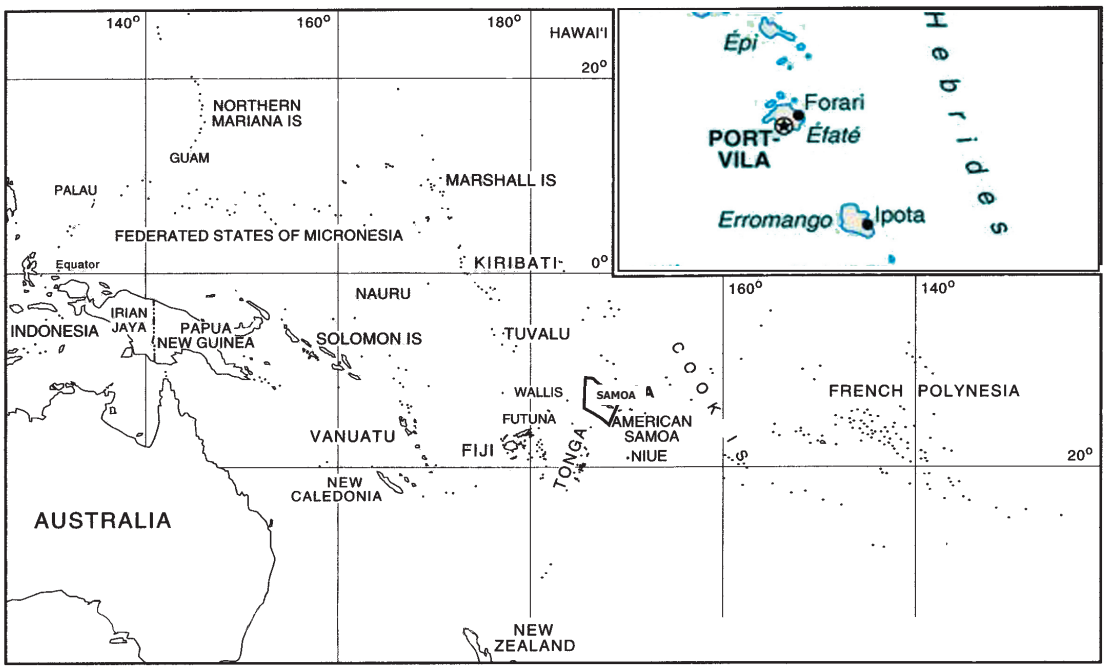
Port Vila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NEW ZEALAND
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PORT-VILA
Éfaté
Erromango
Ipota
Hebrides

Port Vila, Vanuatu

Port Vila and its peri-urban settlements: contrasted situations and policies regarding water supply, sanitation and waste management; environmental and social concerns.

Chair: **Assoc. Prof. Lye Lin Heng,** *Deputy Director, Asia Pacific Centre for Environmental Law, Faculty of Law, National University of Singapore*

Mr. Graham G. Shorten, *Director, Environmental & Community Risk International, Brisbane*
Pacific Cities urban planning and risk management, in general and in the Port Vila case specifically; history and present situation. How to define the most appropriate water and sanitation systems in Port Vila in relation to the other elements of the cities and to the sustainable use of groundwater.

Mr. John Chaniel, *Water Supply Manager, UNELCO, Vanuatu*
The privatization of Port Vila water supply service. Objectives of the Government, decisional process, financial analysis (revenues and costs), evaluation.

Mr. Clive R. L. Carpenter, *Head of Water Resources, SOPAC*
Surveys on water and sanitation problems faced by peri-urban villages and squatter settlements around Port Vila. Appropriate solutions.

Discussion on the Port Vila case. ■

Pacific Cities Urban Planning and Risk Management: Port Vila and Peri-Urban Areas Case Study

Mr. Graham G. Shorten

Director

Environmental & Community Risk International, Brisbane

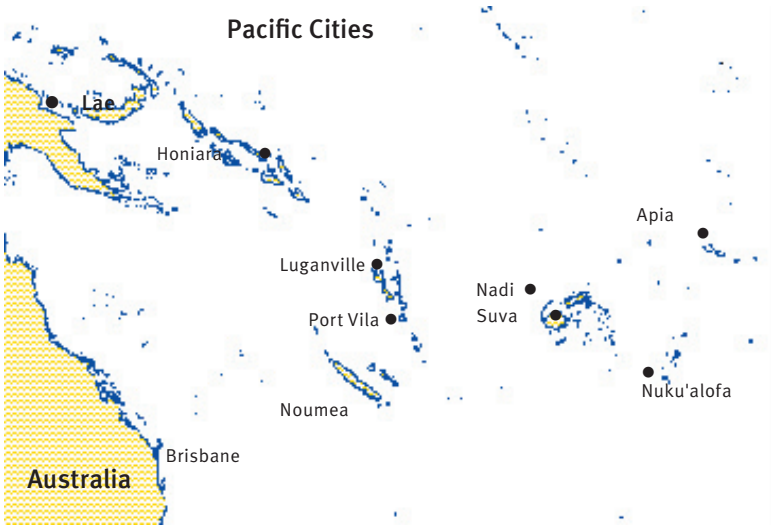
Abstract

The development of the Pacific Cities urban planning and risk management program has been in progress in Port Vila over the past 6 years. The program is founded on the accumulation of physical, cadastral infrastructure and population information in a geographic Information systems database and enhancing of the basic data through hazard, risk, environmental, economic and social investigations. While the database is now extensive, information on water distribution and health and sanitation is still lacking, limiting its use as a tool for social and economic improvement, particularly in the peri-urban settlements of Port Vila where the need is greatest. Comprehensive data are available on building assets while highly detailed orthophotos and digital elevation models and bathymetric models of the harbour and Mele Bay have been developed to support risk-loss studies and planning for development. Risk-loss assessments are made on the basis of the underlying fundamental data and studies and predictions of the magnitude and frequency of disaster events This, in turn, gives rise to an opportunity to develop a comprehensive economic planning model for the city, and the nation, based on sound risk management principles. However, without critical elements such as water supply and sanitation, power supply and telecommunications networks and relevant data represented in the risk-GIS database, it remains incomplete in its role as a planning tool for Port Vila.

Pacific Cities and Related Programs

The Pacific Cities program was initiated in 1996 to assess risk from natural and human-induced hazards to Pacific capital cities and, at the same time, provide a basis for the sustainable development of those cities. Much work has been carried out for Suva, Port Vila, Honiara, Apia and Nuku'alofa, while Lae, Nadi and Luganville are potential new starters. Port Vila is arguably the most advanced city in the program.

Pacific Cities has developed a geographic information systems (GIS) database for each of the participating cities which includes physical data, cadastral information, assets



and infrastructure data and population data as well as overlaying hazard assessment data. This information provides the basis for a quantitative assessment of risk from all sources; it provides a foundation for sociological studies leading to improvements for the inhabitants of the cities and surrounding settlements, and is an essential element in planning sustainable development of the capitals -and thus the nations themselves.
The process has been carried furthest in Port Vila which has also become a pilot site for the development of a catastrophe risk financing scheme aimed at pre-emptive financing for anticipated large-scale disasters. This work was presented to the Forum Economic Ministers Meeting in Port Vila in July 2002.

Pacific Cities falls within a wider framework of the major Community Risk Program of SOPAC. This Program has been promoting a concept known as CHARM (Comprehensive Hazard And Risk Management), which seeks to advocate and implement good risk management practices though all levels of Pacific communities and governments, including appropriate social programs. Also under the CHARM framework is another project, the Environmental Vulnerability Index (EVI) which deals with the promulgation of a set of indices related to national development, based exclusively on environmental issues.

As well, SOPAC is carrying out a UK DFID-funded program of work exploring risk and perceptions of risk in the marginal communities of Port Vila in connection with health, education and poverty issues. Currently, a joint SOPAC/ESCAP/Pacific Islands Forum Secretariat (PIFS) partnership in Port Vila is surveying and defining the plight of peri-urban dwellers who are adding dramatically to the growth of the city, and yet in many cases have few or no water supply or sewerage or waste disposal services.

Port Vila is perhaps the only city thus far to demonstrate substantial progress in all four dimensions of sustainability: economic, social, cultural and environmental. In pursuing this program, SOPAC has developed good rapport with representatives from government, civil society, research schools, enterprise and finance institutions who have provided expositions on the broader aspects related to this work.

