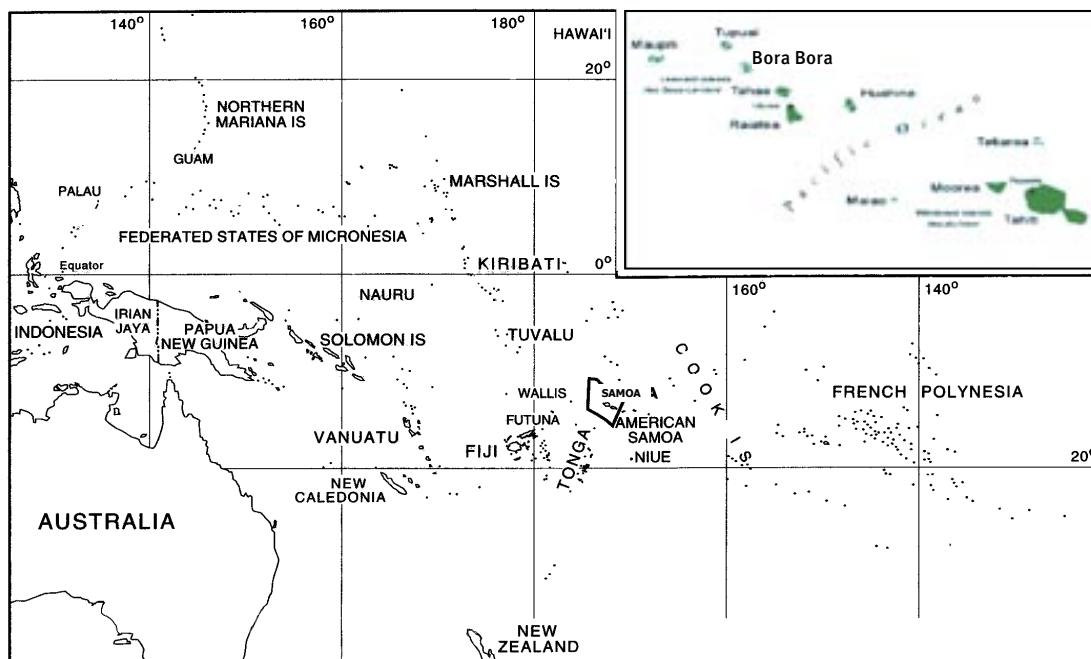


Bora Bora





Bora Bora, French Polynesia

Urban services in their relationship to urban development

Chair: **Dr. Jing-sen Chang**, *Vice Chairman, The Council for Economic Planning and Development, Chinese Taipei*

Mr. Gaston Tong Sang, *Mayor of Bora Bora, Minister of the Government of French Polynesia*
General situation of urban services in Bora Bora (no drinking water, no sanitation, no waste management). Stakes for the inhabitants and tourism. Processes and decisions. Master plans, financing, PPP... Evaluation.

Mr. Joël Allain, *Suez, General Delegate Pacific Region, President of « Electricité de Tahiti »*
Implementation of urban services in Bora Bora. How were the environmental and social dimensions integrated as well tourism? Financial analysis. Partnerships. The Enterprises' point of view.

Mr. Jérôme Yansaud, *Head of the Environmental Infrastructures Department, Ministry of Tourism and Environment, French Polynesia*
General situation of urban services in French Polynesia. Institutional and legal background. Evaluation of the implementation of urban services in Bora Bora. Lessons learned from Bora Bora for the whole French Polynesia.

Discussion on the Bora Bora case. ■





Urban Services in Bora Bora: Challenges for French Polynesia

Mr. Gaston Tong Sang

Mayor of Bora Bora

Minister of the Government of French Polynesia

The Bora Bora Case

Urban Services in Bora Bora before 1990

Background

Some figures for the island of Bora Bora

Geographical situation: one of the Leeward Islands, 260 km North West of Tahiti

Surface area: 29 km²

Population in 1996: 5767 (last census)

Electricity

“Electricité de Tahiti” (SUEZ Group) had produced and supplied electricity since 1976.

The electricity distribution network did not extend to every part of the island.

The service was not satisfactory: interruptions at peak periods, irregular voltage supplied to users, long power cuts...

Electricity was produced by diesel-powered generators; the environmental impact of noise and hydrocarbon emission was not taken into account.

Although tariff levels per kWh were higher than in Tahiti, they did not cover the cost of the service.

Drinking water

Running water was only available in the main village of Vaitape.

It was not drinkable and there were daily interruptions in the supply.

To mitigate these interruptions, many houses had water storage tanks, but this did not favour equitable distribution of the natural resource.

Water was supplied from boreholes on the main island and from the natural lens of poor-quality freshwater.

The cost of the water supply was not charged to the user.

Since it did not generate any income for the local authority, the cost of the service had to be financed by the public funds of the town.

This situation was unfair to those inhabitants who did not enjoy the service. They had to collect rain water from the roofs of their houses. Most tanks had very limited capacity (less than 1 m³) and they were not proof against contamination.

Without running water, flush toilets were rarely available.

Waste

There was no door to door waste collection.

A municipal dump in the north-eastern part of the island was open to all.

The residents of Bora Bora kept their garbage in the back-garden and took it periodically to the dump.



More often than not, people burned or buried rubbish in their garden.

The biodegradable part of the household waste was negligible since it was used for animal feed.

