is the responsibility of the DGMWR within the Ministry of Lands and Natural Resources. In 2007 The Department began developing a Strategic National Water Management Plan. Refer Section 5 of this report.

Major issues with water resource surveillance and monitoring

- All water resource monitoring (quality and quantity) in Vanuatu has been donor funded and "project" based. When projects finish or funds are withdrawn the monitoring stops. Skills transfer has not been complete and the department runs out of essential funds.

- DGMWR water technicians no longer have the means to conduct bacteriological tests. They were using the H2S technique, but have run out of reagent. Other chemicals have expired, their instruments are uncalibrated, and no quality control procedures are in place. This is despite extensive laboratory establishment and training under an NZAID program to support the water resource sector.
- Standard operating procedures for laboratories are lacking.
- Refresher training is required for laboratory staff on drafting monitoring programmes, sample collection, analysis techniques and data storage if they are to continue this work.
- Training is particularly required in analyzing data and drawing meaning from it (i.e. determining if there is a change in water quality/quantity, what is causing it and the implications) and identifying action steps (e.g. in the form of local action, policy development and/or enforcement).
- The water quality database previously established by DGMWR has not been functional for some time. To be used, data must first be converted to ASCII files. Very little of this data has been entered correctly rendering it not meaningful.
- Staff resources are stretched thin. Within DGMWR there is one water technician with one assistant, and together they are responsible for collecting and organising water data for the entire country.
- The UNELCO laboratory is the only reliable water quality testing laboratory within Vanuatu.

Information exchange systems on water resources

Water resource information exchange takes place through the national and provincial Water Resource Advisory Committees. Most communication through these committees is about "projects" or activities that are happening rather than about sharing base information or strategies. With such poor monitoring and no central location for records, information tends to be held by each department or organisation separately.

3.1.4 Measures to manage impacts and concerns

Some existing measures to manage these concerns are detailed below although to date these have been uncoordinated and haphazard usually as donors or NGOs take up the issue.

1. An exception is the establishment of water protection zones in Port Vila and Luganville. A Water Protection Zone for Port Vila Water Supply was originally promoted by Depledge 1994, 1996 and recommended in the Sanitation Master Plan 1997[14]. The Water Resource Management Act 2002 finally made provision for establishing the level of control necessary to effectively limit development and human activities within the zone to:

   √ Protect the quality of the Port Vila Water Supply; and

   √ Avoid pollutants entering the ground water within the Protection Zone.

   The Tagabe Water Protection Zone was gazetted in 2004 as the result of very good efforts by Vanuatu Government, SPREP, UNDP, NZAID, SOPAC and US Peace Corps. A description of the zones and protection rules are provided in Appendix 4.

2. A Water Protection Zone is also being established for Luganville although this is not yet gazetted. The main water intake is being relocated and the protection zone will then be redefined and gazetted. Compensation has already been given to landowners who have been relocated from within the protection zone. Water Protection Zones have not yet been

[14] Sanitation Master Plan for Port Vila, Vanuatu. Royds Consulting 1998

started in Lakatoro and Isangel but it is known that farmers are already living within the water catchment. Protection Zones for all water supplies need to be defined and gazetted as soon as possible to prevent further settlement and farming within these catchments.

3. Water conservation is considered by many urban and rural residents. In urban areas where a reticulated supply is provided water tariffs tend to limit use for the lower socio-economic residents who are fortunate enough to be on town supply. In rural areas where people live on the land and are exposed to seasonal change there is far greater awareness of the water resource, particularly among women. This is one of the reasons women are encouraged to be members of the village water resource management committee. Further assistance for water conservation is the Meteorological Service seasonal forecast. This is a tool provided by the Australian Bureau of Meteorology to enable 3-monthly forecasts for the country. This forecasting would help people prepare for the season only if they receive the information, understand it, know what to do, and actually have options. Many rural people do not have alternatives to the one water supply available.
4. Vanuatu is participating in the Water Safety Plans and Water Quality Monitoring Plans supported by SOPAC. These Plans, although meeting some of the responsibilities of Vanuatu Government, are interventions rather than integral to the plans and programmes of Government departments. They are thus treated as external “projects” rather than department responsibilities. Greater effectiveness would be achieved by assisting Vanuatu Government agencies establish strategic plans and programmes meeting their responsibilities defined by government policy and legislation.
5. The Ministry of Lands and Natural Resources is also undertaking in-house strategic planning which will determine and provide strategic direction for water resource management. Refer Section 5 Institutional Arrangements.

Not withstanding the direction coming from the in-house strategic planning, further measures could include:

1. A structured strategic approach to establishing a national network for water resource assessment and monitoring, including an easily accessed database and GIS mapping of water resources and watersheds. The existing Vanuatu Natural Resource Information System (VANRIS,) includes topography, some data on land use and vegetation, some information on rivers, and protected areas but this is incomplete. It does not yet include any information on watersheds, hydrology/hydrogeology, other water resource data, or vulnerability to hazards. By working up the contours watersheds could be established but with missing data on rivers this would not be accurate. Without this information, catchment management is severely handicapped. By developing VANRIS this could be a very important management tool.
2. Cross-sectoral sharing of water resource information for strategic and specific planning.
3. Policies and plans to implement the Water Resources Act and Environment and Conservation Act to support water resource conservation and protection.
4. Application and enforcement of the Water Resource Management Act, Environment and Conservation Act, and Public Health Act would provide an adequate basis for water resource management.

3.2 Island Vulnerability

3.2.1 Types of disasters

Vanuatu is situated on the Ring of Fire and is in the centre of the South Pacific's Cyclone Alley. It is the most disaster prone country in the South Pacific and the fourth most disaster prone country in the world. Vanuatu's population is concentrated along the coastal environment that plays a vital role in the subsistence and commercial life of ni-Vanuatu. Increased human activity in this coastal environment is placing greater pressure on sensitive areas such as beaches, coral reefs and mangroves. Atolls, low-lying islands, and low-lying coastal areas of Vanuatu are particularly susceptible to erosion, flooding and inundation during storm surges, high seas, sea level rise and periods of intense rainfall.

Climate change

Detailed studies have been made by the Vanuatu Meteorological Service of the vulnerability, effects, and required adaptations to climate change for islands stretching from the extreme north to south of the country including: Torres (Niu, Metoma, Tegua, Loh, Toga), Shepherds (Tongoa, Tongariki, Buninga, Mataso, Makira, Emae) and Tafea (Aniwa, Futuna, Aneityum) island groups. Effects of several climate change and socio-economic development scenarios over a 50 (to 2050) and 200 (2100) year timeframe were analysed for the four sectors that shape livelihoods - agriculture, water resources, coastal zone and resources, and health. Costs and benefits scenario adaptations were analysed[15].

Climate change scenarios analysed included:

- Projected temperature to increase by 1.6°C to 2050 and a 2.5°C to 2080
- Increased precipitation of 5% by 2050 and 7% by 2080
- Tropical cyclones increasing in frequency and severity
- El Nino causing greater extremes of drying and heavy rainfall
- Projected sea level rise of between 9 cm and 88 cm from 1990 to 2100

From the north to the south of the country, these climate changes are already having far-reaching effects on all four sectors including:

- increased coastal erosion undermining the already thin coastal vegetation buffers significantly increasing village vulnerability to tidal activities and reducing coastal agricultural land;
- increased flooding extending inland;
- loss of topsoil;
- heat stress for crops and people;
- habitat change and loss;
- increased infrastructure damage from cyclones and tidal waves;
- water shortages and water contamination from salt intrusion;
- water and vector borne diseases; and
- social dislocation.

Floods and drought

Floods and droughts are also common in Vanuatu and are predicted to become more extreme with weather pattern changes. West Ambae, Ambrym, and Epi are all notorious for difficult dry seasons and droughts. Torba province also frequently endures droughts.

[15] Phillips, Brian. Climate & Sea Level Change Vulnerability & Adaptation Assessment of the Torres, Shepherds and Tafea Groups No date Vanuatu Meteorological Service

Incidence of floods and droughts are recorded by the Meteorological Service and published in their annual climate summary for Vanuatu. Historic data could be accessed through the National Library at the Vanuatu Culture Centre.

The National Disaster Management Office has no quantitative data on how flood and or drought impact on watershed and coastal management. NDMO understands poor farming practices result in erosion, which in turn has negative effects on rivers and marine life in or near the mouth of the river. Tanna has a large erosion problem and has lost entire villages due to it.

Land movement and earthquakes

Vanuatu is susceptible to land movement and tsunamis. It is situated in an active tectonic and volcanic zone, the New Hebridean Island Arc, where the Indo-Australian tectonic plate is subducting eastward beneath the Pacific plate at a rate of 11 cm per year. The island of Santo is almost directly above the main thrust zone where tectonic stresses are high and uplift rates reach 7-8 mm per year on the west coast. Similar but smaller uplift is occurring in the northern Torres Islands. Sudden uplift also results from earthquake and aftershocks as occurred on Malekula in 1965 when there was an uplift of 1.2 m.

In southern Vanuatu, the island of Tanna shows emerged coral reef terraces up to 155 m above present sea level. Uplift in Port Resolution Bay in 1878 raised the shoreline 15 m and caused a tsunami with a 12 m wave.

Subsidence also occurs and is more pronounced in the south of the country than the north. Absolute sea level rise recorded by Vanuatu Meteorological Services is 4 mm per year taking account of subsidence and uplift.

Volcanoes

In general, the islands with active volcanoes all suffer negative effects on water in one way or another. Lopevi, Maroum and Benbow volcanoes all have effects on Paama and Ambrym and from time to time south east Malekula and south Pentecost. However, the most severely affected area is west Ambrym. Maroum and Benbow spew out a mixture of fluoride, hydrochloric acid, and sulphuric acid. ORSTOM, (Institut De Recherché Pour Le Development, IRD) is a good source for specific technical information; they have also conducted studies on the effects of fluoride on children's teeth in Ambrym.

Cyclones

Vanuatu is extremely vulnerable to cyclones. Between 1950 and 2004 Vanuatu reported the highest number of disasters in the Pacific Islands region[16]. Data on occurrence and intensity of cyclones is not available at this time.

Economic costs

Already the economic and social costs of natural related disasters have become a recognised impediment to national development. Tropical cyclones Uma, Anne and Bola that traversed Vanuatu during 1987-88, caused a major disruption to people's lives and to the economy, with 50 deaths, the sinking of 40 coastal trading vessels, massive damage to the copra and tourism industries, and destruction of property valued at approximately US$152 million. Cyclone Uma alone cost the private sector about US$25 million in damages, with infrastructure damages of another $US25 million. The Vanuatu Government, in its effort to rebuild the community, incurred a national budget deficit increase of about US$ 8.5 - US$10.6 million. In 1999 heavy rains associated with tropical cyclone Dani caused serious damage to infrastructure such as roads and bridges, requiring

[16] Bettencourt S. et al 2006. *Not if But When: Adapting to natural hazards in the Pacific Region A Policy Note* World Bank

repairs costing some $US8 million[17]. In Port Vila an earthquake in 2002 measuring over 7.0 on the Richter scale caused severe damage estimated at a cost of US$2.5 million[18].

Development practices

Many developments similar to that of the new condominiums and hotels being built in Pango village, near Port Vila are impacting the environment, and causing threats to property and life. Guest houses are being built right on the beach leaving no barrier to prevent erosion or loss of property in the event of a natural disaster. Development of this kind is becoming common in Port Vila and Luganville, which greatly increases the likelihood that property will be lost.