Arguably, one of the most pressing policy issues for Port Vila is the need to define the water and sanitation systems in relation to the other elements of the city through the use of a risk-GIS (Granger 1998) database. This initiative would contribute to the sustainable use of the city's harbour and groundwater supplies. There is a great deal to be gained for the future of Port Vila by integrating the privatised UNELCO water distribution information, the Pacific Cities urban-planning and risk-management data, and information on the special water and sanitation problems faced by the peri-urban settlements outside the city distribution system, together with the proposed septic and wastewater management plan by the municipal authorities.

Port Vila Database

With the assistance of the Department of Geology & Mines and other Departments, SOPAC assembled a geographic information systems (GIS) database for Port Vila and some peri-urban areas between 1995-2001. This was augmented between 2001-2002 with data from outlying peri-urban settlements including Mele, Melemart and Blacksands, and further, with infrastructural information for the conurbation in 2002.

As of 2001, the published Port Vila Pacific Cities dataset (Biukoto et al. 2001) included the following layers of data in Table 1, systematically named where the first character 'V' refers to the city, Port Vila, and remaining 5 characters describe the data:

Published SOPAC Pacific Cities basic GIS datasets for Port Vila

GIS Data Layer	File Name	Principal Source of Data
1. Assessment of city buildings	Vasset	SOPAC field survey
2. Harbour bathymetry	Vbathy	SOPAC swath mapping survey
3. Borehole locations	Vbhpos	Geology & Mines
4. Geotechnical borehole data	Vbhcla Vbhstr Vbhsam	SOPAC assessment of borehole logs
5. Cadastral property lots	Vcadas	VANRIS database
6. Coastline including major rivers	Vcoast	VANRIS database
7. Drainage	Vdrain	VANRIS database
8. Geology	Vgeolo	SOPAC field notes
9. Roads	Vroads	VANRIS database
10. Seismic microzonation	Vseism	IRD-SOPAC-Geology SOPAC-Geology & Mines survey
11. Micro-tremor recording sites	Vsites	IRD-SOPAC-Geology & Mines survey
12. Physiographic terrain model image	Vdtm12	SOPAC-Airesearch Pty Ltd
13. Orthophoto image (resampled)	Vortho	SOPAC-Airesearch Pty Ltd

In the dataset on the assessment of city buildings (Vasset), information is available for 4,803 buildings in the fields shown in Table 2:

Information fields available for Port Vila building assets

1. Main use of building
2. Subsidiary use
3. Plan regularity
4. Wall material type
5. Window space distribution
6. Roof material type
7. Roof shape
8. Roof pitch
9. No. of Stories
10. Base floor area
11. Min. floor height above ground
12. Max. floor height above ground
13. Under-storey material type
14. Under-storey structure
15. Concrete cantilever width

Lying behind this basic dataset is a further wealth of as-yet unpublished information, including an extremely detailed airborne dataset of height and contour information at 10 m centres, enabling development of a digital terrain model with a vertical resolution of approximately 0.5 m (suitable for urban planning for road works, drainage, water supply and sewerage), and orthophotos with resolution down to 0.2 m pixels for the entire Port Vila city area as well as now for the Mele area. The assessment of the Port Vila city building asset database has been extended into the Mele area, where datasets on drainage, roads, vegetation and crops have also been added. Some of the aerial photography and derived digital elevation model products have restricted distribution due to a cost-sharing and licensing agreement with contractors Airesearch Pty Ltd (now Fugro).

By digitising contour values of Efate from the VANRIS dataset, a coarse digital terrain model of the entire Efate island area with around 10 m vertical resolution has been produced by SOPAC. Very high-resolution swath mapping digital data

is available too from SOPAC for Port Vila Harbour and for the northern half of Mele Bay. A much coarser dataset of deep ocean bathymetry to the west and south of Port Vila was obtained from a combination of the 1-minute satellite altimetry dataset and the ship-track dataset maintained by SOPAC.

Extensive control point surveying and reconciling was carried out by SOPAC in close cooperation with the Department of Lands & Survey to attempt to resolve issues of relative and absolute location that arise from the lack to date of accurate conversion parameters for translating fixed survey points from pre-satellite GPS surveys.

As well, a further dataset sample for 193 households was added in 2002 from a SOPAC-DFID survey carried out in the Mele peri-urban area for Mele, Melemart and Blacksands settlements that adds information in the fields shown below in Table 3. A PIFS-ESCAP project in other peri-urban areas to the north of Port Vila city including Olen and Freswota has produced survey information comparable to that shown below. This is currently being entered into digital format by SOPAC, and the dataset being analysed.

Information on community conditions and risk in Mele, Melemart and Blacksands

a. Household

1. Male or female head of household
2. No. of household members › 16 years
3. No. of household members ‹ 16 years
4. No. of children not going to school
5. Highest qualification of head of household
6. No. of people with a paid job
7. Sale of products from household
8. Weekly household income
9. No. of people attending primary school
10. No. of people attending secondary school
11. No. of people attending college/university
12. No. of people born in Mele
13. No. of people born in Efate
14. No. of people born on other islands
15. No. of people born in other country
16. No. of people emigrated from within Efate
17. No. of people emigrated from other island
18. Name of island of origin
19. No. of people emigrated from other country
20. Reason for emigration to Mele
21. Reason for leaving Mele
22. No. of people with malaria
23. No. of people with dengue
24. Other sicknesses recently contacted
25. Place treatment sought

b. Household - Conditions

1. Wall material type
2. No. of sleeping rooms
3. Need for house improvements
4. Any house improvements made
5. Who paid for house improvements
6. Electricity supply
7. Source of cooking fuel
8. Source of water supply
9. Type of drainage
10. No. of families to each toilet
11. Type of toilet

c. Land Tenure - Livelihood

1. No of household in building
2. House ownership
3. How was house obtained
4. Land ownership
5. Rent paid for land – amount
6. Rent paid for house – amount
7. Any problems with land owner
8. Any problems with house owner
9. Ever forced to move
10. Any land owned by household
11. Adequacy of food supply
12. Proportion of food grown in own garden
13. No. of cattle owned
14. No. of chickens owned
15. No. of pigs owned
16. Proportion of home-grown food traded
17. TV ownership
18. Radio ownership
19. Boat/Canoe/Speedboat ownership
20. Car/Truck/Motorbike ownership
21. Telephone/Mobile ownership
22. Bicycle ownership
23. Torch ownership

d. Hazard - Vulnerability

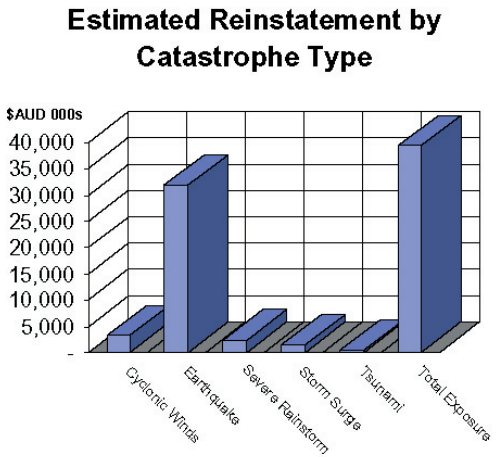
1. Hazard type perceived as major threat
2. Encroachment of flood-water in past
3. Any perceived future flood threat
4. Past storm damage
5. Past earthquake damage
6. Disaster Impact on health
7. Disaster impact on food
8. Any past evacuation or flight
9. Disaster mitigation measures adopted
10. Participation in current disaster activities
11. Source of information on disaster
12. Source of assistance received
13. Kind of help received

Assets – Buildings & Infrastructure

The value of the over 4,800 buildings at risk in the Port Vila city area has been estimated from insurance valuations of various wind-response classes of building provided by Riskman International Pty Ltd. and by Aon Risk Pty Ltd in Port Vila. Using the average of values provided, the total value of buildings in the Port Vila city area is estimated at AUD$675M, with an estimated further AUD$145M in contents. A further 1,500 buildings surveyed in the Mele peri-urban settlements are expected to add another AUD$50M value. Notwithstanding, growth rates estimated at around 10% in the peri-urban areas of Mele-Blacksands and Olen-Freswota, although lacking definition through building control and regulation records, suggest that this value is growing rapidly.

A report prepared for SOPAC by DunlopStewart Pty Ltd of Auckland (Stewart 2002) as part of the current investigations, details the risk to major infrastructure in Port Vila and the surrounding area. Table 4 below summarises the estimated losses from a variety of natural catastrophes for a comprehensive survey of Port Vila infrastructural elements. The level of impact of each catastrophe was set at a level based on scientific investigation and hazard modelling studies:

Anticipated infrastructure re-instatement costs following major hazard



While it did not attempt to estimate the total value of the infrastructure, the report proposed reinstatement costs, given the proscribed events, amounting to almost AUD$40M. Altogether, the value of building structures, contents, and the reinstatement values of infrastructure for Port Vila city and peri-urban areas approaches AUD$1 Billion.