Fish waste was usually dumped in the lagoon.

Sanitation

For all the buildings on the island with direct connections to the water network, waste water collection (where it occurred) was carried out on an individual basis, except for the large hotels which were equipped with small water treatment plants. The water table was so close to the surface that it was difficult to build private septic tanks and no sewage disposal service was available on the island. The sanitation situation for people living in areas liable to flooding was far from satisfactory; during the rainy periods, septic tanks would often overflow.

Hotel water treatment plants were serviced by hotel staff who were often insufficiently qualified for this task: breakdowns were a chronic problem in the operation of plant, resulting in "olfactory pollution". Moreover, these facilities could not be controlled by the island authorities due to the lack of skilled staff. Thus hotel themselves were often responsible for polluting the sea and the beaches.

The only public transport service provided by the town authority was the school bus service.

The hotels had to organise their own system of transport for their employees.

Conclusion

In Bora Bora in 1990, the only urban services in existence were the distribution of water and electricity to the village of Vaitape. These services were less than the minimum expected on the eve of the third millennium.

Challenges for the Local Population and the Development of Tourism on the Island of Bora Bora

Its history, as a result of the American presence during the Second World War, and the beauty of its lagoon -the island is called "The Pearl of the Pacific"- have both contributed to Bora Bora's reputation as the flagship destination of the French Polynesian tourism industry.

In 1989, my electoral campaign was based on economic development. Bora Bora was famous throughout the whole world, but the income from tourism was not yet sufficient to rapidly develop the standard of living of its inhabitants. Therefore, one of our major challenges was to provide access by local residents to the four urban services previously mentioned so that they could begin to enjoy a minimum standard of service. It was important that the local population should be the first beneficiary of tourism development, not only in terms of higher income but also of better standard of living and sanitation. It was not acceptable that luxury hotel employees should return from work to homes without water and lit by kerosene lamps.

The provision of urban services is a necessity for economic development, since an increase in the number of tourists results in a need for more hotels and other businesses, requiring in turn more urban services.

A number of inducements to potential investors are made available by the French Polynesia Territorial authority:

- tax exemptions and financial support for tourism projects;
- development of transport infrastructure.

But the municipalities which host these hotels do not receive any financial support. It is important to note that the water consumption of a hotel with

one hundred rooms is equivalent to that of 100 private households. A town of 7000 inhabitants does not have sufficient financial capacity to develop urban services rapidly.

I therefore had to find other solutions.

Initiatives undertaken in Bora Bora

Electricity

- Energy charter
- Adjustment of receipts against French Polynesia norms
- Reduction of electricity charges
- Improvement of the quality of electricity supply
- Augmentation of power supply in concert with economic development

Drinking water

Although the municipal authority was responsible for the water supply, the financial means to improve the service were lacking. When I became mayor, this became my responsibility and I took the public-private partnership approach as a means of providing drinking water to the whole island. Thus the Vaitehi company was founded, jointly by the municipal authorities (which held 33% of its shares) and “Electricité de Tahiti” (SUEZ Group).

The next stage was to disseminate the message that water, which was free before, would now have to be paid for. It was hoped that the reduction of the electricity bill would compensate this new household expense.

In less than two years, the set objectives were achieved.

The partnership is a success. “Electricité de Tahiti” was able to mobilise the SUEZ Group’s expertise for groundwater explorations and the building of networks. To date, our partner has invested approximately 8 million euros in the project.

A tariff structure has been put in place and has adjusted the price paid by the local residents

compared to the other consumers (hotels, restaurants, shops, tourism businesses,...).

The latest tariff modification resulted from the need to produce drinking water by a system of seawater desalination. There again, tariff adjustments enabled the higher cost of operating a desalination plant being borne for the greater part by the hotel establishments, and the cost to local inhabitants limited. The principle applied was “natural resources for local residents, non-natural resources for visitors”.

This principle only serves to explain the tariff policy, since both water sources are mixed before distribution.

Collective Waste Water Treatment

Alarming instances of pollution at several places in the Bora Bora lagoon, in the bathing zone, were essentially due to the discharge of domestic waste water into the lagoon after little or no treatment.

This was a direct consequence of both the absence of appropriate sewage systems in private homes, and of the poor management of the small water treatment plants in the hotels.

The solution chosen in the Sanitation Master Plan was to implement a collective sanitation system, with the ultimate objective of ending the discharge of untreated waste water into the lagoon.

This public service was implemented as a partnership between the hotel establishments and the water concession holder.

The first phase was to provide all the large hotels with a sewerage system. The success of the first year of operation was enough to convince the institutional partners (State, Territory and EDF (European Development Fund)) of the importance of extending the network to the rest of the island (total cost of the project: 20 million euros). The facilities were then integrated into

the town authority's properties and the task of operating the waste water service was allotted to a specialist company (SPEA from the SUEZ Group) through a leasing contract.

Waste

Door to door household waste collection was also one of my priorities but, contrary to the two previous services, the operation of this service remained under local government control. The town purchased a barge to collect garbage from the hotels situated on the motu (small islands on the barrier reef).

After solving the problem of household waste collection, we needed to find a solution for its treatment. Like all the French Polynesian towns, Bora Bora experiences difficulties financing waste treatment.

Under the new 1996 statute, the Territorial Authority is now responsible for waste treatment; in 1998, it made a proposal to the town authority for a waste management programme.