3.2.2 Major issues and concerns

Inundation of water resources caused by land subsidence, sea level rise and water extraction is becoming more common. The Regional Pacific Island Climate Change Assistance Program (1997) identified small islands to be particularly vulnerable to ground water salination and drought. Mataso Island in the Shepherds group, east Santo, and Aniwa in the south are three of many examples. The opinion of the National Disaster Management Office is that "i*f a village doesn't have a problem with the quantity of drinkable water it has it will have a problem with the quality of drinking water it has. This is an issue for almost every person living in a rural area,"* (NDMO oral comm. 2007).

Further, the Climate and Sea Level Change Vulnerability and Adaptation Assessment recognised that all four sectors studied, agriculture, coastal zone and resources, water and health are climate sensitive and particularly vulnerable to the impacts of:

- Elevated temperatures
- El Nino episodes
- Increased precipitation
- Increased cyclone frequency and intensity, and
- Sea level rise.

The combined effects of climate changes are threatening the socioeconomic wellbeing of the people. Already Tegua village in the Torres Group has been relocated further inland and relocation is being considered for another Torres Group coastal settlement of Yakavikamena.

Another concern is the relationship between traditional resource management and regulatory requirements. In the past, several factors helped ni-Vanuatu to cope with adverse circumstances and environmental stresses. These include an abundant and diverse natural resource base and a traditional social support system that was well adapted to the environment and local circumstances. Traditional structures and values have been challenged over recent times and are in a state of transition, although there are still many positive aspects which ni-Vanuatu retain. These aspects, coupled with the strong and diverse subsistence base economy, give the ni-Vanuatu potential capacity to cope with environmental stress and change if they are nurtured for positive outcome.

[17] National Adaptation Program of Action 1993

[18] McKenzie, E. et al. 2005. Economic Impact of Natural Disasters on Development in the Pacific. Suva, SOPAC and USP, Suva Fiji

Coastal erosion threatening a house on Hiu

Effects of coastal erosion & sea level rise

One of the biggest concerns is the lack of planning and preparedness of Vanuatu for major disasters of any kind. This lack of preparation is exacerbated by poor infrastructure nation wide making communication and access to outer islands difficult either in implementing a warning or in providing assistance after a disaster. The NDMO is responsible for the early warning system and for coordinating assistance after disaster occurs. The office is unfortunately severely under resourced. The Meteorological Service is also assessing vulnerability and proposing adaptation measures to climate change yet this still needs to be translated into policies and actions.

3.2.3 Measures to manage impacts and concerns

Since the 1980s there have been extensive efforts around the Pacific in which Vanuatu has participated to address disasters and climate change. A National Advisory Climate Change Committee was established late 1980s as a sectoral group with NGO and Government representation and supported by the Council of Ministers. Its purpose is to oversee coordination of climate change activities.

Vanuatu agencies have identified and reported in various documents[19], broad initiatives to enhance the adaptive capacity of Vanuatu and specific sectoral adaptation measures. The broad initiatives include:

- Institutionalise and mainstream climate change preparations
- Improve information transfer and coordinate adaptation and mitigation measures
- Increase national capacity to prepare for and adapt to climate change
- Enhance community understanding of climate change, and their preparedness

Adaptation measures specifically for the water sector include the following, although these need to be considered in an integrated plan along with adaptations required for other sectors (provided in Appendix 5) as these are interrelated:

- Increased rainwater storage capacity through the use of water tanks and small-scale dams is expensive, but will benefit the community in times of water shortage especially extreme events such as cyclones and droughts.

[19] Vanuatu National Strategy for the Implementation of the United Nations Framework Convention on Climate Change (Draft), Vanuatu National Statement on Vulnerability and Adaptation (prepared by Nelson Rarua, Patricia Mawa, Russell Nari and Atchinson Marav Smith) and draft reports on second vulnerability and adaptation assessments of critically vulnerable islands of the Torres Group, Paama, Shepherds Group and Tafea outer islands.

- A wide range of methods could be implemented to maintain and enhance quality of surface and ground water resources.
- Measures to enhance and protect sensitive watersheds would both maintain water quality and moderate the impact of extremes in rainfall. There would also be wider environmental benefits, such as reduced erosion and soil loss and maintenance of biodiversity and land productivity.
- Improved water supply in urban areas, being relatively low cost, would help reduce health problems from poor water quality.

Importantly, Vanuatu's National Implementation Strategy on Climate Change places emphasis on:

- A strong institutional structure to ensure sustainability;
- Increasing understanding on climate change;
- Pursuit of sustainable development through opportunities under the UNFCCC and its Kyoto Protocol; and,
- Effective national responses to the impacts of climate change.

Vanuatu's NDMO is currently developing a National Disaster Management Plan. This is based around comprehensive hazard and risk management (CHARM) guidelines. There is a need to integrate and harmonize these tools and procedures with adaptation initiatives and create greater efficacy and efficiency given scarce government resources. The National Adaptation Plan of Action (NAPA) project has this as a high priority.

The National Adaptation Plan of Action for least developed countries highlighted water as a top priority. Under NAPA, assistance will be provided to areas that need urgent attention subject to adequate project profiles being submitted to the Secretariat for Climate Change Convention for funding. This action requires good coordination between Vanuatu Meteorological Services, NDMO, Environment Unit, DGMWR, and NGOs who will be required to assist with implementation.

Under the NAPA and the Priority Actions Agenda (PAA) a Provincial Disaster Management Officer will be appointed whose job will be to prepare their province for all natural disasters, especially cyclones, and volcanoes where applicable. The NAPA will approach disaster management, preparedness and response holistically, through the private and public sector, in every level of government, from the most urban to the most rural places in Vanuatu. The NAPA will incorporate disaster response and disaster management into development. This will include watershed management, water quality and sanitation, and improvements to rural water committees that will improve their ability to maintain and assess the water supply.

To address the need to include traditional leaders, their roles and knowledge in future planning the Vanuatu Environment Unit is currently pursuing a UNDP-funded programme to facilitate and strengthen the conservation initiatives of traditional landholders and their communities to achieve biodiversity conservation objectives and enhance the effectives of local management.

One of the big challenges to addressing disaster of any kind in the outer islands is the poor telecommunications and transport infrastructure.

To support the above initiatives in adaptation to island vulnerability, disaster and climate change there also needs to be:

- Greater cross-sectoral sharing of information and approaches
- Mapped information on water resources and island vulnerability to hazards
- Improved communications services and early warning systems to outer islands

- Greater involvement and contribution by communities in understanding the risks, and planning and preparing for disasters.

3.3 Awareness and advocacy

3.3.1 Awareness campaigns and advocacy

There are numerous initiatives in Vanuatu to increase awareness and knowledge of water resources and efficient water resource use and management. A few are delivered through government agencies such as the DGMWR, Ministry of Health, and Environment Unit - most of which are donor funded. By far the majority of awareness campaigns are delivered through NGOs - all of which are donor funded. UNELCO, a private water distributor provides water conservation and education materials for schools. Table 4 provides a brief description of some of the programmes. Further information is provided in the minutes of the National Water Advisory Committee Meeting held in Vanuatu on 7 March 2007 attached as Appendix 6.

There is consensus among agencies on the usefulness of developing a community and household risk management Water Safety Program approach that would address villages and settlements country-wide, including the recommendation by Ministry of Health to supporting volcanic ash and gas affected communities. UNELCO stated an interest in participating taking part as they now do in water sector activities such as the National Water Resource Advisory Committee while maintaining good working relationships with key government agencies. Ministry of Health and several NGOs are also partners in this program.

3.3.2 Major issues and concerns

Water resource management or more correctly the provision of water supply is a very political issue in Vanuatu, and becomes an election platform each general election. Outside that time, the delivery agencies are severely under resourced and lack political support. Further, Government instability and reform programmes through the 1990s have not provided a stable basis for developing strategic direction and programmes.

Awareness programmes are mostly implemented as “projects” making them short term (two to four years), not integrated into the core functions and strategic direction of government programmes, and not necessarily linked to other community training programmes in place or planned. The result is ad hoc planning and delivery and a certain amount of community confusion and frustration.

Traditional or custom social structures, decision-making, and land ownership have to date created confusion and conflict in resource management as two distinct management systems collided. The constitution of Vanuatu states that:

- All land and resources on that land belong to indigenous custom owners and their decedents;
- Custom rules are the basis of ownership and use of land and resources on that land.

Traditional land and resource owners are key stakeholders in all conservation activities within Vanuatu and traditional rules are integral in resource management in Vanuatu. However, reaching understanding and agreement between custom owners and bureaucratic managers for resource conservation and management issues has been difficult and challenging. In the provision of water supply for example, agreement is now reached with the traditional landowner and community before a water supply system is installed. Yet, as a result of subsequent disputes and disagreements it is still common to have the water supply turned off or damaged in some way.

Sustained growth and development is achievable only through the participation and involvement of all sectors of society. Unfortunately, women in almost all sectors of their lives are disadvantaged when compared to men. In traditional Vanuatu society women do not have a public voice and

rarely own land although this varies from island to island. Some islands follow a matrilineal line, on other islands women share ownership with men, and on most others, women only have rights through their husband. Yet women in particular have a strong vested interest in water resource management. Gaining women's participation in this sector has been a focus of attention with variable results. It is however important that progress and development is managed in such a way that it does not erode away traditional systems and practices that support women and children.

Expensive and infrequent transport, rugged landscapes, and poor communication services exacerbate the difficulties working with remote communities.

Table 4 Water Resource Awareness Programmes in Vanuatu

Name of programme	Implementing Agency(s)	Nature of Awareness	Funding Organisation
Community Development and Water Committee Training	DGMWR VRDCA	Community development and training for community water committees to maintain and manage their water supplies – includes environmental, technical and financial aspects	Various donors. OXFAM has also recently begun Funding VRDTCA into this area.
RWS Construction Manual	DGMWR	Construction Standards Manual prepared by RWS	NZAID
Water Safety Plan	DGMWR and Ministry of Health	Program to provide safe drinking water around - Mele, Luganville, Port Vila; Epule, Talise, Fanafo	WHO/SOPAC
Water Quality Monitoring Plan	DGMWR	Program to ensure water quality monitoring capabilities	WHO/SOPAC
HELP	DGMWR	Hydrology, Environment and Life Policy	
Communities and Catchments 2001-2004	DGMWR	Demonstration project in catchment management	SOPAC
Village Health Worker training	Ministry of Health	Environmental health community awareness training	Save the Children
World Water Day	DGMWR	Annual Water Awareness Week	
Tagabe Water Committee	DGMWR, SHEFA province with UNELCO, Wan Smol Bag and Live & Learn	Comprehensive project to conserve and manage the Tagabe river catchment, including the water protection zone for Port Vila water supply	Various
Compost Toilets	Wan Smol Bag	Installation of compost toilets in Tagabe catchment and in Vanuatu tourist bungalows	
Family Blong Sara	Wan Smol Bag	Radio play regarding health, water and environmental management	Various
Water & Waste	Wan Smol Bag	Awareness programmes for waste management and water conservation	
Curriculum development	Live & Learn	Curriculum for teachers on biodiversity and conservation	
River Care	Live & learn	4-modules on river health and ecosystem, human impacts, water quality monitoring, culture	NZAID
Waste Minimisation	Live & Learn	Focused on reducing the number of	NZ Small grants