Population

The official 1999 Vanuatu census counted 29,356 people in Port Vila. Of the 4,803 buildings surveyed by SOPAC in Port Vila, 3,844 were classified as houses or other accommodation structures while most of the 1,500 buildings in Mele-Blacksands were houses. At the average population density of 6 per household determined from the recent peri-urban survey sample, it could be expected from these (slightly out-of-date) figures alone that over 32,000 people currently live in Port Vila and its peri-urban settlements. At the estimated overall growth rate of around 4% this would fit closely with the projected figures from the 1999 census.

The map of individual enumeration areas of Port Vila was supplied by the Government in paper form and this has since been digitised and included in the Port Vila GIS database by SOPAC

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Hazard Modelling

Using the various datasets, together with a probabilistic approach based on historical information to determine cyclone frequency and magnitudes specifically in the Port Vila area, modelling was carried out for cyclonic wind impact (Oliver 2002). The wind-impact model draws heavily on a combination of probable predicted wind directions and speeds coupled to interactions with the coarser terrain model of Efate at one level, as well as the more detailed models for Port Vila and Mele. Hence a probabilistic database of wind effects also exists for Port Vila. A storm-surge and storm-wave model is currently under production for the area.

The impact takes into account a further development of the building assets database which combines a number of features including relevant construction details, floor area and value per square metre.

Similarly a probability model has also been developed to describe the magnitude and frequency of earthquake impact after work by Prevot & Chatelain (1984) and Louat & Baldassari (1989), and this is in a process of further refinement. The actual effect of any shock on Port Vila is heavily dependent on foundation-response conditions. To this end, a seismic microzoning survey was carried out for the city by a joint team from IRD Noumea, Department of Geology & Mines and SOPAC (Shorten et al. 1999; Shorten et al. 2001; Regnier et al. 2000) to more accurately model the potential effects of future earthquakes.

Based on an assessment of the recorded earthquake magnitude-distribution in the Vanuatu group, it is considered that a magnitude 8.2 earthquake is the largest that can be sustained by the crust in this area. For such a shock, occurring in the area of the trench west of Efate, at a shallow depth with certain orientation, the size of the resulting tsunami has been predicted. The behaviour of this tsunami has been modelled (Titov 2002) across the intervening ocean and through the shallower waters of Mele Bay and into Port Vila Harbour, and finally to its breaking behaviour over the nearshore detailed DEM. A separate database is derived from examining the distribution and number of buildings flooded by the event, and the height to which they are flooded.

The maximum expected tsunami could lead to a flooding of up to 6.5 m above ground level and extend as far as 1.5 km inland of the Mele coastline, with the whole of Port Vila Central Business District and petroleum storage facilities, and much of Mele and Blacksands settlements, inundated, resulting in potentially heavy casualties.

Risk-Loss Assessment

From our knowledge of the elements at risk (people, buildings, infrastructure) and their geographic distribution, characteristics, values and vulnerabilities, and of the nature (impact and frequency) of the hazards facing them, it is then a relatively straight-forward matter to predict the amount and probability of losses that might reasonably be incurred.

The moderate (Ms 7.3) earthquake and tsunami that struck Port Vila on 3rd January, 2002 caused AUD$5.5 M damage, and resulted in the raising of international awareness of the true potential of the situation in Port Vila, and in preparing the local population for a response to the larger scenario disasters foreseen. It also provided a chance for the SOPAC team to perform a ‘reality-check’ on the numerical predictions for earthquake and tsunami impact on Port Vila.

Port Vila faces substantial losses in the event of natural disasters during the life span of the current building stock. In a major disaster, losses are expected to be in the order of 20-30% of the stock. This overall figure can be broken down further by the type of impact, and the variations in building style and quality in the study.

It is a matter of risk-acceptance as to which return period is chosen for planning, but the risk to buildings is typically considered within a time-frame comparable to the life-expectancy of the structure; normally a period of 50 years. The 500-year event has a 10% chance of occurring in any 50-year period, while the 100-year event has a 40% chance in the same time frame. The return period suggested for planning is the 100-year event.

The predicted losses from earthquake are AUD$120M for Port Vila in the 100-year event, while cyclone risk models predict losses for the same return period of over AUD$260M from wind damage.

Maximum probable losses (500-year event) to housing, other buildings, contents and infrastructure in Port Vila from wind effects during a direct hit from a large cyclone will be in the order of AUD$650M, with the added risk of storm surge causing a further AUD$30M damage. The expected losses from the maximum earthquake are around AUD$300M with the added risk of tsunami causing a further AUD$50M damage. Business interruption losses are not assessed here, but would be substantial.

Risk Financing for Catastrophes

Following discussion in the 1999 Forum Economic Ministers Meeting (FEMM) of a potential Pacific regional catastrophe insurance scheme (similar to that being developed by the World Bank for the Caribbean region), Ministers requested SOPAC to report on the conclusions of the pilot study of Port Vila to FEMM 2002. The pilot study was undertaken to consider the desirability of a comprehensive risk mitigation plan, including insurance cover against catastrophic natural events. In light of the findings of the pilot study, FEMM requested a report on the applicability of catastrophe insurance as a possible component of a broader, more comprehensive disaster management strategy in the Pacific.

The objective of a regional insurance scheme is to increase the ability of Pacific island Countries to address the financial impost of natural events domestically and eliminate the need to call on donors for emergency assistance. However, catastrophe insurance is only one possible component of a broader, more comprehensive disaster management strategy. Catastrophe exposure can be incorporated into macroeconomic policy making, to generate a process of more sustainable economic growth and reduce the financial and economic volatility from periodic natural disasters.

The Catastrophe Insurance Pilot Project undertaken in Port Vila, having now put dollar figures on earthquake and cyclone risk, indicates that it is of sufficient magnitude to potentially wreck a fragile, developing-country economy, given that the entire annual GDP of Vanuatu is only in the order of AUD$330M.

The report to the 6th Forum Economic Ministers Meeting held in Port Vila in July, 2002 summarised the outcomes of research on the efficacy of a catastrophe insurance or financing scheme, including a report on the conclusions of the Port Vila pilot study on hazard and disaster events, and a review of the feasibility of risk financing for catastrophes as part of a broader risk-management strategy in that part of the Pacific region most at risk. Walker (2002) highlighted the various options available to take such a scheme forward. Part of the conclusions drawn from the work indicated that it was probably not feasible to cover the risk on behalf of any individual city such as Port Vila, or even for Vanuatu as a whole.

To successfully insure against the magnitude of likely loss from the expected events, a mutualisation approach across the region, or spreading the risk over like-regions throughout the world would be necessary.

Communities at Risk in Peri-Urban Settlements

Around the margins of Port Vila is a number of multi-cultural and multi-lingual communities of mostly low-income urban and peri-urban dwellers and workers, commonly displaced by past disasters, and living in areas of marginal land at high risk from catastrophic natural hazards.

Building on the achievements of the Pacific Cities program which has already produced a risk geographic information system (risk-GIS) infrastructure for Port Vila, a SOPAC-DFID project aims to improve the security, quality of life and opportunities of peri-urban dwellers in high-risk areas of marginal land around Port Vila and Mele, by developing and implementing together with all stakeholders, a disaster risk-management process, which will serve as a pilot model for the Pacific.

The project is seeking to affect recovery for the inhabitants of the marginal areas in a sustainable fashion over the long-term. DFID also funded SOPAC to carry out a post-disaster technical assessment in the immediate aftermath of the recent damaging Port Vila earthquake and tsunami to the same end. From that work it became evident that neither the inhabitants of Port Vila and peri-urban areas, nor the Government, were well prepared for the large-scale disaster scenarios that are thought likely for the city.

At the same time, PIFS and ESCAP are also working under UK DFID funding to assess the extent of vulnerability in squatter settlements in the Port Vila urban area and to outline ways of addressing social and land issues arising from such settlements. In doing this they will examine existing social data, review land tenure arrangements and local government administrative structures, and assess social needs using a participatory process.

SOPAC has formed an association with PIFS and ESCAP as project partners to carry out the initial survey (Schmall 2002). By having input into the design of the social survey project, SOPAC hopes to ensure that the survey adequately addresses risk management issues. At the same time, the partners, by representing the survey data in an appropriate way on a GIS database, may be able to more efficiently and effectively query and utilise the information in the long term.