This programme includes:

- The recycling of green waste through composting. The green waste collection service is already in operation and the composting centre should be up and running before the end of the year.
- The recycling of certain items of waste such as paper, glass, aluminium, plastics,... A door to door selective collection service will be provided and recycling items will be sent to the Papeete sorting and transfer centre -which is managed by the "Société d'Environnement Polynésien", SEP (Polynesian Environment Company).
- The disposal of biodegradable waste in an engineered landfill site. Land acquisition for this purpose is in progress. The municipal landfill which is currently in use will be closed as soon as possible. It is estimated that 2,200 tonnes of waste will need to be processed every year.

Specific attention was given to the risk of pollution to surface and ground waters. This risk

results from the formation of leachate -also called "landfill juice", as a result of the seepage of rainwater and runoff into the compacted waste.

To limit the risk, the following measures will be implemented:

- Lining the landfill site compartments to make them watertight, with the addition of a drainage system to prevent pollutant leaks into the ground.
- Laying of a semi-watertight covering layer on top of the compartments to limit water infiltration and reduce leaching, and to also contribute to the degradation process during the operating cycle.
- Collection of leachate for treatment via the collective waste water treatment network already in place.

Eventually, the waste management scheme will operate as follows:

- Door to door selective collection by the town authority.
- Management of the engineered landfill site by a private company on behalf of the territory.
- Packing and transportation of recyclable waste by the SEP, a semi-public company created by the French Polynesia Territorial Authority to deal with waste treatment and recycling.

Conclusion

Our utilities improvements have been implemented under many different organisational systems -concession, leasing contracts, local government control.

We took the following measures in implementing the development plan:

- Under the building permit system, I was in a position to oppose the individual establishment of water, electricity and waste water treatment by each hotel, thus enabling public utility services to secure sufficient income to ensure sustainability.
- In 1997, a visitor's tax, levied by the town authority, was created to fund environmental protection initiatives.

The Results Achieved in Bora Bora

Hotel capacity was increased by a factor of three in ten years, jumping from 450 beds in 1990 to 1,400 beds in 2000. Capacity will reach 2,200 beds in 2005 when the current hotel building projects are completed.

Tourism development has resulted in an increase in the resident population of approximately 72% between 1990 and 2002.

The population migration balance is the highest in the region with +1.3% per year. This positive figure reflects the dynamism of the local economy, with unemployment almost non-existent.

We are approaching a saturation threshold in terms of hotel capacity, but this limit has been deferred thanks to the ability of the local population to share in the benefits of economic growth, in particular access to adequate urban services.

In less than a decade, Bora Bora has succeeded in implementing the necessary urban services.

Between 1990 and 2001, the concession holder has buried the high-tension lines in tourist areas and built a new power station complying with environmental protection standards. The quality of public utilities in Bora Bora is now equivalent to that of a major city.

Bora Bora is the first town in French Polynesia (out of 48) to have a full distribution network for drinking water. It was also first to be equipped with a desalination plant.

Because it was convinced that the development of tourism in French Polynesia was linked to the development of Bora Bora, the Territorial Authority provided subsidies which enabled us to develop the sanitation service that had been initiated by the private sector. The results of this sanitation programme -which started in 1992- are more than satisfactory: 70% of the population is now connected

to sewerage and we expect this proportion to reach 95 % by 2004. Bora Bora is the first town to be equipped with a public sanitation network.

Bora Bora was also the first town to build a composting plant for green waste. And in two years, the engineered landfill will complete the last component of the waste disposal scheme.

Since 2000, the blue European flag has been flying over Bora Bora.

This distinctive international label is understood by all our European visitors, and symbolises our success in achieving harmonious development of tourism and the economy whilst protecting our environment.

The Challenges facing French Polynesia: The «two-step» between Tourism and the Environment

When nuclear tests were stopped in the Pacific, it became obvious that complete economic restructuring was inevitable if long-term financial autonomy of French Polynesia was to be assured.

In view of the exceptional quality and attractiveness of our landscape, tourism naturally suggested itself as the main area of development for our economy.

At the same time, the impact of our economic development -to which tourism is the greatest contributor- on the environment needs to be taken into account by the authorities in order to safeguard the natural heritage of our islands, and notably, our lagoon.

To care for our environment in a sustainable manner, not only do we need to reduce the pollution generated by human activity, but we also have to