		plastic bags used – community awareness, education, advocacy	scheme
Waste Management	Live & Learn	Provide waste management education resources in one educational package	SPREP
Sustainable Futures	Live & learn	Education for sustainable development. April 2006 - 2009	NZAID
Education for biodiversity conservation	Live & learn	Provide education material to strengthen the formal education sector to support biodiversity conservation and national biodiversity strategic action plans	EU
Facilitating and strengthening the conservation initiatives of traditional landholders and their communities to achieve biodiversity conservation objectives	Environment Unit	Supports National Biodiversity Strategy and Action Plan recognising the importance of customary landholders to protect their knowledge and practices as resource custodians and users, and in fully integrating landholders and their communities into measures to manage and safeguard biological resources. Aims to strengthen traditional approaches to conservation to enable locally governed and managed protected areas to be more effective conservation tools.	UNDP/GEF
International Waters Project	Environment Unit	Working at a national and community level of coastal and freshwater issues. Three-year pilot completed in 2006.	SPREP
Chiefs Project	Live & learn	Working with community leaders to increase awareness -Tanna, Efate, Epi, Erromango	Canada Fund
Decision making	Live & learn	Education materials for critical thinking and decision making	International Women's development
Food Security	Ministry of Agriculture	Regional Food Security Project	FAO
Vanuatu Climate Change Adaptation Project	Vanuatu Meteorological Service	Increase knowledge and understanding of climate and sea level change through education and awareness	AusAID
Met Service seasonal outlooks and cyclone tracking	Vanuatu Meteorological Service	Three monthly climate outlook and cyclone tracking provided to public but poor communication makes distribution to outer island difficult	AusAID
Community governance issues	Foundation of the People of the South Pacific	A range of extension and advocacy initiatives to strengthen community governance	?

3.3.3 Measures to manage impacts and concerns

Since the early 1990's the government has promoted a community mobilisation approach to development although until recently this has remained a sectoral approach.

Attempts have been made to integrate community awareness into core responsibilities. One example is the community development and water committee training undertaken by DGMWR as part of their water supply delivery function. This training is integrated into their core business and as such is provided each time a water supply system is installed or repaired. Rather than being "project" funded the cost is included in the design cost of water supply systems which themselves are donor funded. The limitation of this programme is the severe staffing and resource shortage of the DGMWR department. One staff member in the Rural Water Supply Department is responsible for all water supply designs and preparation of all funding applications. This causes a severe bottle neck in the process. However, given that there is only one community development officer in Port Vila and one water supply officer in each province, the implementation rate is also strangled.

The Biodiversity Conservation Program that responds to the National Conservation Strategy also delivers community awareness. Once again, the implementing agency (Environment Unit) is severely constrained by lack of staff and resources. The Environment Unit has one permanent staff member and one project officer.

Despite severe resource shortages and lack of support, government agencies are strongly committed to their responsibilities. DGMWR is diligent in its delivery of community development and water committee training as an integral component of water supply delivery. They are also willing participants in the Water Safety Program, the Water Quality Program and are partners with several NGOs in providing community awareness and training. The Ministry of Health also expressed strong support for the Water Safety Program and are willing to work closely with all stakeholders to implement pilot projects in Vanuatu. Whilst this commitment is admirable staff are distracted from their core functions, their time is overcommitted, and many activities are undertaken poorly or incompletely resulting in frustration and exhaustion for staff, communities and donors.

The Vanuatu Climate Change Adaptation Program (VCCAP) also attempts integration to implement community level adaptation measures as a practical means toward protecting, building and maintaining sustainable ni-Vanuatu communities and values in the face of present and future climate change and other human induced and natural global change. The program goal is to enable Vanuatu to protect its environment through enhancing national and community level capacity in sustainable development and achieving improved livelihoods. VCCAP's expected output/outcome is two fold:

1. Planning, implementation and monitoring of adaptation measures.
2. Increased knowledge and understanding of climate and sea level change through education and awareness.

To date the community awareness and education components are lacking.

High-level initiatives through the Government Investment Program (GIP) have attempted to coordinate projects nationally with limited success. The Environment Unit also has responsibility to oversee and coordinate environment programmes. What is needed to enable this coordination is a strategic approach developed not just by central government but by ministerial staff guided by government policy as is already provided in the PAA for 2006-2015.

Implementation and enforcement of existing legislation (Water Resource Management Act and Environment and Conservation Act) would also provide the government support necessary to recognise the constitution of Vanuatu and thus customary land tenure and resource ownership which creates tensions and challenges for resource managers.

3.4 Technology

3.4.1 Types of water systems

Water supply in Vanuatu is divided between urban and rural supplies with responsibilities delegated to two government departments – Public Works Department and Department of Geology, Mines and Water Resources respectively. Government focus has however been on the urban centre of Port Vila where water supply delivery has been privatised to a French operating company, UNELCO.

Urban and peri-urban

The Port Vila urban water supply system is owned by the state and operated by UNELCO under a concession contract that runs to 2032. Water supply systems in Sanma, Malampa and Tafea are managed and operated by Public Works Department (PWD), and in Torba and Penama water supplies are operated by provincial authorities.

Within urban and peri-urban centres however only a small percentage of the population has access to piped supply as shown in Table 5. Many households still rely only on household tank, communal village standpipe or water tank, or surface water supplies such as rivers or springs. Urban household water supply is still largely inadequate.

Table 5 Household Access to Water Supply

Province	Piped Water	Village Stand pipe	Household Tank	Community Water Tank	River, Well Spring etc	Total Households
Urban	6,206	97	617	287	1,051	8,258
Malampa	1,996	347	1,049	1,311	1,780	6,483
Penama	1,217	296	1,307	1,257	1,294	5,371
Sanma (rural)	912	309	581	1,042	2,023	4,867
Shefa (rural)	1,566	208	1,081	708	1,170	4,733
Tafea	1,916	730	227	365	2,126	5,364
Torba	197	84	204	501	353	1,339
% of HH Surveyed	**38**	**6**	**14**	**15**	**27**	36,415

Source National Statistics Office Port Vila 2002

(Note: Total number of households compared with 42,344 in Vanuatu Statistics Yearbook 2002)

Rural

The Rural Water Supply (RWS) Section of the DGMWR, Ministry of Lands and Natural Resources has responsibility for rural water supply system delivery countrywide. These comprise wells and boreholes, surface water collection, and rainwater catchments. Many water sources are unprotected and affected by pollution, and in some cases contaminated by volcanic ash and gas emissions, and increasingly saline intrusion to groundwater. Desalination, provided in the past as emergency relief only, is now being donor-funded for Ra Island in the northern Banks group and Aniwa in the south.

Rural Water Supply keeps a national database of water supply based on type and condition of water supply and percent of population covered. Unfortunately at this time the database is faulty showing far greater coverage by percentage of population than actually exists. The Director of DGMWR estimates rural coverage at approximately 65% in March 2007 although accurate

statistics on rural water supply coverage are not known at this time. Despite its limitations, the database is an excellent system to be encouraged and improved. In order to enable better comparison with the national statistics perhaps it would be more appropriate to record coverage by household rather than population which at this stage is quite mobile. The interesting thing that can be drawn from the RWS database is the condition of water supplies. In March 2007 approximately 48% of existing rural water supplies were in reasonable condition, 26% need minor repair, 23% need major repair, and for 3% the condition is not known.

In rural areas village water committees are responsible for operating and maintaining the water supply where they occur. The above statistics on the coverage and condition of water supplies indicates the extent of RWS workload in both delivery of supply and community training. The condition of water supply also indicates the difficulties community water committees have in operating and managing the supplies both in terms of technical know how and funding.

Past departmental focus has been on improving access or 'coverage' although a more recent trend is to also consider water quality particularly as the department becomes a lead player in the Water Safety Plan and Water Quality Monitoring Plan.

Bore Hole Drilling Santo

3.4.2 Types of wastewater/sanitation systems

In Vanuatu there is still no direct legislation or regulations covering sanitation as a distinct sector. No government department or local authority therefore takes responsible and no country statistics on sanitation facilities are available through the Government Statistics Office. Yet the Municipal and Provincial Councils have responsibilities in the general area of health and sanitation referred to obliquely in Part VI of the Municipal Act of 1980. The Health Department through the Public Health Act with explicit responsibilities for sanitation and waste disposal has potentially the most definitive role to play in conjunction with the Municipal Councils. The Port Vila Sanitation Master Plan 1998 went through several iterations funded by ADB and the World Bank before finally gathering dust on a shelf unimplemented. Sanitation remains unregulated and unmanaged.

Septic tanks are used for all formal developments in urban areas along with VIP and water seal type pit latrines. Non-formal housing areas have very poor sanitation services causing ground and water pollution and danger to human health. Rural areas generally have very poor sanitation facilities mostly comprising pit latrines or bush toilets. The principal formal guidelines are:

- Standard draining detail for septic tanks and soakaways (PWD undated)
- National Building Code 1990
- VIP construction guidelines, Ministry of Health

No code has yet been adopted as an official standard or building requirement and no permits are required for construction other than consent for a building. The quality of construction is highly variable independent of type of latrine.

The Port Vila Sanitation Master Plan (1998)[20] concluded that *there is no evidence to support the contention that generally septic tank discharges to ground are having an adverse effect on the quality of ground water or adjacent water bodies. Land treatment can be very effective and continue but location and rate of application be controlled*. Despite this, there is serious concern over the poor construction, inappropriate siting, inadequate supply, and poor maintenance of pit style latrines.

The recent (2004) Port Vila Eco-Sanitation program is an attempt to introduce ecologically sustainable compost toilets to the Tagabe River area of Port Vila and Vanuatu in general through the Vanuatu Island Bungalow Association. It is supported by the Tagabe River Management Committee (TRMC), which represents a multi-stakeholder, inter-sector, multi-disciplinary, community-based initiative to restore and protect the watershed.

Wastewater treatment plants

There are five waste water treatment plants in Port Vila.

- Port Vila Central Hospital
- Iririki Island Resort
- Le Lagon Resort
- Le Meridian Resort
- University of the South Pacific

All five were assessed during drafting of the Port Vila Sanitation Master Plan (1998) which reported concerns about each of them being overloaded. The plan recommended that they be upgraded from an activated sludge plant to a rotating biological contractor with disinfection. Iririki Island Resort has been upgraded to date.

Discharge from the Hospital plant is monitored by UNELCO although no data has been made available because the hospital was unable to be contacted. The system has been maintained and improved but no major upgrade has been undertaken.

Storm water collection and drainage

Storm water drainage in Port Vila and other provincial areas remains poor.

Solid waste

The municipalities of Port Vila and Luganville provide solid waste collection (principally in the CBD) and disposal facilities. The Municipality ensures that waste does not pose a threat to public health. In other areas such as north Ambae solid waste is disposed of in a lake where water is drawn for the community. Addressing these solid waste issues is becoming a high priority for many islands as health hazards from waste grows.

Observations of the Sanitation Master Plan 1998 include:

- Waste deposited at the Bouffa landfill is mainly from Port Vila Municipality.
- Iririki dumps and burns its own waste on the island.
- Residents of most informal housing areas dump and burn waste within these areas.
- Septic tank sludge and scum is disposed of at the landfill.
- There is no facility for disposal of waste oil and paint.