The challenge, then, is to jointly design and adequately represent the social surveys carried out by all the project partners within a GIS database so that the information can be queried more effectively, and particularly so that the data can be used to better define and manage the risk-environment in which the squatters and peri-urban settlers now live.

The work is set to continue with analysis and evaluation of the risks based on this work and then to the development of means for treating the risks identified for the peri-urban settlements.

CHARM

SOPAC, working closely with the National Disaster Management Office, is now adopting risk-management procedures to deal with the problems it encounters in Vanuatu and its other member countries; first establishing the issues in their Pacific context and cultural setting, identifying the risks to each country, then analyzing and evaluating these risks to eventually provide real and acceptable treatment options.
The adoption of the approach of the Australian and New Zealand Risk Management Standard

(SAA 1999) is leading to better cohesion in risk programs, and a structuring of the risk management effort that has, up until recently, been lacking. In particular, the ultimate focus of the approach is to treat the risks that afflict the people of the Pacific Island Countries. Rather than providing solutions to engineering problems, it is rather more a question of how those solutions will be applied to treat the impact of that problem on the wider community. The SOPAC Community Risk Program has adopted the risk management standard with vigour, and the activities now being developed throughout the Pacific are being developed under a Comprehensive Hazard and Risk Management strategy, or CHARM.

Water Distribution, Sanitation and Waste Management

Aspects of water and sanitation are to be largely dealt with under a separate presentation by SOPAC, using the results of the SOPAC-DFID community risk survey carried out in the Mele-Blacksands settlements. However, a GIS data layer which integrates information on water supply networks, and information on alternative water sources and sanitation with the other sources of information amassed on the SOPAC database, is obvious by its absence.

Water distribution and sewerage networks and related consumer information are not yet available on a freely available database. The same comment applies to telecommunication and electricity distribution networks, and even to the unavailability of up-to-date digital census information despite informal and formal attempts to have these features included on the SOPAC database.

Without these critical elements being brought together to achieve the construction of a full and comprehensive database for Port Vila, it can be said that development of Port Vila and its peri-urban fringe is unlikely to reach the stage of moving forward under sensible and informed planning.

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The Privatisation of the Port Vila Water Supply

Mr. John Chaniel
Water Supply Manager, UNELCO, Vanuatu

Introduction

UNELCO has been operating the electricity utility in Port Vila for more than 60 years and in 1994 was granted a contract for the Operation and Management of the Water Service in Port Vila.

I was asked by the Task Force for Sustainable Cities to present the case study of our operation, with the idea that it may be seen as an option for providing sustainable urban services in small island Cities such as Port Vila.

I was asked in particular to examine how social, economic and environmental considerations were taken into account in the privatisation process.

To do this, I will go briefly through the privatisation process as it is an integral part of achieving a "sustainable service". This is when all decisions are made.

I will also endeavour to highlight Economic and Social aspects.

Background

Let us first of all look at what led the Government of Vanuatu to delegate the operation of the water service of Port Vila to a private operator.

Vanuatu, which had previously been under the rule of a condominium (i.e. the French and the British) gained its independence in 1980.

Until that time the urban Water Service in Port Vila was operated by the Public Works Department and over the years that followed independence there was a gradual degradation of the service, due mainly to the fact that previous assistance from the condominium partners had been somewhat reduced.

Some of the fundamental difficulties which the Government had met were :

- The Government was unable to collect sufficient funds to cover operating costs.
  Although water was metered and water charges were adequate, the level of collection was poor.
- As a consequence, the Department of Public Works had little or no capacity to invest, not only in new works, but also in basic day to day operations.
- The network was deteriorating, as was the quality of service.
- This was beginning to tell on the tourism and other industries.

Apart from being essential to the well being of the people, a Quality Service is essential to industry, in particular the tourism industry which Vanuatu very much depends on.

These were the reasons for which leaders at the time became concerned and started looking for a solution.

The water supply in Nouméa was managed by a private operator - this is where the Government of Vanuatu drew its inspiration from.

It set itself a number of objectives to move forward with.

These were:
- The transfer the responsibility of the operation to a private operator.
- The improvement of the quality of service to help the people and help industries.
- Making the service financially autonomous.

The Government was clear on what it wanted to achieve and was clear on certain **"pre conditions"** which would protect the people, such as:
- The retention of ownership of the assets by the Government.

The Government did not want to "sell out" the assets as is the case in some models of privatisation.
- Prices had to be affordable – this is one of the key issues for a **"Sustainable Urban Service".**
- The Government wanted a strong contract to protect its rights and those of the consumers.

The first steps

Having fixed its objectives and preconditions, the Government was ready to take the first step. In early 1992 it called on a number of specialised companies to submit offers to "Operate and Maintain" the water utility.

In March of that year, a delegation from the "LYONNAISE DES EAUX" Group from Nouméa arrived in Port Vila to initiate a process which would allow them to make an offer.

This process was the key to a successful contract - the objective being to draft a "tailor made" contract which would fit the specific needs of a particular situation- it involved a lot of dialogue.

The Audit

A detail audit of the utility was carried out to collect data.

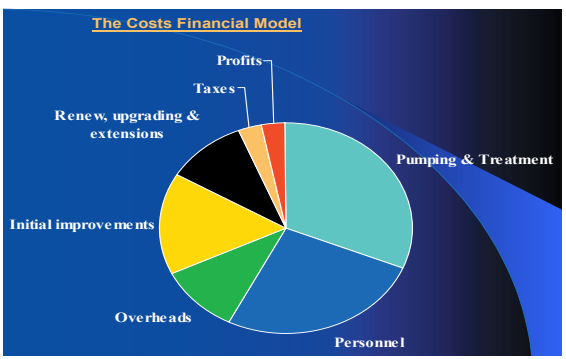
For example:
- The state of the network, its capacity to "do the job".

This would allow the operator to program investments to upgrade the infrastructure to an operable level.
- An inventory of the assets.

This would allow the operator to evaluate the renewal of assets - i.e. asset management.
- The customer base, to evaluate demand and revenue.
- The water consumptions.
- Growth forecast.
- The water resources.
- In general any information which would bear on the future operating costs, investments and revenue.

The Financial Model - Costs

With this information in hand, a financial model was built of the operation which was used as a tool for dialogue between the operator and the Government. It allowed the exploration a number of scenarios. Such as in search of solutions to cater for the low income consumers.



For example, the operator and the Government looked at:

- The cost of Pumping and Treatment
- Personnel costs - Social issues were taken into account, all of the existing staff of the Public Works were taken on board by UNELCO.
- The cost of overheads - as the operator was already the electricity supplier, the utility already "existed", set up costs and overheads were minimised.
- Investments to initially improve the network to an operable level, allowing the operator to fulfil his obligations.

Various scenarios were run through the model, testing the impact of the initial upgrade versus the duration of the contract.

This is an important stage of the negotiation, where both parties must agree on the level of the investment, that is "how far" we should go with the upgrade and the duration of the contract as both have an impact on the tariffs.

- Ongoing investments were looked at to:
  Renew.
  Upgrade.
  Extend the network.

The operator must renew parts of the network as they come to the end of their useful life.

He must upgrade parts of the network as they become insufficient in capacity.

These are obligations which will ensure the longevity and hence the sustainability of the infrastructure.

The operator and the Government looked also at provisions for extensions of the network, to reach out into non serviced peri-urban areas, aiming at a 100% coverage of the service.

The question which came up was:

"How much should be built into tariffs for extensions of the network and whilst keeping tariffs affordable?"

The financial model again allowed the testing of a number of scenarios.

A consensus was reached where the Government was satisfied of a sustainable balance between investments and tariffs.

The financial model also included:

- Taxes.
- Profits.

Having looked at operating costs and capital investments, the Government and the operator looked at revenue.

Revenue

Some pre-conditions were set, the tariffs had to:

- Be affordable to the consumer.
- Allow the operator to fulfil his obligations.
- And allow the operator to make a reasonable profit.