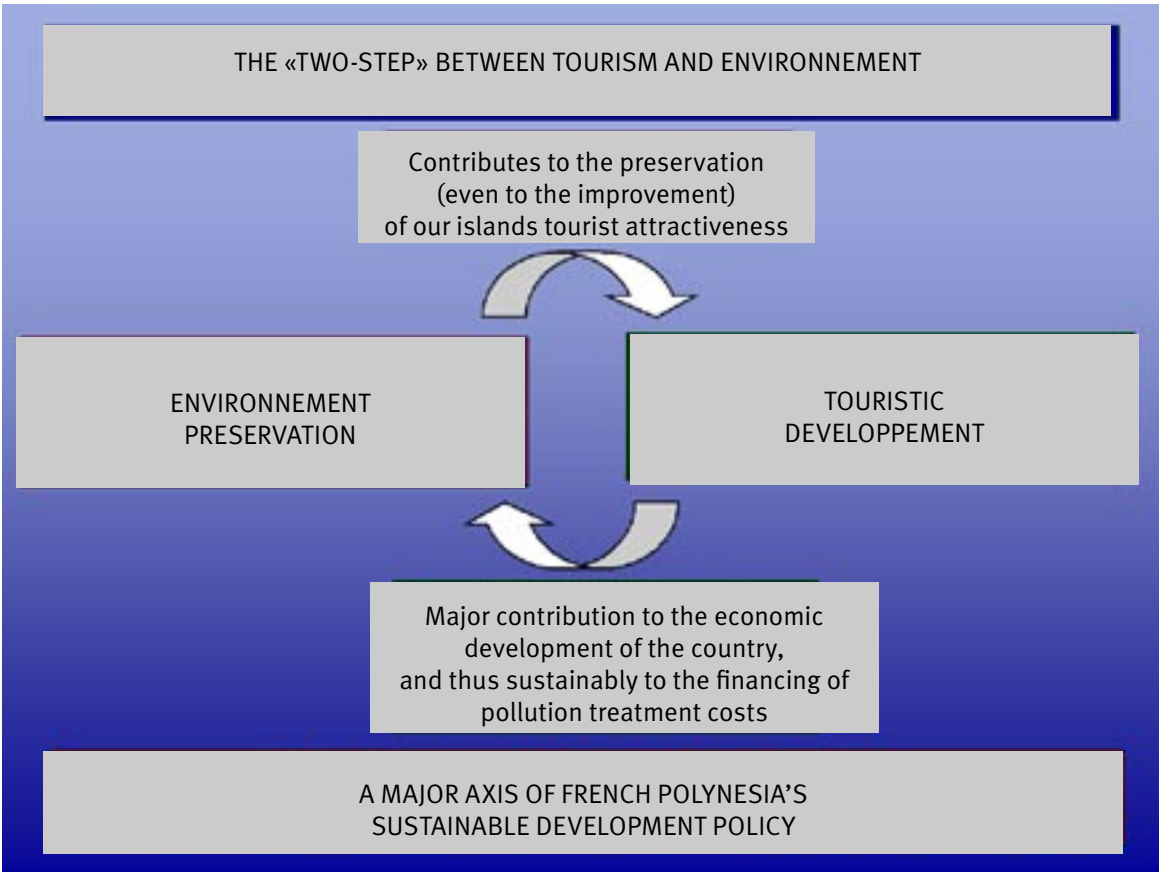
offer efficient and long-term solutions, in particular as regards sewage and waste treatment.

This approach requires that substantial investment and operating costs be borne by the people.

Although tourism obviously depends on the quality of the environment, the people of French Polynesia should be aware that the reverse is true: there must be sufficient financial resources

to care for the environment now and in the future, and therefore the tourism sector in French Polynesia must be prosperous.

This “two-step” between tourism and the environment adopted by the Government in the last decade has been one of the major guidelines in French Polynesia’s sustainable development policy, with the objective of improving people’s quality of life, in terms of income, convenience and public health. ■



The Water, Sanitation and Waste Situation in French Polynesia: Conditions for the Implementation of Environmental Infrastructure Programmes

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The Situation Concerning Basic Urban Services in French Polynesia: Water, Sanitation And Waste

The Water Situation in French Polynesia

Responsibility

Town authorities are responsible for the provision of this service (under State administrative supervision).

Operating Mode

As a general rule, the water supply service operates under local government control, with the exception of Bora Bora and Papeete, where the service is conceded to private companies.

Current Situation

Although production units and water supply networks exist in most French Polynesian towns, only Bora Bora and Papeete have been able to supply their local residents with drinking water. They base their tariffs on users' consumption as opposed to the set-price policy practiced elsewhere. However, income drawn from this policy does not cover the cost of operating and maintaining the facilities. Likewise, upgrading costs are not covered either. This explains why

the service is often subsidised by funds from the town's general budget, notably to support technical breakdown repair costs.

Local government control involves a number of problems of manpower:

- Lack of sufficiently trained and qualified staff;
- Difficulties to recover bills;
- In addition to wasteful behaviours encouraged by the set-price policy, the lack of financial resources to provide for general repair and maintenance on the network, can lead to excessive water utilization which may jeopardize the sustainability of natural resources;
- The absence of reserve funds has resulted in the impossibility of upgrading the facilities, some of which are already past their life expectancy.

Actions Undertaken

Since 1995, the State has launched a number of studies -in the form of master plans- to seek solutions to improve this situation:

- Assessment of the water supply situation in the towns;
- Sensitising the elected representatives -the mayors in particular- to the importance of this issue;
- Implementation of utilities improvement pro-

grammes on the basis of a partnership between the Territorial Authority and the town authorities (funding of 1/3 x 3).

The adoption of a tariff policy based on consumption has been a prerequisite for the funding of these programmes.

However, the volume of required investment is such that it is important to consider solutions involving public-private partnerships, as in Bora Bora or Papeete, to secure necessary funding for these utilities:

- Concession schemes should be given priority in order to secure a mixed system of funding between public subsidies and private investments of specialist companies, with adequate experience and expertise in the field.
- These partnerships will not be efficient unless adequate human resources are available within the local authorities to supervise and control the public service concessions.

The Situation of Sanitation Systems in French Polynesia

Responsibility and Regulatory Framework

Originally, town authorities were responsible for the provision of this service.