[20] Port Vila Sanitation Master Plan 1998 Royds Consulting Ltd

- Hazardous waste (from quarantine and hospital is poorly and unhygienically disposed of.
- All disposals are in response to need rather than according to any plan.

3.4.3 Major issues and concerns

Issues for water supply

UNELCO report that they have never had to ration water supply although water levels have at times been low and there is concern that the size of the shallow aquifer is not known.

Demand for water supply is not fully met. There are peri-urban squatter settlements in Port Vila not yet receiving any reticulated water supply. Since 1998 UNELCO has extended its concession area to include Pango, Erakor Bridge, Manples and parts of Blacksands. Despite this, there are still settlements in Blacksands for example where up to twenty families share one standpipe.

Table 6 shows water consumption and the number of urban users in Port Vila. The small numbers of large consumers are factories, hospital, hotels and horticulture, which consume between 15-30 percent of water supplied depending on season.

UNELCO report unaccounted for water has dropped since they initiated a leak detection program in 2000 focusing on locating isolating and fixing the problem earlier. As a result of this program they reached 74% efficiency in 2000. This dropped back to 64% in 2005 and following further effort in the leak detection program efficiency rose again to 70% in 2007. Illegal connections are reported to be minimal.

Table 6 Port Vila Water Consumption

Consumption	1rst quarter 2006	2nd quarter 2006	3rd quarter 2006	4th quarter 2006	2006
0-50 m³	229,044	217,338	228,906	227,602	902,890
51-100 m³	115,592	99,131	121,986	125,100	461,809
150-200 m³	99,246	80,679	105,260	107,261	392,446
over 200 m³	298,200	247,531	344,465	370,533	1,260,729
Total m³	**742,082**	**644,679**	**800,617**	**830,496**	**3,017,874**
Number of consumers	5,490	5,581	5,606	5,646	
Number of large consumers (meter size >=30 mm)	115	116	113	110	
Consumption of large consumers (m³)	220,910	212,495	160,273	188,345	**782,023**

Source: All data provided by UNELCO March 2007 from UNELCO Billing System

PWD report supply issues in several locations and are concerned about their ability to meet the increasing domestic water demand. Isangel has a small storage capacity so that water use exceeds the capacity to pump and store. Water is pumped 24 hrs per day although the water supply is only available to the public from 8-11am and 6-8pm. At Lakatoro the pump is too small and cannot keep up with demand. Larger pumps are being installed but no assessment has been made of the resource and no water use efficiency strategies are promoted by PWD.

In rural situations and unserviced peri-urban areas water shortages can be severe during drought years. Some islands in particular where there are no ground or surface water supplies, residents sometimes paddle some distance to a neighbouring island to collect water. On other small islands or where there is land subsidence there is increasing saline intrusion into groundwater.

Issues for sanitation

This glaringly obvious omission in government responsibility to control or regulate sanitation and wastewater requires urgent attention.

Health issues

In high-density living areas poor waste management is impacting both human and environmental health.

Resource issues

All government and municipal water supply providers are severely constrained by limited human and financial resources.

3.4.4 Measures to manage impacts and concerns

The Millennium Development Goal (MDG) for water and sanitation is to "Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation."

The Government Priorities and Action Agenda[21] is deficient in addressing water supply and sanitation needs. It provides the following policies for infrastructure and utilities, focusing on urban infrastructure:

- Ensure the provision of commercial, quality, efficient, and competitively priced infrastructure, utilities and services, either through public enterprises or through private sector partnerships and competition;
- Encourage the development of a competitive private sector involvement in the provision of utilities and services;
- Minimise subsidy requirements for public utilities;
- Ensure economic infrastructure and support services are available to other sectors to enable all stakeholders to achieve their own sector objectives.

The PAA then provides the following priorities and actions for water supply.

- Extend the coverage of improved water supplies in rural areas;
- Provide training in maintenance of village water supplies in conjunction with provincial governments.

To achieve the MDG with respect to water supply Government needs to more proportionally distribute resources to rural communities where the majority of people live. Rural water supply construction is slowly being standardised with the Rural Water Supply department developing a Standards Manual but delivery and cost are yet to be regulated.

With respect to sanitation and waste management the PAA proposes to:

- Improve sewage treatment and reduce pollution in harbours and lagoons near urban centres;
- Conduct a solid waste disposal study;
- Encourage eco-tourism as a means to protect the environment.

Appropriate technologies and methods for sanitation and wastewater treatment have been recommended in the Sanitation Master Plan, by various NGO projects, and in the Port Vila Eco-

[21] Priorities and Action Agenda 2006-2015 "An Educated, Healthy & Wealthy Vanuatu" Department of Economic and Sector Planning Ministry of Finance and Economic Management June 2006 p 41

sanitation project. To date, no government department is taking a lead role to address this issue and promotion remains an NGO focus.

To achieve the MDG with respect to sanitation, Government needs to take sanitation seriously and allocate responsibility to an appropriate authority that can take leadership in developing appropriate design and standards for both urban and rural situations. For example:

- Formal pit latrine standards are needed to provide for a range of pit-type constructions, including the use of automatic flushing, pit desludging, and upgrading to flush type latrine.
- Use of pit latrines needs to be controlled, particularly where they are sited in close proximity to wells used for drinking or where ground or surface water is close by.
- A pit latrine maintenance program is needed to educate all involved with such constructions and to ensure pump-out before problems occur.
- It would be advisable to promote eco-sanitation (compost toilets) in sensitive environments and where water supply is scarce.

The only water conservation measures known about are the education materials provided to schools by UNELCO and the Live & Learn NGO in their River Care project. Further conservation projects integrated with public health services would be beneficial.

Storm water management is not addressed directly in the Priorities and Action Agenda but promotes proper maintenance of roads and a review of existing land transport legislation with the establishment of a Land Transport Authority.

A plan for managing solid waste in all urban and provincial centres is required.

Perhaps one of the most significant measures that could be implemented is addressing the legislative and institutional inadequacies in water supply delivery and sanitation and waste management. This could include developing comprehensive legislation addressing sanitation systems and waste management, and developing the capacity of Public Health and Municipal and Local Councils to implement and enforce it and/or developing a Public Utilities Board. The Board could be established within the Ministry of Infrastructure and Public Utilities with input from the Ministry of Internal Affairs and Ministry of Health on an ongoing basis.

3.5 Institutional Arrangements

3.5.1 Types of institutional arrangements

Vision

Until recently most Vanuatu government programmes and policies were sectoral in approach, lacked strategic vision and tended to be reactive rather than proactive. The Department of Economic and Sector Planning within the Ministry of Finance and Economic Management is providing direction in national development and planning in Vanuatu. The institutional arrangements for managing water resources need to be viewed in this context.

The vision for Vanuatu in the Priorities and Action Agenda 2006-2015 is "An Educated, Healthy & Wealthy Vanuatu". The Government believes that raising the welfare of the people of Vanuatu will be achieved through: higher sustainable economic growth to create jobs and raise incomes while conserving resources for future generations; ensuring macroeconomic stability to create a stable investment climate; and raising standards of service delivery particularly to rural and outer regions to improve access to basic health and primary education services while lowering costs of internal trade[22]. The main reference made in the PAA that could be inferred to refer to the water sector is to state as an overarching strategic priority "the provision of better basic services; especially in rural areas".

The PAA integrates and prioritises the action agendas contained in the already accepted and ongoing national and provincial programmes including the Comprehensive Reform Program (CRP), Business Forum Outcomes, and the Rural Economic Development Initiatives (REDI). The overall objective is to link policy and planning with the limited resources the government controls. This will ensure that the most urgent and important outcomes of these programmes are achievable in the medium term.

The PAA is a high-level set of priorities and strategies with a ten-year timeframe. Implementation of the strategies is the responsibility of Ministers and their ministries. Each aspect of government needs to have its own, more detailed, sector plans and strategies. Some already exist, but most ministries still need to develop formal sector plans.

Financing is within overall government plans – a medium term expenditure framework (MTEF) and the Government Investment Program (GIP). The MTEF needs to be completed and a new, more strategic approach taken for the GIP. To translate the policies into funded activities, programmes and projects involves the preparation and updating of the Budget strategy to determine how much resource to allocate in a particular year – from the government's own budget and with the support of aid donors.

The Ministry of Lands and Natural Resources comprises a large number of departments and the challenge is to integrate the different sectors and establish a long-term strategic approach and policies within the one Ministry that is proactive rather than reactive. The Director General of the Ministry of Lands & Natural Resources has begun on a strategic planning process for the Ministry and Departments. A National Land Summit was held in 2006 to review national land legislation, policies and administration. A Review of National Land Management was published in September 2006[23]. A draft Energy Policy and Rural Electrification Master Plan was also released in March 2007. The Ministry is currently working on a National Water Strategy using a similar process, which is due for completion in August 2008.

The goal of the current Water Resource Strategic Plan in process is: *Sustainable access to safe water for the people of Vanuatu to support improved public health and promote economic development.* The Plan is being prepared by the DGMWR as a national strategy to be implemented by the department with assistance from other government and non-government agencies that will be identified during the planning process.

Water resource legislation

The Water Resources Management Act No. 9 of (2002) provides for the protection, management and use of water resources in the Republic of Vanuatu. The Department of Geology, Mines and Water Resources within the Ministry of Lands and Natural Resources administer the Act.

[22] Priorities and Action Agenda 2006-2015 "An Educated, Healthy & Wealthy Vanuatu" Department of Economic and Sector Planning Ministry of Finance and Economic Management June 2006

[23] Nasonal Lan Samit 25-29 Septemba 2006 Faenol Ripot Compiled by Steven Tahi Gavman Blong Ripablik Blong Vanuatu

The Act upholds customary rights of land tenure and resource ownership as defined in the constitution.

The Act provides for the formation of the National Water Resource Management Advisory Committee (NWRMAC) to address the nation's water related issues. The committee has representation from DGMWR, Department of Health, Port Vila Municipality, SHEFA Province, UNELCO, Department of Forestry, Meteorology Services, Public Works and NGOs. Section 15 of the Water Resource Act defines the responsibilities of the National Water Resources Advisory Committee as:

1. Provide advice to the Director on matters relevant to the protection, management and use of water;
2. Oversee the proper planning and development of urban and rural water supplies;
3. Operate in such a way as to ensure coordination of water resource management activities; and
4. Do such other tasks as are agreed with the Director.

NWRMAC has to date however been reactive rather than proactive in nature. Little has come out of this committee in terms of policy advice and planning with the exception of the Tagabe Catchment Management Committee and protection of the Tagabe River and water supply.

The Water Resources Act also makes provision for preparation of a National Water Resources Management Policy or National Water Resources Management Plan if the Minster determines it necessary. A major barrier to the successful implementation of the Act has been the lack of effective leadership and no strategic water resources management direction. With the planning approach taken by the Director General of the Ministry of Lands and Natural Resources this is now changing.

Policies

To date, policies have tended to be reactive rather than proactive and to be implicit or inferred rather than explicit.

Water supply delivery

Rural Water Supply as a service provider has quality standards for construction but not delivery or cost. Construction standards are not supported by any policy indicating that either the Rural Water Supply Department or any one else constructing water supplies need comply with them. And, it is likely that many potential participants in this sector do not know about the standards.