Financial Model – Revenue

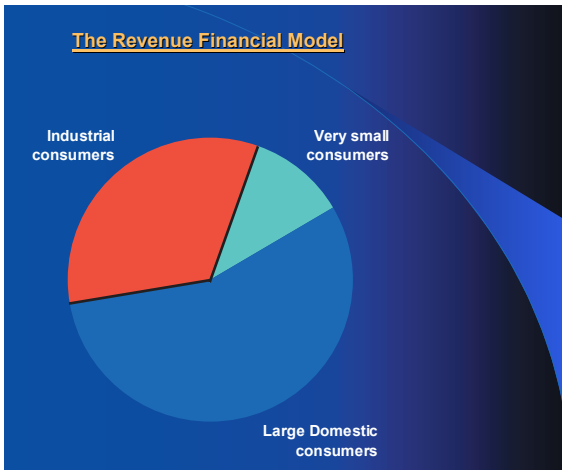
A financial model of revenue was built, taking into account variables such as volumes of sales, growth etc. It allowed the testing of a number of scenarios and tariff structures.

This is where the social issues are addressed. The Government was concerned to keep tariffs for low income consumers at an affordable level - a tariff structure was designed to reflect the Government's wish.

A number of categories were established for the simulation of revenue:

- Very small consumers who, because of their limited financial means, dispose the least domestic, water consuming appliances and hence consume the least water.
- The large domestic consumers of the more affluent part of the population who, the nature of their lifestyle, consume more water and can best afford it.

- The industrial consumers who, by virtue of their activity consumer large volumes of water. Affordability comes from the commercial activity.



A number of scenarios were run to see who would pay how much, where would the cross subsidy be.

After a few simulations, an equilibrium was achieved between cost and revenue.
This became the basis of the contract.

The financial conditions which were incorporated in the contract are as follows:

The amount for new capital works to be invested over the first 5 years was 200 million vatu.

For the following five years it was 100 million vatu.

In all 800 million vatu over the duration of the contract.

This covers investments to renew, upgrade and extend the network.

In order to differentiate between the different categories of consumers we have seen previously, a tiered tariff structure was adopted, giving the lower income earners, a significant advantage.

The tariff structure is as follows:

Tariffs

Quarterly consumption	Price per m^3		coefficient
	Vatu	US cents	
0 - 50 m^3	42,31	30,07	1
51 - 100 m^3	55,00	39,09	1,3
101 - 200 m^3	59,23	42,10	1,4
above 200 m^3	63,47	45,11	1,5

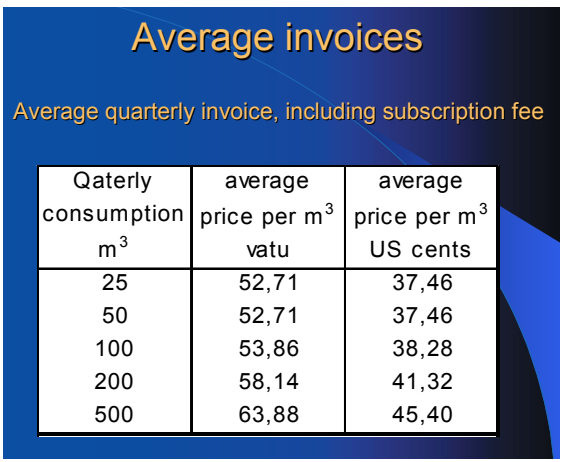
Note : 5,8% increase since 1994
exchange rate : 1 US$ = 140,70 vatu

A subscription fee is charged depending on the diameter of the meter.

Quaterly subscription fee

Size of meter	Vatu	US cents
15 mm	520	3,70
20 mm	840	5,97
25 mm	2 110	15,00
30 mm	5 280	37,53
40 mm	7 400	52,59
above 40 mm	10 570	75,12

For consumptions less than 25 m3 per quarter, the subscription fee is reduced to 260 vatu (1,85$)



A further concession was made for small consumers: the quarterly fee was reduced to 250 vatu for those consuming less than 25 cubic meters.

These are the current tariffs, they are the result of an increase of 5.8 % thorough the application of the price adjustment formula since 1994.

The Contract

The result of this process was the signing of the contract in December 1993.

We will have a brief look at its contents and we will see how it has translated in terms of service delivery, coverage, etc:

- The contract is for a period of 40 years - this was to ease the impact on tariffs of the initial investments to upgrade the network.
- The network remains the property of the Government - it is returned to the Government free of charge at the end of the contract
- The operator has the responsibility to operate, renew, upgrade, maintain and extend the network within the geographical limits of the concession area and within a predetermined budget for the next 40 years - as we have seen previously, financial constraints limit the extensions which can be funded through the contract.
- At the end of the contract, the operation is returned to the state, or a new contract is signed.
- The price of the water is fixed and varies by the application of a price adjustment formula - the increase as been 5.8% since the beginning of the contract in 1994.
- The performance of the contract is controlled by the Government - there are periodical technical and financial reports from the operator. Regulation consists in the Government ensuring that the terms of the contract are respected.
- The operator guarantees the quality, quantity, pressure and continuity of service as specified in the contract.

And in return, the operator is allowed charges for services

Conclusions

Let us see how the application of this contract has translated in terms of service delivery by answering some common questions:

What has been done to cater for the low income earner?

The contents of the contract, such as investments to service new areas, duration and the tariffs and tariff structure have been carefully balanced and designed to advantage the small consumer - this is visible in the tariffs which we have presented.

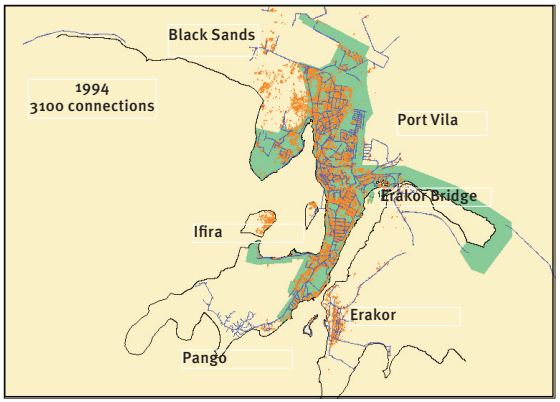
As special fund to which the operator allocates 1 vatu per cubic meter, was established.
This fund is used at the discretion of the Government to finance water connections for low income earners.

When new areas have been serviced, that is Ifira Island, Erakor village, Pango village and others, this fund was used to finance all connections.

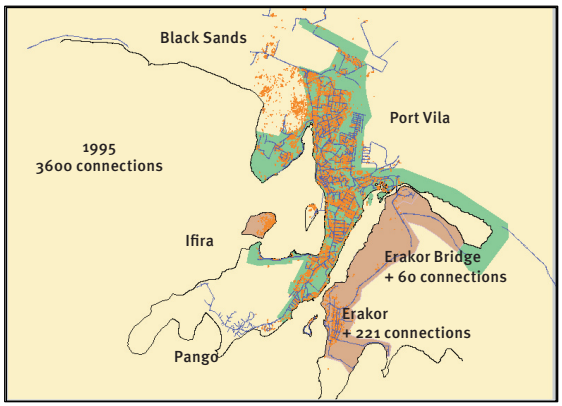
What is being done about extending to peri-urban areas?

Let us look at the extensions of the concessions and the service since 1994:

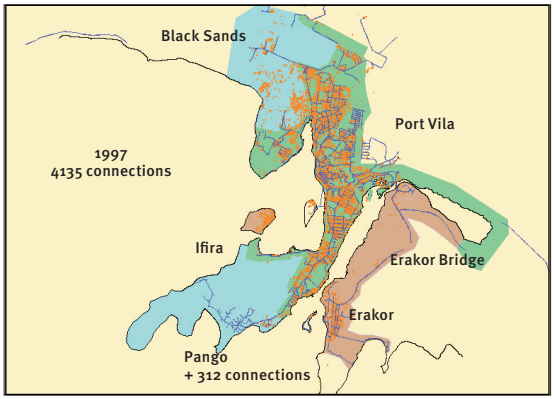
- The initial concession was signed in 1994 and comprised mainly the Municipal area of Port Vila with 3100 connections At that time, the villages of Ifira and Erakor were supplied by a main meter at the boundary of the concession but the quality of the service was very poor since the responsibility of the operator did not extend into the village and there were numerous leaks.

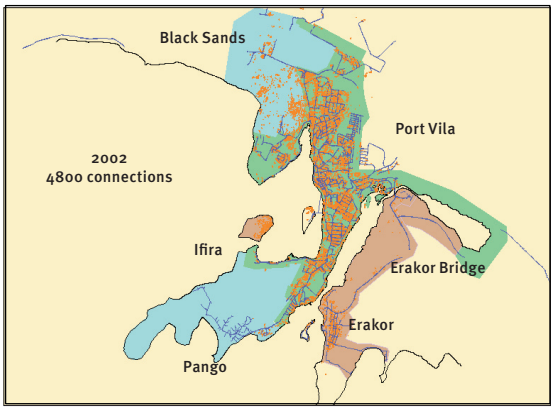


- In 1995 an addendum was signed, extending the concession area to include the sectors of Erakor and Ifira; the network inside the villages was upgraded and people once again had 24 hour water. By the end of 1995, the number of consumers had increased to 3600 from 3100 the previous year.