However, in view of their difficulty in implementing the service, for financial reasons essentially, -there was no public sanitation system in French Polynesia before 1994- the Territory, in agreement with the State, took on responsibility for the service and embarked, as a contracting authority, on a series of infrastructure programmes in this field.

The regulatory framework regarding sanitation is relatively recent (1987): resolution n° 87-48/AT of 29/04/87 concerning waste water sanitation regulations (amended by resolution n°98-152/APF of 10/09/98).

Ten years later, a number of important decrees were enforced:

- Decree n°1401/CM of 16/12/97 fixing the norms

and conditions of wastewater disposal by public or private sanitation systems.

- Decree n°1369/CM of 13/10/98, stating the operators' obligations in terms of self-regulation.

Sector-based Policy

The French Polynesian Government policy can be summed up as follows:

In highly populated areas or in areas with dense economic activity, private or semi-private sewerage systems -septic tanks or small wastewater treatment plants that are poorly managed and maintained, and difficult to control- are inadequate; this is especially true in the lowland areas near the lagoon, where the water table is close to the surface. Public sanitation systems are therefore indispensable both to protect the environment and to provide a better health and sanitation situation.

In areas where the economic impact of tourism is paramount, environmental protection is a prerequisite to sustainable development.

Actions Undertaken

At first, the authorities focused primarily on the implementation of a public wastewater system in areas with a high concentration of hotels, notably on the island of Bora Bora, in Punaauia on the island of Tahiti, and in Haapiti on the island of Moorea.

The second phase of this policy addressed densely populated urban areas: the Papeete conurbation (from Paea to Mahina) and the town of Uturoa on the island of Raiatea, a major pole of economic development in the Leeward Islands.

Operating Mode

In Bora Bora which was a pilot project for French Polynesia (with the first public network in operation in 1996), the municipality was so successful in providing drinking water supply - due to its commitment and management capacity- that the Territorial Authority decided to transfer ownership and management of the facility to the

town authority. The latter chose in turn to allot the task of operating the waste water service through a leasing contract to a specialist company (SPEA), which was already in charge of the water supply service in Bora Bora.

Then, in order to have a coherent investment policy in the whole of French Polynesia, the Territorial Authority created a semi-public company, the SEM, «Assainissement des Eaux de TAHITI» (Tahiti sanitation system).

As a tailor-made concession, its objective is to manage all the public sanitation systems implemented in French Polynesia. Due to its semi-public statute, it associates private know-how - notably in terms of financial management- to a public service, since it is funded in part by public funds from the Territory and the towns involved, and in part by private partners such as the EDT Group and the SOCREDO bank.

After invitations to tender, SEM subcontracts the operation of the facilities to specialist companies.

Billing is based on consumption via a contract between SEM and the towns involved.

Waste Management in French Polynesia

Responsibility and Regulatory Framework

Originally, town authorities were responsible for the provision of this service.

After the failure of the SITOM (Syndicat Intercommunal pour le Traitement des Ordures Ménagères de Tahiti -Association of town authorities for the management of waste in Tahiti) due to technical and financial difficulties experienced by the treatment plant TAMARA NUI which had to cease operation in 1993, the towns were left without any waste treatment solution.

After the revision of the statute of internal autonomy and in view of the volume of investments involved, the Territorial Authority took on the responsibility of waste treatment issues (except for green waste).

The towns remain responsible for the collection and treatment of green waste.

In the last five years, the Territorial authority adopted a number of blueprints in the waste management field:

- Resolution 97-91 APF of 29 may 1997 made the drawing up of a waste management programme compulsory within a five-year timeframe;
- Decree 653 CM of 7 may 1998 defined technical specifications for the building and operation of a class 2 and 3 engineered landfill in the Windward Islands;
- Resolution 2001-42 APF of 30 march 2001 defined regulations concerning waste immersion in the French Polynesian waters;
- Resolution 20001-81 APF of 5 July 2001, defined regulations for the disposal of medical and clinical waste;
- Decree 1061 CM of 21 august 2002 defined technical specifications for the building and operation of class 2 and 3 final waste product disposal facilities in the Austral Islands, the Leeward Islands, the Marquesas Islands, the Tuamotus and the Gambier Islands.

Sector-based Policy

In view of the major differences in population densities and geological variations in all the islands, the Government made waste treatment regulations more flexible in all the Archipelagos, except in the Windward Islands (Tahiti and Moorea).

This applies to a double concern:

- Imposing feasible technical regulations (for instance, the absence of appropriate natural watertight sites on the atolls makes the building of engineered landfills difficult);
- Aiming at a financially balanced service by avoiding disproportionately strict operating constraints in relation to the tonnes of waste to process.

Actions Undertaken

The Territorial Authority, via resolution AT of 29 may 1997, made the drawing up of a waste management programme (PGD) compulsory

within a five-year timeframe, which would act as a decision-aiding framework. The Commission in charge of drawing up the PGD was created after the decree of 18 January 1999 and the Territorial Authority was then able to launch the first phase studies.

In the meantime, because of the compelling nature of the waste treatment issue in Tahiti and Moorea, the Territorial Authority resumed the actions undertaken by SITOM in 1994 to find a landfilling site and chose, in 1997, the area of Paihoro to build a class 2 and 3 engineered landfill.

In 1998, a semi-public company, the SEP (Société Environnement Polynésien -Polynesian Environment Company), was created with the following tasks:

- Management of the waste treatment plants. SEP is the concession holder, on behalf of the Territorial Authority, for the Windward Islands' engineered landfills;
- Development of selective waste collection;
- Information, communication and education in the field of waste management.