UNELCO as the main urban provider operates under a concession agreement with Government. Public Works Department, Rural Water Supply and Drilling Section are also service providers operating without concession or regulation.

Water quality monitoring and protection

No policy or standards for water quality delivery currently exist. In the absence of national standards UNELCO does its best to meet WHO standards and DGMWR has previously focused on delivery rather than quality. This focus is changing with the introduction of the Water Safety Plan and Water Quality Monitoring Plan. Yet, it is not clear what policy or standards these two plans are working to.

There is also no policy or standards for water quality monitoring developed within the DGMWR or as part of the Water Safety Plan or Water Quality Monitoring Plan. Both these external interventions also need to focus on assisting government to establish the supporting institutional arrangements.

In terms of water quality protection there is no known policy for riparian zones along rivers or foreshore[24]. Similarly, wastewater management is unregulated.

Forestry

There is a clear Code of Logging Practice (COLP) for Vanuatu which outlines minimum standards for all forest operations – planning, roading, harvesting. The purpose is to protect environment, promote sustainable forest management, protect cultural, historical and archaeological sites; recognise and respect resource owners, outline roles of each stakeholder, maintain forest health and encourage growth of commercial timber. This is one of the clearest policies impacting and potentially protecting water resources.

Other legislation and administering bodies

Legislation	**Administering Body**	**Purpose**
Constitution of the Republic of Vanuatu	Government of Vanuatu	Uphold the rights of Ni-Vanuatu
Water Resource Management Act No. 9 2002	DGMWR of Ministry of Ministry of Lands & Natural Resources (MLNR)	Manage and allocate water resources
Land Tribunal Act 2003	Ministry of Lands	To resolve land disputes following the traditional system of chiefs
Vanuatu Water Conservation Strategy 1993	Environment Unit	This may have been replaced by Environment and Conservation Act 2002
Environment and Conservation Act 2002	Environment Unit, MLNR	Policy development and coordination of environmental management and conservation
Public Health Act No. 22 of 1994	Department of Public Health Ministry of Health	Public health including water quality, and powers of inspection over local authorities in matters relating to public health.
Laws of the Republic of Vanuatu (1988) Chapter 126 Municipalities	Municipal Councils of Ministry of Internal Affairs	Provision to make by-laws for management of all forms of waste
Public Works Act	PWD of Ministry of Infrastructure and Public Utilities	?
Forestry Act Revised 1997 to enable COLP to be legalised	Ministry of Agriculture Forestry and Fisheries	Protect environment, resource owners and promote sustainable forestry
Planning & Building Codes	Ministry of Internal Affairs	? Physical Planning Act

Monitoring, enforcement and compliance

[24] There may be provision within the Environment and Conservation Act but this has not been sited.

Few policies or systematic methods have been established to address monitoring, enforcement or compliance for any water related issues except for those relating to land confiscation or compensation which are addressed under the Land Tribunal Unit. Contaminated discharges to rivers are known for which no action is taken. Water supplies are deliberately damaged and no action is taken.

Regulations require permits for development and yet anecdotal evidence suggests many developments go ahead without permits and no action is taken. Further, a Preliminary Environmental Assessment (PEA) is required to be prepared and submitted to the Environment Unit for review for any development activity including water supply delivery. To date, no PEAs have been prepared for any water development undertaken by DGMWR.

A systematic approach is required to establish policies, regulations, priorities and action plans to implement existing legislation.

Multilateral Environmental Agreements (MEA)

- Ratified Convention on Biological Diversity March 2003
- Ratified the United Nations Framework Convention on Climate Change (UNFCCC) March 2003

3.5.2 Major issues and concerns

In 2001 the Government of Vanuatu, with the assistance of the Asian Development Bank and AusAID, commissioned a comprehensive study of the Vanuatu economy with a view to strengthening development policies. The resulting report made several recommendations to raise the rate of growth of output and enable improved public service delivery. A subsequent diagnosis of the reasons for persistent revenue shortfalls of the state, and of potential remedies to this problem, added to an already large and rather overwhelming list of recommendations yet to be implemented by authorities. The goal, therefore, of the Medium Term Expenditure Framework of the PAA is to formulate and articulate medium term priorities of Government, and to sequence and resource policy interventions so as to realise the developmental goal of the State.

One of the major issues facing institutional arrangements is that it has been reactive and sectoral. During the Comprehensive Reform Program (CRP) much of Vanuatu's governing legislation was reviewed and updated. And, without a further review would adequately provide for sustainable development as promoted in the PAA. What is seriously lacking is implementation of the legislation into Ministerial policy, regulations, strategies and actions. There is little experience of this thinking style in Vanuatu.

All government departments in Vanuatu are seriously short of resources – people, funds, information, and knowledge. GDP has declined every year for the last decade and is now less than in the 1980's. GDP per capita was calculated as Vatu 172,883 million in 2001. With such demand on limited resources, a prioritised approach is essential.

Reform of Government activities in the utilities and services sector has focused on marine, air, and land transport sectors with the corporatisation of Airports Vanuatu, and plans to establish a Land Transport Authority as a separate regulatory authority.

Efforts have also been made to improve the operations and efficiency of public enterprises in general with the design of a divestiture program to increase private sector participation in the operation and maintenance of services. However, this has met with limited success and continuing subsidies have been a substantial drain on government's budget. This lack of progress is reflected in the high level of subsidies and transfers to public enterprises, which were equivalent to 6% of GDP in 2004. This reduces the funds available for priority sectors such as health and education.

There is therefore still much to do to improve the performance of both infrastructure and utilities service providers. The government is in the process of setting up a Regulatory Authority.

The PAA is a significant planning tool for Vanuatu. It is a set of intentions for government yet it is unclear who is responsible for ensuring its implementation. There seems to be a disconnect between state planning and ministerial and departmental planning which demonstrates a lack of integrated planning concepts and tools.

Sectoral planning has also failed to address customary land tenure and resource ownership issues adequately especially in relation to the delivery of water supply and protection of land and water resources. Policy and guidelines on how to implement the Water Resource Management Act, Environment and Conservation Act, and Forestry Act need to be established in consultation with the Land Tribunal.

The NWRMAC has been ineffectual to date. It lacks leadership to clarify its role and develop plans and actions that result in clear direction and development of policies and guidelines. It is the appropriate agency to drive integrated water resource policy.

Compounding the lack of resources, lack of capacity and strategic direction are the well-meaning offers of external government "interventions" which usually bring with them resources – people, funds and information. Yet, if these interventions are not well embedded in supporting government priorities they end up being distractions from core functions and requirements. Some carefully placed NGO support is however extraordinarily beneficial and necessary to both communities and government agencies. NGO and civil society contributions hold governments accountable and fill essential developmental roles.

Sustainability of external interventions and NGO activities needs to be built-in to the intervention through a system of accountability checks and balances. Information provided for this report has clearly shown that "project" based interventions even of three or four year duration are not sustainable and more often than not the "project activity" stops as soon as the resources introduced through the project are withdrawn. This is despite the good will of the implementing agency to continue.

Confounding all attempts is a shortage of good quality information. Information is generally scattered, sectoral, patchy, and mostly not yet digitised. There is need for a central reference library.

3.5.3 Measures to manage impacts and concerns

Institutional, policy, legislative

The PAA has already developed strategic medium-term high-level policies, priorities and actions for all sectors. Priorities for environmental and disaster management and utilities and services are provided below. Each sector now needs to take these priorities and develop their own sector strategies and plans as the Ministry of Lands and Natural Resources is currently doing. Staying focused on these priorities is the only way to move forward with such limited resources.

The PAA focus on increasing growth necessary for development needs to be balanced with the social and environmental sustainability needs. Whilst this is provided for in the PAA it will require very good communication and cooperation across government departments to ensure economic, social and environmental needs are met. The IWRM approach would provide an opportunity to build on the lead already taken by government and provide the framework for integrated sectoral planning and implementation.

The natural agency to coordinate and lead the IWRM is the existing NWRMAC. Considerable attention is needed to increase its capacity (knowledge and skills) to under this task which has quite a different focus from its current focus on project implementation.

PAA policy objectives, priorities and strategies for environment and disaster management[25] :

1. Implement the Environmental Management and Conservation Act and the regulation of related activities;
2. Encourage the development of protected areas;
3. Improve sewage treatment and reduce pollution in the harbours and lagoons near urban centres;
4. Conduct a solid waste disposal study;
5. Encourage eco-tourism, where feasible, as a means to protect the environment;
6. Conduct community awareness of the need to protect the environment including through reduction of risks from natural hazards;
7. Develop and implement risk reduction programmes in communities;
8. Prepare a Port Vila development plan to define how public amenity can be maintained or improved and the attractiveness of the town enhanced for both residents and tourists.

PAA objectives, priorities and strategies for water and utilities sectors[26]:

Objectives

1. Ensure the provision of commercial, quality, efficient, and competitively priced infrastructure, utilities and services, either through public enterprises or through private sector partnerships and competition;
2. Encourage the development of a competitive private sector involvement in the provision of utilities and services;
3. Minimise subsidy requirements for public utilities;
4. Ensure economic infrastructure and support services are available to other sectors to enable all stakeholders to achieve their own sector objectives.

Priorities and Actions

1. Reduce the cost of services, particularly of electricity and communications including internet;
2. improve the regulatory framework to more effectively enforce contract conditions, and encourage additional competition in these sectors where possible;
3. Extend the coverage of rural electrification by the most cost efficient means;
4. Promote the use of renewable energy, especially where these can be used effectively in remote locations;
5. Extend communications services to remote areas by using innovative technology options;
6. Extend the coverage of improved water supplies in rural areas;
7. Provide training in maintenance of village water supplies in conjunction with provincial governments.

Practical measures also include:

[25] PAA Priorities and Actions 2006-2015 Pg 28

[26] PAA Priorities and Action Agenda 2006-2015 pg 42

- Further analysis is required to establish the reasons for non-compliance with legislation so that these issues are addressed before establishing compliance and enforcement rules and regulations and methods to enforce them.
- Develop standards for water quality, delivery and service and systems for ensuring compliance.
- Digitise information systems and make them available to other sectors in a useable format. This has begun in the Ministry of Lands and Natural Resources.
- Develop a central system for holding government publications in a way that makes them available to others to use e.g. update this facility in the National Library.
- Focus on human resource development.

3.6 Financing

3.6.1 Types of financing arrangements

Rural water supply

Traditionally rural water supply systems installed by DGMWR are largely funded by bilateral aid from a variety of donors - NZAID, AusAID, EU, CIDA, JICA etc. Funding may also come from non-government organisations such as Rotary (either domestically in Vanuatu or from New Zealand or Australia), Water Aid or OXFAM. A portion of each water supply system budget is funded-in-kind (usually staff wages) by the delivery agency e.g. Rural Water Supply or Drilling Section. Communities also contribute in kind with labour and other local skills and knowledge. Each project is designed, costed, and submitted for funding through the Government Investment Program (GIP), where it can spend considerable time moving through the congested administration.

Rural water supply systems are operated and maintained by communities. Village water committees are encouraged to collect household water fees at a price decided by the committee and usually about Vatu 100 per month. In practice, this fee is often too high and collection is difficult although this varies from village to village. Some water supply systems are easier to repair than others. What usually happens is that the water supply eventually breaks down and large maintenance repairs again go into the GIP for donor-funding.