- In 1997, a second addendum was signed, adding the sectors of Pango, Manples and Black Sands. This extension allowed us to connect over 300 new families in Pango.





As for Manples and Black Sand, where there are thousands of families without water supply, UNELCO has been unable to obtain right of access from the custom owners to implement a project which had been budgeted since 1995.

The contract stipulates that it is the responsibility of the Government to provide acess for the service.

After many years of persistence by successive Governments, we still have not managed to serve the thousands of people who each suffer the hardship of doing without an acceptable water supply. This is not for the lack of funds.

- What contribution does the water service bring to the social and economic development and to tourism?
- some extensions have been constructed to previously non serviced areas - over 900 new connections since 1994.
- Potable water and a reliable service has helped boost the confidence of the tourism industry.
- Low income customers are catered for through a preferential tariff structure and free water connections.
- What could be done to accelerate the extensions of the network in peri-urban areas?

We all know that the need always exceeds the means - you will understand from this presentation that there is a limitation to the operator's capacity to extend into non serviced areas.

The options which could be considered to accelerate extensions to new areas:

1. Increase the level of investment of the concessionaire:

- this implies master planning the requirements for say the next 20 years;
- use the financial model to simulate the new tariffs;
- accept an increase in tariffs and apply it through an addendum to the contract.

2. Seek grants from agencies. This would be a way of injecting grants into an infrastructure which, as we have seen remains the property of the Government and is operated by a competent operator who has the obligation to maintain upgrade and renew the infrastructure so that its longevity is guaranteed. Is that not what all funding agencies are looking for?

3. Or a combination of the two.

There may well be other options, please let us know what they are. ■

Water and Sanitation Provision in the Peri-Urban Settlements of Port Vila: A case study of problems or solutions ?

Mr. Clive R. L. Carpenter

Head of Water Resources, SOPAC

Sustainable Urban Services

Water and Sanitation Provision in the
Peri-Urban Settlements of Port Vila:

A case study of problems or solutions ?

Clive R L Carpenter
Head of Water Resources SOPAC

PECC SCTF 2001 - 2003 Programme Third Seminar, Noumea, New Caledonia, 04 - 05 November 2002

Presentation Outline

Introduction and Background to Port Vila
- Case Study areas & survey details
- Survey results in Mele and Blacksands
- Reasons for level of service provision
- Lessons learned and possible solutions

Port Vila Introduction and Background

- Capital city with 32,000 population (1999)
- National growth rate 2.6% pa, urban 1980's 4.2%, urban 1990's 7.2%, Blacksands 1990's 12.8%.
- Urban water supply privatised to UNELCO
- Rural water supply DGMWR Rural Water Supply Dept (Installation & advice only)
- Wastewater – no urban or rural provider. Household responsibility (except hospital)

Port Vila Municipal Statistics

- Treated private water pipes - 50%
– VT 42 (US$ 0.31) / m3 for 0 - 50 m3 per quarter
- Treated shared water pipes - 29%
- Community or household tanks - 11%
- None of the above - 10%
- Flush toilets w. septic tank - 57%
- Improved Pit latrines - 25%
- None of the above - 18%
- Source: 1999 Population & Housing Census Report

Case Study Areas & Survey Details

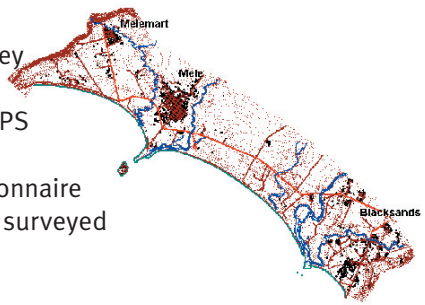
Mele Bay
Peri-urban area 1-5 km north of Port Vila
Survey Details:

Designed for disaster risk assessment

Building survey

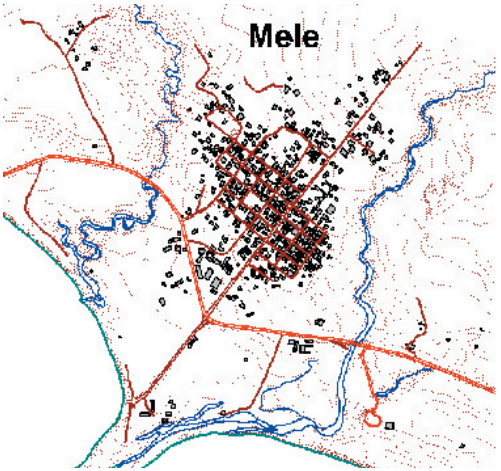
Differential GPS

Social questionnaire
1 in 4 houses surveyed



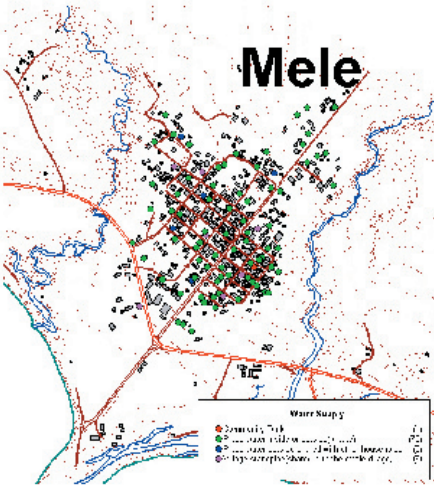
Mele Village

Customary ownership of their land
Traditional Chiefly System: Village Chief & Village Council
Village committees & groups: including women, youth, disaster & water, community shop & transport
84 households surveyed
7.0 people av household
Population approx 2,600 (1999)
100% of households w. electricity
Village owns a holiday 'resort' & cascades



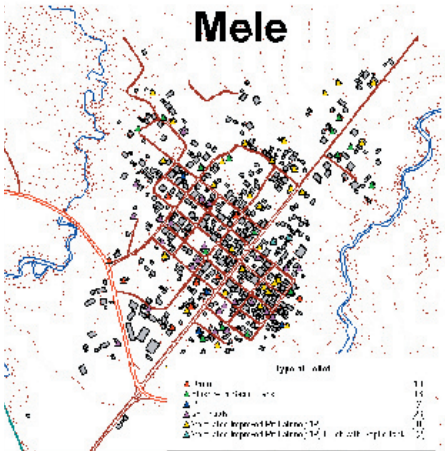
Water provision in Mele

Dbase recorded highest tech source
River water used for washing
Communal piped water supply
Piped to private house (95%)
Shared standpipe (4%)
River intake, 80mm main to 2 No. 120m^3 communal tanks, 150mm main to village. Village plumber.
BUT: no 24 hour provision, night time flow (6 l/s) = 65 –70 % leakage. Daily flow 8.7 l/s (2.7 l/s = 90 l/p/d).
System over designed & inefficient, BUT has no water treatment
Installation fee, plus 500 Vatu/ month, administered by a Community Trust



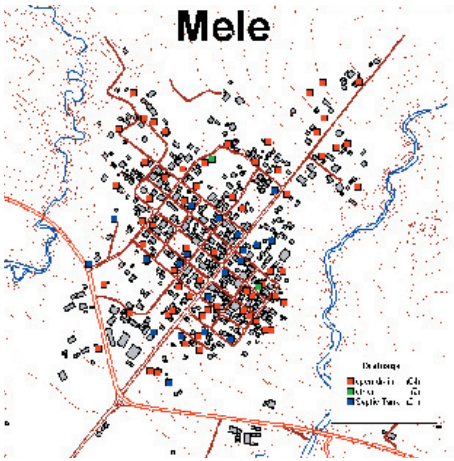
Sanitation provision in Mele

Flush with septic tank (19%)
Pour flush (31%)
Ventilated Improved Pit VIP (33%)
Drum (12%)
Pit latrine (5%)
1 family sharing (68%)
2 families sharing (11%)
3-5 families sharing (11%)
6-9 families sharing (6%)
10-12 families sharing (4%)