As a first step, the Territorial Authority delegated to the SEP the responsibility of building the Paihoro engineered landfill. Then SEP launched the selective collection of waste in the island of Tahiti. Containers were distributed to every household and the Motu Uta sorting and transfer centre was inaugurated in 2000. Selective collection on the basis of two different containers was finally implemented.

Several programmes are in progress for the treatment of hazardous waste:

- The building of an incinerator for contaminated medical and clinical waste;
- The creation of the Nivee waste treatment centre in Tahiti.

In 1999, the Nivee site was state-approved to secure land rights and it is now being serviced. This centre, funded jointly by the State and the Territory, will eventually host:

- A class 1 engineered landfill;
- A waste stabilizing plant;

- An incinerator for contaminated medical and clinical waste;
- Another class 2 engineered landfill to complete the Paihoro site.

SEP is currently building two recycling centres in Tahiti and Moorea with delegated ownership from the Territory.

Operating Mode

Collection

Waste collection is generally ensured by the towns, except for Papeete and Pirae which have conceded the service to a subsidiary of the VIVENDI Group.

SEP is in charge of sorting recyclable waste, and recycling is essentially done via exportation. Operation of the sorting and transfer centre has also been conceded by SEP to the VIVENDI Group.

SEP is currently installing collection banks for batteries, glass and waste oil in Tahiti.

Treatment

Waste treatment is managed by SEP which has delegated the operation of the Paihoro engineered landfill to the VIVENDI Group.

Except for the Windward Islands, treatment plants do not exist in the Archipelagos and the responsibility of household waste management falls on the town authorities.

Analysis of the Conditions of Environmental Infrastructure Project Implementation

Introduction

The various phases in implementing an infrastructure project are as follows:

1. Planning	2. Identification
3. Investigation	4. Funding
5. Implementation	6. Operation and appraisal

We shall attempt to analyse the conditions of implementation of environmental infrastructure projects already in existence or in progress in French Polynesia, detailing each phase of the process. This analysis is far from being exhaustive but seeks to highlight some of the main prerequisites for a successful project, on the basis of our experience in French Polynesia.

The Planning Phase

This is when the sector-based policy framework of the country is being defined in a given field. Obviously, the role of the public authorities is paramount at this stage since decisions are made on public investment trends and priorities.

For the last ten years, The Government of French Polynesia has been aware of the importance of sustainable environmental protection and has dedicated an increasing part of its finances to this purpose (about 10% today).

This financial effort is not a de facto commitment since many other aspects of economic development are urgent and require major public funding: social housing, roads, harbour facilities, schools, hospitals,... Moreover, the importance of the issues previously described in terms of sustainable tourism and economic development is not as obvious to everyone (the elected representatives in particular): if access to water and waste collection has become a priority for all people in French Polynesia, waste management and wastewater treatment are a recent concern, not yet thought of as indispensable by the local residents.

On the strength of its experience in France, the State has supported the Territorial Authority's political will by focusing on the necessity of implementing these programmes, via bilateral funding agreements over several years -the "Contrats de développement" (development contracts) provide a good example of this.

Finally, the commitment of certain public figures like the Mayor of Bora Bora was a determining factor in winning over the rest of the political community. Not only did he have the courage, regardless of electoral considerations, to apply water rates depending on consumption, but he also embarked on a public sanitation system and was rewarded by the blue European flag, a distinctive environment-friendly label for which one has to compete every year.

When he was Minister of Infrastructure, he also engaged the Territory into sanitation pilot schemes. Finally, as Chairman of the Association for the Promotion of the Municipalities, he helped to sensitise the Mayors of the French Polynesian towns on these issues.

Besides financial investments, this sector-based policy must be accompanied by the required regulatory framework, as a preamble to project implementation (for example, the norms and conditions of treated wastewater disposal in the natural environment).

The Identification Phase

Once the major guidelines of the sector-based policy have been defined, the identification phase consists in estimating, defining and prioritising the operations to be implemented via what could be called outline studies (master plans, for instance).

Decision makers tend to neglect this phase although it is of major importance since it provides a global vision, ensures the coherence of the various operations planned and helps to estimate funding commitment per year, in relation to existing or expected financial resources.

The State, the Government of French Polynesia and the Municipal Authorities have often engaged in tripartite partnerships to implement a number of master plans for an archipelago, an island or a town in fields related to drinking water, sewerage treatment and waste.



The Investigation Phase

Once an operation (or a project) has been identified, preliminary studies are undertaken prior to funding the programme, from a technical, economic, environmental as well as social and cultural point of view if relevant.

These studies seek to help decision-makers (public authorities and/or financial partners) as well as users (professional or private) to understand the relevance, feasibility and sustainability of the projects.

The Territory and the municipalities of French Polynesia do not have the resources to carry out the type of complex engineering studies which require highly qualified staff and experts. Most of the time, the studies are subcontracted to private engineering firms, after invitations to tender.

Related Investigations

These concern the basic data required for the design of project facilities, in particular topographic surveys, land surveys and geotechnical studies... Updated topographic databases and a sufficient number of surveying consultancies are available in French Polynesia, and the public works research department provides adequate land and geotechnical survey information.

Design Studies

As a preamble, it is important to note that French Polynesia opted for the complete delegation of project management to the private sector, which means that the consulting firm managing the project is in charge, from the design phase to the control and supervision of construction work.