Bore hole drilling

Where bores are drilled for private consumption these are privately funded. This is a significant revenue stream for DGMWR – Vatu 3 million in 2005.

Urban water supplies

Tariffs for urban water supplies are high, caused by high costs of delivery and operation. In the case of water supply provided by UNELCO, prices are set according to an agreement with Government, under the Ministry of Lands. The price is indexed to a variety of inputs and there is no scope within the agreement and concession contract to take account of increased economies of scale. The UNELCO tariff structure from January 2007 is based on a connection fee, a fixed fee for < 25m^3 per quarter and tariffs of <50m^3 = 55.13 vatu/m^3; 50-100m^3 = 71.67 vatu/m^3; 100-200m^3 = 75.18 vatu/ m^3; >200m^3 = 82.70 vatu/ m^3.

Where utility services are provided by the Public Works Department, revenue generated is generally insufficient to maintain the assets. This is in contrast to those utilities owned or operated by the private sector such as UNELCO. PWD fees and tariffs are aligned and fixed with those of UNELCO. The complexity of the issues pertaining to utilities has been discussed at length in various reports.

Fees for urban water supplies are high at 55.13VT/m^3 < 50m^3 and although many people's budgets are stretched to pay there is still demand for more connections. UNELCO report that there are virtually no illegal connections.

Wastewater management

This is currently uncontrolled and unregulated with consequently no tariffs or government revenue. On the other hand, there are a variety of non-government organisations and donors funding community-based sanitation and wastewater management.

3.6.2 Major issues and concerns

The constraints and challenges in providing adequate and efficient infrastructure, utilities and supporting services are both physical and structural. The country is widely scattered and the island geography is often rugged. The costs of providing infrastructure, water supplies and wastewater management in such circumstances are high and the economies of scale are small. Vanuatu is also highly vulnerable to natural disasters arising from its location, climate and geology, which can lead to serious disruptions to supplies and services.

The responsibility of rural communities to manage and maintain their water supplies is onerous and not particularly successful. It is a model not replicated many other places. The high maintenance cost and low incomes means rural water supplies may need to be subsidised by government and donors for some time to come.

Not enough information is at hand to undertake a financial analysis of UNELCO and PWD, what has worked for UNELCO and why, and why PWD needs to be subsidised by government. Further work is obviously necessary here before all the issues and concerns can be established.

3.6.3 Measures to manage impacts and concerns

Efforts have also been made to improve the operations and efficiency of public enterprises in general with the design of a divestiture program to increase private sector participation in the operation and maintenance of services. However, this has met with limited success and continuing subsidies (for example for water supplies provided by PWD) have been a substantial drain on government's budget. This reduces the funds available for priority sectors such as health and education and alternatives need to be found.

The government is in the process of setting up a Regulatory Authority to oversee and monitor delivery and cost of public services.

UNELCO provides a model for urban water supply delivery that could be used to review PWD efficiencies and improve their systems, establish a utilities board or further privatise water supply delivery in urban and provincial centres.

Private public partnerships for water supply delivery and sanitation services deserve further investigation.

An existing situation that could be enhanced to better provide for public health is to fulfil the obligations under the Health Act and encompass sanitation and water supply as a health policy. Clearly, capacity within the Public Health Department needs developing to undertake this.

IWRM is an opportunity to gain cross sectoral commitment to water resource management and gain efficiencies through collaboration and working towards a common purpose.

4. LINKAGES TO OTHER AREAS

4.1 Landuse and agriculture

Landuse policy with reference to water resources

Vanuatu lacks a national landuse policy and any impacts on water resources or watersheds currently need to be managed within other existing policies.

What conflicts exist in relation to land use within watersheds?

Human settlement and human waste discharged within watersheds is significant. It is the main cause for concern in the Tagabe River watershed and reason why the Luganville watershed needs defining and gazetting as soon as possible. Refer Appendix 4.

Agriculture

Vanuatu is still an agriculture-based primarily subsistence economy with over 70% of ni-Vanuatu living on their traditional lands growing food crops and harvesting forest and marine resources for personal consumption, exchange and gifting. Both subsistence and commercial agriculture are based on rain-fed production systems of taro, yam, sweet potato, copra, cocoa, bananas, peanuts, kava and cattle. Irrigation is used only in a few horticulture ventures and is not significant with respect to water use at a national level.

High population growth rates and lack of significant long-term growth in the agriculture sector is touted to be the cause for the decline in Real GDP per capita over the last decade. Except for some limited successes, commercialisation of smallholder agriculture has been slow in developing, while many of the former colonial plantations were broken up at independence. Despite this, since 2003 the agriculture sector has grown at an annual rate of 3.3 percent compared to 2.8 percent growth for the economy and an average population growth rate of 2.6 percent per annum. Anecdotal evidence suggests there is significant uncontrolled land clearing for both subsistence and commercial agriculture.

Forestry/deforestation

There are 27 logging companies mainly in SHEFA Province, and more than 50 mobile saw mills. The Department of Forestry has a very well established Code of Logging Practice (COLP). The Forestry Act under which the COLP was established has no power over land and land use and land ownership conflicts compromise the application and enforcement of the COLP.

When questioned, forestry staff were unable to identify where deforestation and sedimentation has impacted watersheds.

4.2 Habitats and ecosystems

A comprehensive study of habitats and endemic or endangered species has been undertaken in the Biodiversity Conservation Project[27].

There are a number of protected areas in Vanuatu as detailed on the land use maps provided in Appendix 7. These include:

Province	Location
Torba	Hiu Island Reserve, Tegua Island Reserve, Loh Island Reserve
Sanma	Western Peninsular, Vatthe Conservation Area, Lory Protected Area (all on Santo)
Malampa	Nagha Mo Pineia, Lasenui Protected Area, Uri Marine Park, Lakorombanga Protected Area, Pankumo Protected, Vendik Pik Protected Area, Ringi Te Suh Marine Conservation Area (all on Malekula), and Ambrym Megapode Reserve

[27] Facilitating and strengthening local resource management initiatives of local landholders and their communities to achieve biodiversity conservation objectives, Environment Unit Vanuatu 2003

	(Ambrym)
Penama	No protected areas
Shefa	Teouma, Central Efate
Tafea	Lownahuru (Tanna), Erromango Kauri Reserve

Of the seventeen protected areas identified, thirteen are coastal; two are inland and protect waterways Teouma and Pankumo, and two are protecting forest areas - Lownahuru, Erromango Kauri Reserve.

The primary threats to these protected areas include lack of knowledge and involvement of communities in establishing and managing the reserves. Despite the biodiversity study undertaken by the Environment Unit there is still a lack of research and knowledge of habitats and endangered species.

The Environment Unit and Department of Forestry have jointly established a land conservation initiative. This is donor-funded and considered not sustainable in its present form unless donors continue to support this initiative for the long haul.

4.3 Health and Hygiene

Scabies, skin diseases and malaria are three of the most common health issues in Vanuatu with a consequent reduction in the wellbeing and productive capacity of the people. All these diseases are water related. Epidemics of malaria can occur during both the dry and wet season, with outbreaks occurring when rainfall and floods, and poor drainage and waste management provide pools of water that are favourable breeding sites for the mosquito.

Unmanaged and uncontrolled sanitation and wastewater are also major concerns for health. Whilst there are currently no major issues related to this there is concern particularly in high-density areas that should a problem emerge it will be difficult to control especially as communicable diseases account for a large proportion of illness and death in Vanuatu.

The tourism industry is also under threat from poor sanitation facilities. The Vanuatu Island Bungalow Association (VIBA) is participating in the Eco-Sanitation Programme in an attempt to introduce more hygienic and more acceptable sanitation to remote tourist locations.

Community awareness programmes are continuously improving. An inter-sectoral team (DGMWR, SHEFA Provincial Government Council, SHEFA Provincial Health, The Ministry of Health, and Peace Corps Vanuatu) participated in Village Water Committee Training in 2006[28] in an effort to provide comprehensive training in water quality management and disaster management whilst continually linking all topics to health.

4.4 Watershed and Coastal Management

Increased human pressures on coastal environments are enhancing the vulnerability of coastal areas to erosion or sedimentation, pollution, and climate and sea-level variations and change. Much of Vanuatu's significant infrastructure has been developed within metres of the shoreline. Pollution in Port Vila Harbour from land-based activities and water-borne pollutants in particular has been highlighted for over a decade with no real action to address it.

Throughout Vanuatu, coastal fisheries on which many islanders depend are declining due to a combination of overfishing, pollution from chemicals and animal and human waste, in-fill, sedimentation, and climate change.

[28] Prokram Disaen blong Vilej Rural Wota Saplae Komiti mo Trening blong Olsem Wanem blong Manejem Mane, Dipatmen blong Jioloji, Maen mo ol Wota Risos (DGMWR) Port Vila, Vanuatu, Februari 2007

Outside the system of reserves, no formal sectoral linkages are currently known to plan for or manage coastal development or the impacts of land based activities on waterways and coastal ecosystems.

The Third National Report to the Convention on Biodiversity[29] identified several critical coastal ecosystem issues which are examples of areas where there could be a more integrated coordinated management approach. For example:

- There is only a small area of mangroves within Vanuatu. Where they occur they are important as fish nurseries, crustacean habitats and for environmental services. The Forestry Department is seeking to amend the Forestry Act so as to be able to initiate mangrove management plans. From work on Malekula the threats to mangroves are both natural (tectonic uplift and storm damage) as well as human (cutting for firewood and posts and encroachment of agriculture activities on their landward margin).

5. STAKEHOLDER ENGAGEMENT

This Diagnostic Report was prepared over a very short time frame eliminating any opportunity to gather and collate much needed information and data and to have extensive stakeholder participation. The approach was threefold:

- A one-week field visit was made to Vanuatu during which first hand information was gathered through personal interviews of organisations and people involved in the water sector. An in-country program of activities is provided in Appendix 2.
- During the weeklong visit to Vanuatu a min-workshop was held with the National Water Advisory committee to discuss the project in concept, establish government and non government commitment to it, gather pertinent information and begin the process of identifying water resource “Hotspots”. Minutes of the workshop and people attending are provided in Appendix 6.
- Significant information came from existing formal and informal published reports. A full bibliography is provided in Appendix 1.

Stakeholders actively engaged during report preparation are described in Table 7 below.

Consulting with stakeholders and ensuring their contribution is a fundamental building block of inter-sectoral sustainability at all stages of planning, implementation, monitoring reflection and learning. In past years, DGMWR has consulted widely during strategic planning stages and on specific issues. They are currently undertaking a strategic planning exercise including extensive stakeholder consultation. However, consultation tends to happen at infrequent intervals and is reactive rather than proactive.

One significant issue emerged during consultation for this report. An overriding concern from all consulted was that, with the exception of one meeting in the Solomon Islands, no previous consultation has occurred in Vanuatu over the nature of the IWRM, how Vanuatu would participate, what would be involved, and how it fits with existing programmes, responsibilities and plans. There is therefore little understanding of IWRM and very little ownership of the process or outcome.