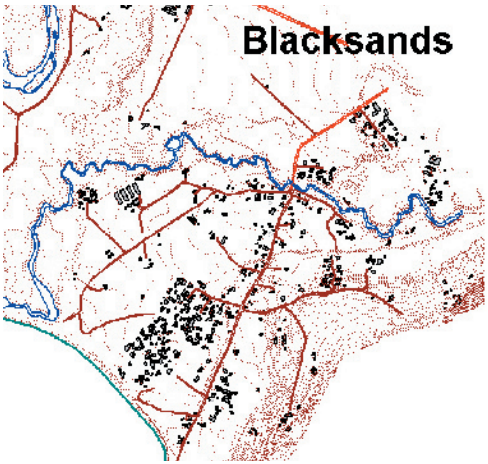
Household drainage provision in Mele

Open drain (74%)
Septic tank (24%)
Old open drainage system blocked
Community wants a drainage scheme
Flooding occasionally from river
Shallow groundwater levels
Surface water removal ineffective

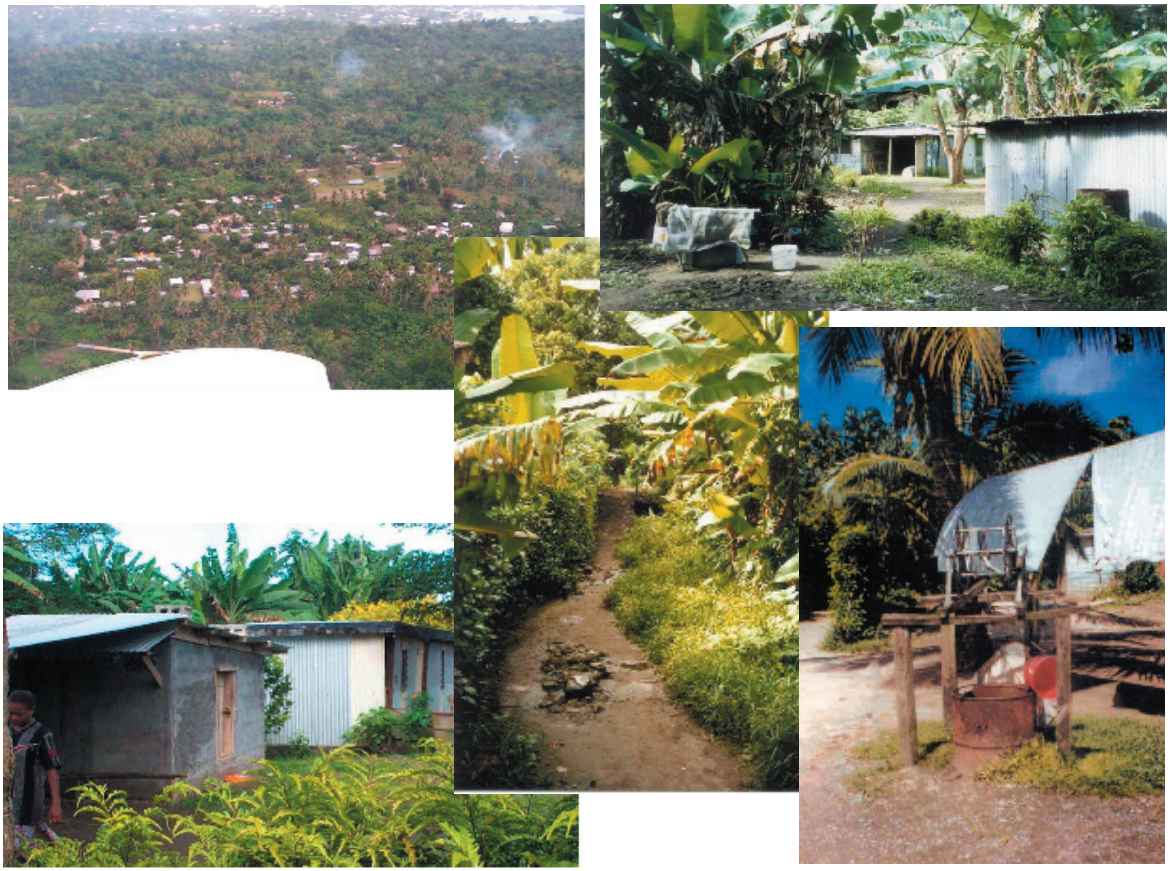


Blacksands Settlement

1.5 km NW of Vila on 92 ha
Squatter Settlement since 1960's
4,873 residents in 1999
Residents from different islands
Local Ifirans have customary land ownership
'Verbal' permission to occupy land
25% pay rent for occupancy
83 households surveyed (6 p/house)
No serviced water, 6% electricity, no solid waste or telephones

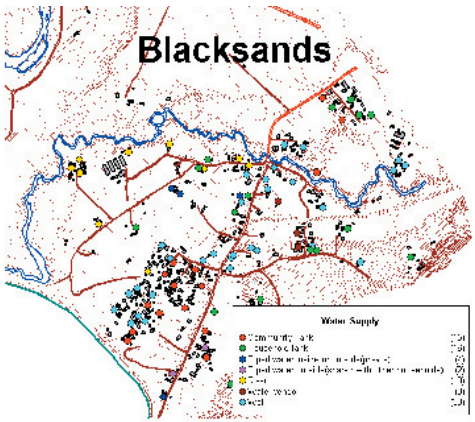


Blacksands Settlement



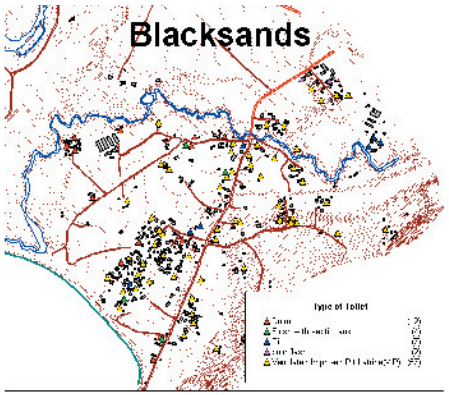
Water Provision in Blacksands

No communal water supply
No piped water supply
No water organisations
Open unprotected wells (47%)
Community & household tanks (15 % & 16%) : rainwater tanks, oil barrels, bulk chemical containers, freezers
River water (12%)
6 - 42 people per well
River water for washing
Water vendors sell at 750 – 1500 VT/m3 or 15-30 times UNELCO base tariff



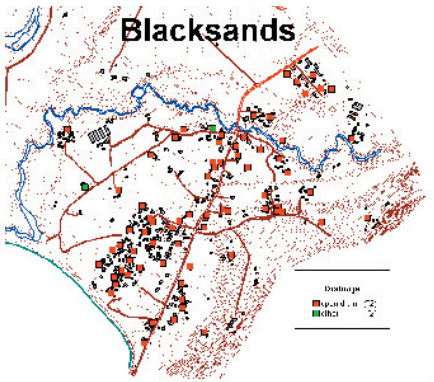
Sanitation provision in Blacksands

Flush with septic tank (5%)
Pour flush (2%)
VIP (69%) - recent aid programme
Drum (15%)
Pit latrine (9%)
1 family sharing (83%)
2 families sharing (7%)
3-5 families sharing (9%)
6-9 families sharing (1%)



Drainage provision in Blacksands

Open drain (97%)
Septic tank (0%)
Flooding occasionally from river & coastal concerns
Very shallow groundwater levels
Surface water drainage inadequate



Why differing levels of provision?

• Customary land ownership vs informal occupancy
– Rights to activities on land, rights to access
– Security of tenure & desire to risk investment in betterment
• Customary ownership disputed in unplanned areas
– Rented land – CO's see improvements as securing their rights
– Non-rented land – CO's see improvements as losing rights
• Strong community groups vs poorly mobilised residents
– Organisation of community functions
– Unified interests & social strength
• Income generation
• Human resources – village capacity building
• Weak partnerships between national & provincial govn., land trusts, customary land owners & occupiers

Possible water supply solutions

• Community operated water supplies: inc. operation, maintenance & tariff collection (Mele)
• Connection to the urban water supply system (Erakor, Ifira, Pango)
• Connection to adjacent village water system (Mele-Maat)
• Land owners lease land to subdivision management who operate supply (Beverley Hills)
• Private partnership with clan/tribe/kinship owned companies eg ILT & IGS. May be for Blacksands.
• Subsidised low cost rainwater tanks

Possible wastewater disposal solutions

• Accept that off-site sanitation is not a near reality for most of Port Vila (except the CBD)
• Strengthen sustainable & appropriate technical solutions (on-site sanitation)
– Flush toilets with septic tanks – septage disposal
– Composting toilets
– VIP latrines
– Village sanitarians: hygiene awareness & promotion

In Conclusion

• Peri-Urban water supply provision is hampered by :
– protective customary land ownership
– poorly organised communities
– lack of partnership & coordination between stakeholders
– limited maintenance, cost-recovery, & technical capacity
• Peri-Urban wastewater disposal is hampered by :
– the above plus
– No clear national approach to wastewater provision
– No clear mandates/roles for 'interested' institutions
– No lead or focal agency
– No action to implement the municipal wastewater plan
• Examples of adequate peri-urban water & sanitation provision exist and demonstrate possible solutions. ■

Port Vila

Discussion

Chris Kissling
I am interested to know whether in law the government would have the power to require landowners, customers or otherwise, to achieve certain levels of sanitation, if they allow people to live on their land?