This approach is based on the current M.O.P. law (law on public works ownership) in France.

In French Polynesia, several environmental engineering consultancies have been created in the last fifteen years and have managed to secure engineering expertise, sometimes by employing young local graduates who have completed their studies in France (unfortunately those are not yet in sufficient number: French Polynesia only

produces three local engineers each year in all sectors).

They receive additional training at the workplace and thus become very operational. Tribute should be paid to this approach which is a sort of long-term investment. Indeed experience has shown that the technical design of works is much more efficient when it is carried out locally. In France, local parameters are not always sufficiently taken into consideration.

The engineering firm SPEED (Polynesian Company for Water, Electricity and Waste) provides a good example of this. It is a subsidiary of the EDT Group, and the divisions related to environmental engineering (water, waste, sanitation) include six engineers and approximately ten technicians, planners and draughtsmen, all specialists in this field.

At this stage of the project, a report of the preliminary design type is submitted. Various technical solutions are presented in a priority order, with details of investment costs, time for the execution of the works, as well as operating costs and subsequent service costs. All the solutions proposed must comply with current regulations (for instance, the norms and conditions of treated wastewater disposal).

Environmental Impact Studies

The environmental impact of the various options defined in the preliminary studies needs to be assessed by an external body. Towards this end, regulations relevant to public works have been enforced in 1996, in French Polynesia. In addition to environmental considerations, these studies also assess the social, cultural and economic impact of the projects. These impact studies are later made available to the public (residents and users) at the Town Hall where opinions and observations are collected and integrated into the studies when relevant.

Economic Studies

The purpose of the schemes is to create a public

service. The purpose of the studies is to examine the administrative and institutional framework within which they will operate, including economic and financial aspects related to tariffs and corresponding balanced budgets over several years.

Procedure Management

At this stage, the contracting authority has to form a team which will be responsible for «procedure management», and its task will consist in organising and monitoring progress in the execution of the procedures identified. This task must be performed by a small number of well-qualified people. The procedure management team comprises members of the authorities' technical services and must have competence and expertise in the following:

- drawing up bills of specification for the above-mentioned sub-contracted studies,
- call for, processing and analysis of tenders, engineering bids in particular,
- establishing funding files to the required format,
- knowledge of regulations regarding public finances,
- project reporting and development of adequate decision-aiding tools,
- assistance to politicians for project communication...

In French Polynesia, at the local level, the number of candidates fitting this profile is very small and employment conditions in the past few years have been less attractive in the public sector than in private companies.

However, a few procedure management units have been formed in the relevant fields, notably in the technical services that concentrate most of the engineering expertise on the territory, such as the Infrastructure Division.

The government has recently decided to bring these units together in a specific service (the Environmental Infrastructure service). Its objective, via project and procedure management tasks,

is to implement environmental infrastructure schemes. The creation of a specific service under the authority of the Environment Ministry enables Government to display a clear and coherent policy towards the elected representatives, the financial partners, the local residents and the media.

The Funding Phase

Once decisions have been made on the basis of the preliminary studies, a funding plan has to be drawn up. When national and international sponsors are called upon, applications must fit into the specific framework of a given organisation. The procedure manager in charge of these applications must know the rules and procedures applied in his/her own organisation. For example, the European Development Fund, one of French Polynesia's main partners in public sanitation funding, requires that all applications be made in a standard format called "logical framework". Several project leaders in the Territorial administration have been trained for this purpose.

Beyond the form of the document, the real challenge lies in the ability of all stakeholders (technical services, decision-makers and funding organisations) to adopt a common language, where notions of relevance, feasibility and sustainability can be assessed in an equitable manner in all the projects.

The Implementation Phase

The implementation phase is reached once funding has been obtained. It starts with the completion of the detail technical studies which will form the basis of the invitations to tender for the subsequent works.

The various administrative clearances needed at this stage, such as building permits, are examined by the relevant services. The French Polynesian administration, like its counterpart in France, is organised so as to be able to determine whether projects abide by regulations in terms of spatial

development, public health and environmental protection. When examining the projects these divisions are independent of other divisions called “works divisions”.

Construction is then performed by civil engineering companies following invitations to tender. Local companies are in sufficient number in the civil engineering sector to enable fair competition, but tendering is also open to international companies for large-scale projects.

However, local companies have sometimes experienced difficulty in adapting to newly developed sectors in French Polynesia, such as the building of wastewater collection networks -with electro-mechanic and telemanagement equipments- in particular regarding on-site management. There again, specialist technical skills are lacking and expatriate manpower is resorted to in order to fill these jobs.

In the implementation phase, monitoring and control of works are part of the project management tasks delegated to the private sector. The competence and experience of the project manager’s team are essential parameters to ensure state of the art completion of the works.

Project communication, which is the procedure manager’s responsibility, is critical at this stage in order to explain the issues at stake to justify temporary annoyance generated by work in progress.

Operating the Facilities

For the local authority, operation of the facility must have been planned prior to construction work. Bills, contracts and invitations to tender must be prepared in advance. The determination of a tariff level adapted to users’ financial resources is a major factor of sustainability and should have been calculated in the preliminary studies. In addition to engineering competence, the contracting authority must have legal and financial expertise.