[29] The Third National Report to the Conference of Parties of the Convention on Biodiversity November 2006, Environment Unit, Vanuatu

Table 7 Stakeholder Engagement in the Diagnostic Report

Institution	Stakeholder Interests and Responsibility	Relevance to IWRM and reason for inclusion	Role in the consultation process
Ministry of Lands and Natural Resources	Land Management Resource promotion and development Mapping Coverage Environmental Legislation and Policy	Government agency with responsibility for environmental and water resource management	Interview with DG
Environment Unit	Responsible for providing advice on environmental matters to government and people of Vanuatu	Responsible for environmental impact assessments	Interview with Ernest Bani, Principal Environment Officer
Department of Geology Mines and Water Resources	Responsible for water resource management and rural water supply delivery	Focal point for IWRM strategy Contributor to Water Committee Workshop	Lead role in preparing workshop and interviews
Ministry of Health	Responsible for Public Health	Water supply and water quality have a major impact on public health – responsible for water quality surveillance	Interview with Public Health staff
Department of Public Works	Responsible for water supply in three semi-urban centres. Responsible for storm water drainage	Responsible for water supply delivery in urban and provincial centres.	Personal interview with project manager
UNELCO Vanuatu Ltd	Provider of water supply to urban Port Vila	Is the major water provider and plays a significant role in supporting and undertaking water testing and community education	Participated in National Water Committee workshop and interview held with key water staff
Live & Learn (NGO)	Community education and awareness	Provide education material for communities and whilst working in the community are gathering enormous amounts of information about how the communities relate to the environment.	Participated in National Water Committee workshop and interview held with key staff
Wan Smol Bag (NGO)	Community education & awareness	Major provider of community education material and supporter of numerous community enhancement projects	Interview with key staff and reports
National Disaster Management Office	National disaster preparedness and response	Focal point for community awareness and preparation for change	Provided relevant data in response to written request
Ministry of Agriculture, Forestry and Fisheries	Primary resource and land use management	Linkages to other areas affecting and affected by water resources	Participated in National Water Committee workshop and interview held with key staff

6. Other Programmes Project Activities Related to IWRM

There are a number of activities in Vanuatu that impact on or are related to an integrated water resource management approach. Some of these are described in Section 3 as community awareness projects whilst others that focus more on an integrated approach are described here. The projects are organised in terms of their support to water and sanitation planning and policy or water and sanitation resources and services.

Water and sanitation planning and policy

Project Name:	Vanuatu Water Safety Plans (WSP) Program
Date:	2006 –2007
Location:	Vanuatu (as well as Cooks, Palau, Tonga)
Purpose:	It is a risk assessment, risk management approach to providing safe quality drinking water. Basically to identify risks/critical points along water system and try to minimise/eliminate these risks for maintaining good quality water. The 4 pilots selected are Cooks, Vanuatu, Palau and Tonga. First stage of scoping missions has been completed, also in-country planning workshops have been completed. Next stage is to verify WSPs and implement them.
Benefits:	Improve quality of (reticulated and non-reticulated) water delivered in Vanuatu and increase the capacity of delivery agencies across all government sectors and communities to monitor water quality and contribute to safe drinking water.
Funding:	AusAID
Contact Person:	Davendra Nath, Water Safety Plans Officer, SOPAC Fiji

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Project Name:	Vanuatu Climate Change Adaptation Project
Date:	2007 for three years
Location:	Three main villages
Purpose:	Improve the adaptive capacity of Vanuatu communities to climate change and related risks through community level adaptation projects and awareness programmes.
Benefits:	Protect Vanuatu's environment by enhancing national and community level capacity in pursuance of sustainable development and achievement of improved livelihoods. VCCAP's expected output/outcome is 2 fold; 1. Plan, implement and monitor adaptation measures. 2. Increase knowledge and understanding of climate and sea level change through education and awareness
Funding;	AusAID
Contact Person:	Vanuatu Meteorological Service

Project Name:	Capacity Building for the Development of Adaptation Measures in Pacific Island Countries (CBDAMPIC)
Date:	2007 for three years
Location:	Three main villages Three selected sites, including Lateu community in the Torres Group of Islands, Luli Community on Paama Island, and Panita Community on Tongoa in the Shepherds Group
Purpose:	Improve the adaptive capacity of Vanuatu communities to climate change and related risks through community level adaptation projects and awareness programmes.
Funding;	CIDA
Contact Person:	Vanuatu Meteorological Service

Water and sanitation resources and services

Project Name:	Water Quality Monitoring Capacity Building Program for PICs
Date:	2006-2009
Location:	Vanuatu (as well as Niue, Cooks, Marshall Islands)
Purpose:	Contributes to Pacific Regional Action Plan (2002) and Pacific Framework for Action on Drinking Water Quality and Health (2005). Strengthen the capacity of in-country labs to accurately monitor the quality of their water (drinking and if needed coastal). The 4 pilots selected are Cooks, Niue, Vanuatu and Marshall Islands.
Benefits:	The Water Quality Monitoring program serves to verify that the Water Safety Program is functioning well and is indeed achieving safe drinking water. The Water Quality Monitoring program will develop capacity to analyse water quality accurately.
Funding:	NZAID
Contact Person:	Tasleem Hasan Program Adviser, Water Quality Monitoring Capacity Building, SOPAC, Fiji.

Project Name:	Talise Basin – Maewo, Vanuatu
Date:	
Location:	Talise Catchment, Maewo, Vanuatu
Purpose:	Develop community awareness around the impact of their activities on the Talise River and catchment and inform them with knowledge and actions that better manage their environment. Generate and analyse high quality data on the hydrology and environment of the Talise Catchment and compare rainfall and water level data to flooding events for environmental and risk management purposes.
Benefits:	The Hydrology Section of the Department of Geology is responsible for gathering data on Vanuatu's water resources. The Department is attempting

to address the serious lack of water resource and environmental data through the planned installation of the monitoring station at Talise, Maewo. The station will be equipped with a Steeling Well that consists of automated water level recorder, a floater, and a rain gauge.

Funding: UNESCO

Contact person: Erickson Sammy, Water Resource Manager, DGMWR, Vanuatu

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Project Name: Flood and hydrological monitoring

Date:

Location: La Colle and Teouma Rivers South Efate, Vanuatu

Purpose: Extend hydrological studies around the island of Efate; generate high quality Hydrological data; compare rainfall and water level data to flooding events.

Benefits: The Hydrology Section of the Department of Geology is responsible for gathering data on Vanuatu's water resources. The Department is attempting to address the serious lack of water resource data through the planned installation of 2 monitoring stations, one at La Colle and the other one at Teouma River on Efate. Each station will be equipped with a Steeling Well that consists of automated water level recorder, a floater, and a rain gauge.

The project will determine to what extent the high water level is impacting and overflowing River banks along side and downstream the La Colle and Teouma Stations.

Contact person: Erickson Sammy, Water Resource Manager, DGMWR, Vanuatu

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Project Name: Port Vila Eco-Sanitation

Date: August 2004

Location: Tagabe River, Efate, and other VIBA locations Vanuatu

Purpose: The Port Vila Eco-Sanitation workshop is a combined effort to address sanitation issues in the Tagabe River area, and introduce ecologically sustainable sanitation to the wider community through The Vanuatu Island Bungalows Association (VIBA). VIBA represents rural bungalow operators providing eco-tourists with lodging. The Tagabe River Management Committee (TRMC) represents a multi-stakeholder, inter-sector, multi-disciplinary, community-based initiative to restore and protect the watershed.

Benefits: 1. Solve a major drawback to eco-tourism in VIBA through the elimination of tourist complaints about poor sanitation.

2. Ensure year round toilet availability even through severe drought.

3. Free water resources for more essential uses.

4. Lower installation and maintenance costs when compared with flush toilet systems.

5. Help make bungalow developments viable in areas with small water resources.

6. Eliminate local pollution of groundwater and coral reef systems.

7. Introduction of dry toilet technology

8. Improve health and hygiene through the major reduction of insect borne pathogens.

9. Demonstrate the viability of healthy toilet development in areas where groundwater pollution is a potential problem e.g. Maskelyne Islands.

10. Demonstrate that the composting toilet requires less land area than wet pit toilets thus increasing the area of arable land available to villages.

11. Contribute to protection of water quality in the Tagabe Watershed by assisting the Tagabe River Management Committee (TRMC).

Funding: NZHC for workshop, construction design manual, some materials

Contact Person: Dr Leonie Crennan, Australia

Project Name: Facilitating and Strengthening the Conservation Initiatives of Traditional Landholders and their Communities to achieve Biodiversity Conservation Objectives.

Date: 2004

Location: Gaua, Tanna, Santo, Vanuatu

Purpose: Facilitate and strengthen traditional approaches to conservation to enable locally governed and managed protected areas to be more effective conservation tools. Establish a mosaic of community conservation areas through community participation in design, implementation, management and monitoring to promote biodiversity conservation outcomes.

Uphold constitution of Vanuatu by recognising the indigenous rights of land owners, and complement the Biodiversity SAP.

Several other biodiversity and conservation projects also exist and are described in the proposal to GEF for this project.

Benefits: Greater and more effective application of locally and culturally appropriate mechanisms to conserve Vanuatu's internationally significant biodiversity. More integrated management of forest, freshwater and coastal ecosystems. (Marine ecosystems are not a primary target).

Funding: UNDP

Contact Person: Ernest Bani, Vanuatu Environment Unit, Ministry of Lands, Vanuatu

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7. Capacity Development Needs for Removing Barriers

IWRM Island Style looks at managing water resources not only within the watershed but also the receiving coastal waters requiring:

- Drought and disaster preparedness plans
- Small size of island countries necessitates a national approach to capacity building, awareness and governance
- Adopt new approach “Ridge to Reef”, “White Water to Blue Water”, “H2O”
- Pacific examples “Island System Management” (ISM) and Integrated Coastal Zone and Watershed Management (ICWM)
- Make use of HELP, HYCOS, WSP concepts and approaches

Whilst this Island Style management is laudable and necessary, there are basic skills required for this to be successful. The PAA Medium Term Expenditure Framework primary priority is to create an environment for private sector led economic growth, including activities in the primary sectors of agriculture, forestry and fisheries, as well as in tourism. The next level of priority is human resource development. However, it is proposed here that human resource development must come first in order to have the skills and create the environment for primary sector development.

Capacity building is cross cutting across all six thematic areas – water resource management, island vulnerability, awareness, technology, institutional arrangements, and financing.

7.1 National Cross-Cutting Capacity Building Requirements Include

Leadership

- One of the most critical issues in Vanuatu is leadership at all levels of government and civil society.
- Strategic thinking and planning is critical to Vanuatu developing Ministerial plans and scenarios to implement the well thought through PAA.

Policy development

- Existing legislation needs to be interpreted and developed into policy, regulations and guidelines for implementation.
- Assessment needs to be made on why existing policies and regulations are not being enforced and these issues addressed to strengthen enforcement preferably as incentives.
- Research and information needs to be translated into meaningful and enforceable policy across all sectors.
- Strengthen the capacity of national coordinating bodies such as the National Water Resource Management Advisory Committee (NWRMAC) to coordinate activities and address policy and inter-sectoral issues.
- Build capacity to develop national disaster preparedness policies and implementation plans and action.

Technical capabilities

- Training is required to develop water assessment programmes (quantity and quality) and to record and analyse data for easy interpretation and use.

- Rationalisation of water quality testing laboratories is required, and a decision made on who will undertake water quality tests on a national level. This laboratory then needs supporting with policies, standards and guidelines.
- Further capability is required to assess and map habitats and ecosystems and develop participatory management plans.
- Technical capacity needs developing across all sectors to understand and use the VANRIS data for a variety of different applications.
- Technical capabilities to design and build appropriate sanitation is required.