John Chaniel
At present, there is no such legislation concerning sanitation. There is a Water Resources Act, which should go to the parliament in the next months; there is no such thing at present. There is an Electricity Act and a Water Act, which give the government power to acquire land for compensation. But in practice, it creates quite a few difficulties, because outside of the urban area, there is difficulty in identifying the real custom owners, and this process can go on for years and years. There is one case where the problem was raised in 1995 and to this day it is still not resolved.

Geneviève Dubois-Taine
What surprised me is that you spoke very little about Local and National Authorities, as if local communities had to manage their problems by themselves. It is very strange. I understand what John Chaniel said, for example that it is not sustainable to have this water system Nola-Kate spoke about. It is not sustainable for the water pipes perhaps, but it's perhaps more sustainable for people. And who has to fight for a more sustainable town? There are Local and National Authorities and you did not speak about them and for me it is a great loss in the whole system of managing sustainability and this brings us back to the question of the definition of sustainability we spoke about in Hong Kong and Santiago, and now what is sustainability? It is bringing a better life to people in affordable conditions, so the Local Authorities are in charge of that, but you did not speak about these Authorities.

John Chaniel
I just wanted to say, and I think this answers your question, that we are just part of the way through the process. What results from the survey is that we are halfway along the road. We are planning meetings in January and February to get the local activity groups together with the government to try to add real solutions to this. So we are really halfway through this process at the moment.

Lye Lin Heng
If I can make a comment, I fully agree with Genevieve because it is not clear to us at all, what the governance is like here. We need to talk about an environmental management system for the whole country and translate it down to your cities and to the villages. It is not clear at all what is the system. I think Clive Carpenter mentioned that there is no clear national approach to waste water. It seems to me that there is no clear national approach to the environment, generally speaking, from the absence of the national and local authorities with clear responsibilities for the environment.

Clive Carpenter
I think that the very lack of clarity is one of the issues of Vanuatu, and that is the reality. No one has any legal responsibility to take on the issue of sanitation. As a result, because of lack of national funding, it is not something that any particular institution has taken any responsibility for. Ministry of Health would be an office place to start, Public Works would be an office place to start, and there is a National Water Committee which meets on an ad-hoc and quarterly basis, it is an advisory entity, it has no formal or statutory

rights. But it meets from time to time, and the issue of waste water plan which was written in 96 I think, when we started to talk to them about it because they were expressing an interest to try and look into it and think how they could start to fund parts of this, no one had any knowledge of the plan per se in itself, so that might be a function of the consultation that went into looking at that plan. But the lack of human resources, the lack of financial resources has made that the people have concentrated inside their mandates and inside their roles, and those things that have fallen outside have simply been neglected.

Robert Guild

Just a brief comment. I do not know the Vanuatu system terribly well but I do know a little bit about some of the other Pacific Islands countries and the situation is that many municipal administrations do not have sectoral responsibilities, water is the responsibility of Ministry of Health or Public Works Department perhaps at the national level, and the need for integrated metropolitan planning arises very much out of the fact that there is no local authority in many sectors with metropolitan responsibilities. It is very difficult to draw lessons from developed countries where you have a municipal department that might take care of these things. In the Pacific, they have to look to the national administration and if you are not in the national capital, it is doubly difficult to do so.

Tu'u'u leti Taule'alo

I want to follow up on the question that was earlier asked about the government involvement or authority involvement. It is very interesting to see the status and this is incredible community development initiatives to try and get those communities to be self-sufficient. Unfortunately, I think that for urban planning, the whole basis of plan is that somebody up there or somewhere would need to look into the public interest. Now, if you are not going to get authorities or government or whoever, then it is not going to work because people are either not in charge of the resources or they could not come in and try to make decisions that would affect their communities. So, I think that it is very important for planning that the people who deal with the resources, that own the resources or are in charge of the resources, are involved in the planning process, otherwise it is not going to work.

John Chaniel

Maybe I can bring some sort of clarification regarding the various authorities. It is clear to me that the Central Government is responsible for water supply and must be responsible for wastewater since it initiated the wastewater master plan. Outside of the urban areas, the provincial councils are responsible for their individual urban planning. So really the responsibilities are a combination of the two, the provincial councils for the purpose of doing the urban planning which would allow to bring in urban services from Port Vila in the case of the peri-urban areas. I think that the lack of progress is due to the lack of initiatives, not from certain parties to move along and get things done.

Lye Lin Heng

You probably need someone to spearhead, to talk, to push things to get them done and it gets translated down the line.

Clive R L Carpenter

I think one of the points on sanitation in Vila, without generalising too much, is that in a lot of the capital towns, a lot of the cities in the Pacific, there are lots of problems of fragmentation, just for water. Water, where it is actually being dealt with, to some shape of form, in a municipal form there is a particular system. When you actually get to the point when you do not have any sewage system, then there is no community in the sense of the town, no ownership or any sort of function like that. That degree of fragmentation goes yet another step further because no one is taking responsibility for the issue, let alone responsibilities for the assets. The sewerage system has never been developed by a municipality or a municipal council. It means that 20, 30, 50 yards down the road, the issue is not being addressed by any of the stockholders.

Alf Simpson

What is being described here is kind of a reality of the situation. It has to be somebody's responsibility and unfortunately it is not, and particularly for Port Vila which wants to promote itself as a tourist destination and in an area where you have very porous limestone, the wastewater is not being controlled at all. What do you wait for? Do we wait for a disaster? We talked about the natural hazards, but from the health point of view, we've got many areas where you have done environmental studies and they show that the level of pollution is high. Eventually when you have a major disaster, maybe then something will be done.

This is common throughout the region. In Fiji, when we had a disaster awareness week, just a few weeks ago, the focus was on marine issues. They wanted to talk about disaster reduction in Fiji waters. But when you look at the administration of the marine environment area, there was something like 17 different agencies and ministries with responsibility over marine environmental and marine issues. Then, when we went on to look at the water issues, I could count about 16 different agencies that were responsible. It is a situation where it's everybody's business and nobody's job and so how do we talk about sustainability in the same breadth as we have governance which is unsustainable? We had success stories, like Bora-Bora that are driven by economics and necessity, but in many areas throughout the region, the reality is not so.

Gaston Tong Sang

I do not wish to take up too much of this workshop's time . It is true that someone is missing to speak about Vanuatu, certainly someone representing either the government or the municipality. I think a lesson can be learned from this case, that of communication. Whatever the organization of a country, you have the national, territorial and authorities and you have the local one, whatever name you give it. It can be a municipality, a chieftainship, a custom... I think that today all projects must include communication, must find a way to pass down the message to the population and to use as much as possible the proximity media. They have a certain way of passing down the message. Drinking water is a common good. Why should property thwart this project when what we are looking for is everyone's interest, everyone's well being. It is vital and everyone's health depends on it.

Perhaps we have not given enough thought to these communication media. And one must get as close as possible to the population. It can be a small community, a neighbourhood organization. They must be called upon very often. I think that even when you have finalized a project technically, financially, even if you have done very thorough sociological studies, if you don't make an effort to explain, to communicate before sending the first truck, the first bulldozer, this can ruin your project. Even if it's a public interest project. We've had these problems on site. I think that we've all had this problem so we regret the absence of local or national authorities here. Maybe we can hear them next time.

Bernadette Papilio – Halagahu

I wanted to speak about the fact that Vanuatu's problem is a general one, common to many islands. But this morning someone was saying "we always tend to think that the majority of the Oceania population is a rural one whereas a large part of it is urban". I think that here we are often forgetting that Oceania is still undergoing a mutation and even if we are witness of a rural exodus, we still have a strongly rural structure and we must adapt to an urban organization which is in fact an imported organization. This is one of the reasons why many Oceania Governments must give time some time. We must give time some time so that Oceania Governments can enter this urban structure because even if you live in a city, you don't have this urban structure in your mentality. This is somehow the conclusion I wanted to give to this session. ■