Infrastructure development

- Communication systems need improving across the country.

Awareness and participation

- Far greater involvement of island communities is required in all aspects of development. This needs to be actual contributions to identifying issues as well as solutions rather than consultation once the action has been decided.
- Systems for sharing information across all sectors are required.
- This also includes far greater and more effective networking of policy makers nationally and regionally for sharing ideas, resources and support.

Institutional arrangements

- Capacity to regulate service providers needs developing.
- Public private sector options for delivery of water supply and sanitation services needs further research and development.

7.2 Implementation and application

7.2.1 Vanuatu contributions and outcomes

To date Vanuatu involvement in developing IWRM concepts has been small. Understanding and ownership of IWRM will require a commitment from Vanuatu and from regional support agencies to allow the time and provide the support to encourage and enable this to happen.

The first requirement for capacity development targeted to implementing IWRM is for the water resource sector stakeholders in Vanuatu to review the information, outcomes and recommendations of this report, to use it as the basis for developing their own set of capacity development needs and IWRM approaches. It would be important that this is a facilitated process with the intention of developing this outcome. This report is a resource for this process not the definitive statement.

The Ministry of Lands and Natural Resources is currently undertaking a strategic planning process with a focus on water resource management, which is to be complete by August 2007[30]. The timing is excellent to integrate these two processes.

7.2.2 Training

As much training as possible should be provided on a regional basis which provides the opportunity to develop networks or communities of practice so that people may share their questions, reflections and learning regionally and provide support and encouragement. Regional training would ensure that communities of practice share a common understanding and language.

[30] A draft was completed in September 2007

Leadership

Leadership training for all leaders and managers is essential to build the capacity of people in these positions to fulfil this role. Several trainings targeted towards senior and middle mangers could be provided on a regional basis over the next few years. These trainings need to bring leaders into today's knowledge worker age leadership thinking and modelling focusing on enabling others rather than micromanagement[31]. This is a paradigm shift that will free people to take responsibility and initiative, and be incredibly rewarding.

Policy development

Significant new legislation has been gazetted during the reform programmes undertaken around the Pacific. Yet, much of it goes unimplemented. Training is needed for senior managers and policy developers to interpret the legislation and develop policies, plans and actions to implement it. This training could also be provided on a regional basis over the next few years.

Technical capabilities

Several areas of technical capability need developing and could also be provided on a regional basis:

a. Regional training for staff in designing water monitoring plans (quality and quantity) and in analysis, reporting, and recording.

b. Habitat and ecological assessment and management plans.

c. Mapping, recording and sharing data. VANRIS in Vanuatu should be encouraged and continue to be developed and more people must be trained in how to use it.

Awareness participation facilitation information sharing

Communication skills are critical. These cover all aspects of how we involve others and share information. Several trainings around this could be provided:

a. Focusing on enabling communication and conflict resolution skills.

b. More technical capabilities of information management and sharing.

7.2.3 Institutional development

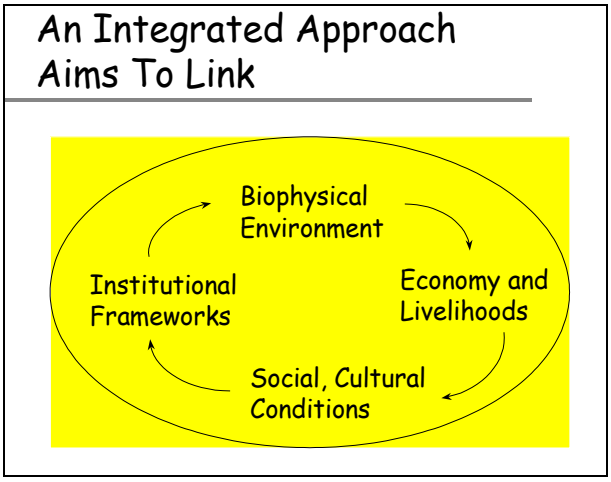
Vanuatu is already in the process of addressing the need for a regulatory authority and the need for regulation and management of sanitation services. The best option here is to seek advice from Vanuatu on what, if any, assistance they may want or need to progress these needs.

[31] Refer: Steven Covey 2004 The 8th Habit;, Bruce Roberts and Robert Fritz 2006 The Managerial Moment of Truth; Margaret Wheatley 2005 Finding our Way leadership for an Uncertain Time

8. Introducing an Integrated Approach Towards Barrier Removal

Integrated water resources planning and management aims to take appropriate account of important physical, social, economic and cultural linkages within a water resources system, such as:

- physical linkages between land use and surface and groundwater quantity and quality,
- economic linkages between various, and sometimes competing, water uses,
- social linkages between water development schemes and potential beneficiaries or those adversely affected, and
- institutional linkages, both horizontally and vertically, among various formal and non-formal stakeholder institutions.



Strategy

A strategy for developing an integrated approach to water resource management could be structured into four areas:

- Research
- Public Awareness
- Capacity Building
- Policy and Institutional Development

However, in order for any approach to be successful there first has to be willingness, comprehension, and ownership of the need and process, and agreement on how stakeholders will contribute. For IWRM to gain traction and be successful in Vanuatu stakeholder contribution[32] will be essential. To date this has not happened and creative inclusive processes need to be employed to encourage it, both from the external advisors and within Vanuatu.

This role of integration and inclusion would logically be facilitated by NWRMAC although processes for doing this need to be considered carefully. Their role would extend to include the cross-sectoral

[32] Contribution is used here rather than participation because it requires a different approach both to and from stakeholders. Research over the last decade shows that processes that involve the "whole system" are likely to foster contribution and greater intelligence of the whole system. Such processes include Future Search Conferencing, World Café, Scenario Development for example.

integration of resource management and planning as well as institutional planning and integration. In order to achieve this, the composition of the committee will need to be reviewed and the committee receive strategic planning and management and policy development training.

Most critically, IWRM must be a long-term commitment. Global, regional and local support agencies need to be prepared to support this initiative over many years into the foreseeable future. To withdraw or change direction substantially would be to hold countries into the donor-funded project cycle of design, implementation, withdraw, collapse which has created such dependency.

Research

Research is required to develop a sound information base for integrated water resource management including:

Water resource data

- Water resource assessment, identifying rivers, groundwater levels, catchments, watersheds, needs to be undertaken systematically across the country and developed into an easily accessible and useable database that can be shared across sectors.
- Systematic water quality assessment is required nationally to determine water quality data for developing water quality standards.
- Water quality monitoring needs to be undertaken systematically for all water supplies developed across the country to protect human and environmental health.

These activities should be lead by DGMWR and bringing in other sectors using the NWRMAC as a working forum to discuss, design and implement plans.

Habitats and ecosystems

- Habitats and ecosystems (including commercial and indigenous forests, wetlands, and endangered habitats) need to be characterised and defined nationally.

This is the responsibility of the Environment Unit and Department of Forestry.

Health

- Health data from across the country – which is currently held by Ministry of Health, could be mapped. Overlaying this with water resource data could be very revealing.

Department of health may need to review how their data is recorded and stored to make it available for use by others and particularly to include it in VANRIS.

Sanitation

- Research on appropriate sanitation systems based on water resource data and ecosystems could be used to develop a systematic approach to sanitation standards and guidelines across the country.

This is a multi-sector responsibility that could also use the NWRMAC as a working forum.

Vulnerability

- Work on identifying islands vulnerable to disaster, including climate change to continue and be mapped and included in VANRIS.

Research begun by the Meteorological service to be continued and entered into the VANRIS maps.

Impact assessments

- Impact assessments of activities such as agriculture and forestry on watersheds needs to be undertaken systematically to provide base data for policy development.
- Further research required on economic impacts of disasters to provide information to drive policy decisions.

To be driven by Environment Unit and National Disaster Management Office.

Information management

Information management needs to be developed and digitised across all sectors. (Excellent work has begun digitising all land records).

- Accurate and reliable records are required for all the above research activities.
- The existing VANRIS mapping system is excellent, if incomplete. It is critical that these records continue to be developed and information from the above research activities recorded on VANRIS.
- Most importantly, the information on VANRIS needs to be accessible to all policy makers across the sectors.
- The existing rural waster supply database is good. It needs updating and improving so that it can be compared with Vanuatu Statistics.

This is across all departments and sectors.

Public Awareness

In many regions, countries and local communities have come to realise that water is a multi-stakeholder issue, and that partnerships of all interested and affected parties are a viable mechanism to translate IWRM into practice. Major groups including Chief Executive Officer unions, indigenous people, water journalists, parliamentarians, youth and children all have a point of view and deserve the right to be heard. Yet large segments of society, especially women and the poor, are not given a voice. There is a need to closely examine participation based on economic status, age, gender, religion and indigenous/cultural status to ensure inclusiveness.

Public awareness is being addressed in a multi-faceted way.

- Support in terms of resources and information could be provided to NGOs who are already delivering community awareness programmes to ensure that a unified approach to IWRM is being applied across the country.
- Government departments to integrate community awareness into their core responsibilities and look to NGOs or other private sector assistance to deliver these programmes where appropriate.

Capacity Building

Leadership

- One of the most critical issues in Vanuatu is leadership at all levels of government and civil society.
- Strategic thinking and planning is critical to Vanuatu developing Ministerial plans and scenarios to implement the well thought through PAA.
- Research and information needs to be translated into meaningful and enforceable policy across all sectors.

- Develop capacity of national coordinating bodies such as the NWRMAC to coordinate activities and address policy and intersectoral issues.

Technical

- A request was made for training to develop water assessment programmes (quantity and quality) and to record and analyse data.
- Technical capacity across sectors to understand and use the VANRIS data for a variety of different applications.
- Technical capabilities to design and build appropriate sanitation is required.

Policy and Institutional Development

The Priorities Action Agenda 2006-2015 and the NAPA have both identified an intended strategic way forward. From Government perspective it is important to determine who will drive the PAA. Ministers will be responsible at Ministerial level and any intervention for IWRM must fit within the strategic direction provided by government and by the Ministry of Lands and Natural Resources in their current strategic planning exercise.

Policies and institutional developments must focus on MTEF. Actions could include:

- Policies, regulations, standards and actions to implement existing legislation e.g. Water Resource Management Act, Environment and Conservation Act.
- With respect to the above a decision needs to be made on determining whether government or private enterprise will provide water quality monitoring activities.
- Continue the review of land policy to address ongoing land ownership issues.
- Gaps in government responsibilities to be addressed such as providing for the regulation of wastewater and sanitation. Standards and delivery could be provided by PWD and surveillance by Ministry of Health.
- Polices for corporatisation of utilities and services and privatisation where feasible.
- Establishing a Regulatory Authority for delivery of utilities and services to set a standard of delivery and keep tariffs at a reasonable level.
- Tariffs for service delivery should fully recover capital[33] and operating costs, or if there are social obligations, they should be determined and funded in a transparent manner through government subsidies.
- Ensure all regional intervention programmes such as WSP and WMP, Biodiversity, etc. are compatible with IWRM so that a unified approach is being delivered.

[33] This does not mean that capital expenditure by a utility has to be financed directly out of tariff revenue – clearly long-lived assets need to be financed by equity or long-term debt. But the tariff needs to be high enough to cover depreciation on the asset, pay the interest charges, and provide a return to the providers of equity.

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