As for operating the facility, under a system of delegation after invitations to tender, the presence in French Polynesia of specialist companies, often subsidiaries of major international groups, is a valuable asset, both in terms of sustainability and adequate level of technical expertise and know-how.

However, implementing a public service involves the levying of a charge to users. Therefore, whatever the type of organisation – concession, leasing contract or simple operating contract – the public authorities are responsible for the control and monitoring of the contracts and need adequate human resources to do so.

From a general point of view, public-private partnership -although evidently adapted to today’s context in French Polynesia- will function efficiently in the long term if it is properly controlled and regulated.

Appraisal

For the decision-makers and the funding organisations at this stage, project appraisal should determine whether, with the same type of organisation and circumstances, similar schemes.- improved or not- could be implemented elsewhere.

The manner in which the facilities and the related public services operate demonstrates the relevance of these investments to the decision makers and the population at large. The implementation of sanitation and drinking water pilot projects in Bora Bora during the nineties serves as a concrete example in sensitising information campaigns.

For example, the municipality of Bora Bora frequently organises visits, by schools, media and elected representatives of French Polynesia, to its wastewater treatment facilities -and more recently to its desalination plant. In fact, the Moorea municipal council and the residents associations which were sceptical at first about a waste water treatment plant project, became unanimously in favour of the implementation of a sanitation system on their island after a visit to the Bora Bora facilities.

Punaauia wastewater treatment plant provides a further example of this. It is the first of its type in Tahiti and started operating in March 2002. It is situated in an urban area and has been harmoniously inserted into the landscape. It has been designed to host the public: the entrance

hall is equipped with a video projector, the telemanagement of the facilities and network is displayed, films and educational programmes are shown and visits to the plant behind Plexiglas windows are organised... ■





Urban Services in their Relationship to Urban Development in Pacific Islands: The case of Bora Bora

Mr. Joël Allain

SUEZ, General Delegate Pacific Region

President of “Electricité de Tahiti”

Introduction

Before the introduction of an administrative authority at the level of the city (1972), there was a territorial service with the responsibility for implementing and operating the infrastructure for the production and supply of water in all the islands of French Polynesia.

In 1990, the infrastructure that had been installed by the American army during the second world war as part of one of its major base installations was still in service to part of the island. Until 1976, public electricity distribution service existed on the island of Bora-Bora. Until 1990, water was distributed a few hours per day in small areas and was not drinkable. Until 1993, no municipal sanitation system existed.

The local authorities responsible for these issues had only slender financial resources. There was capacity to finance only the highest-priority investments, and there was no technical capacity to maintain services, even if the infrastructure had been installed.

Electricité de Tahiti (EDT), which had provided Tahiti with an electricity service for several decades under a Territorial public utility concession statute, was approached in 1976

to explore the possibility of a partnership to finance and maintain a similar service on the island of Bora-Bora. This partnership was based on the first public utility concession granted by town authorities in French Polynesia, and will be described later. Then, with the election of a new Mayor, the problems of managing the territorial infrastructure to promote the development of tourism (an essential activity of the island, and a word which had not yet acquired its current connotations), took on a new dimension.

Our electricity company partnership perceived, in the new municipal authority, a clear will to collaborate in the design of a project intended to ensure a distribution of high quality water to the whole population. Indeed, it was not tenable that inequitable access to drinking water should continue.

Thus EDT and the town jointly founded the Vaitehi company in 1990, to which a concession for the production and distribution of drinking water was granted. This event took place whilst the population of Bora-Bora was divided between incredulity and resignation (“even the Americans could not supply all the island in 1944 ...”), and had little hope of anything beyond a distribution system rationed in volume, hours of service and area of supply.



Later, an identical type of partnership was the foundation of the enterprise which launched the first initiatives to implement sanitation systems on the island.

There are a number of issues which it would be useful to explain in this paper:

- The various types of public-private partnership developed on Bora-Bora, depending on the nature and problems of different spheres of activity;
- How specific needs were taken into account in order to adapt infrastructure and plans to the management policy of the town authority;
- Research into tariff solutions and their evolution over time according to the difficulties encountered and the financial capacity of various users;
- The advantage of synergy (mutually-enhancing cooperation) between utilities, particularly the commercial relationship with customers.

However, from the private sector point of view, it is appropriate to not only point out the success factors underpinning these projects, but also the principal difficulties which had to be overcome (and those remaining to be overcome), in order to provide useful input into any comprehensive analysis of the chance of success of extending the Bora-Bora experience to other islands or groups in the process of urbanisation.

- 806 salaried workers in the tourist accommodation sector,
- 170 occupations directly related to the tourist industry.

The economic activity of the island is thus based on tourism. Its hotel community has evolved in quality, diversity, number, and site, and the needs of tourist customers have contributed towards sensitising the various actors to the need for establishing sustainable urban services.

The local population has achieved virtually full employment, and this has allowed the inhabitants of Bora-Bora to considerably improve their standard of living. In this respect, it is worth pointing out that remuneration and social securities in French Polynesia are among the highest in the Pacific region (minimum wages of \$900 per month, for 39 hours per week with 5 weeks of annual leave, and general medical and social cover).

The most numerous class of hotels are the 5-star, defined by an average daily revenue per room higher than US\$350, and are important providers of direct employment, with a ratio of 1.8 employees per hotel room, as well as indirect employment of 0.6 per room. Thus each 5-star room provides an average employment for 2.4 people.

Apart from those in compulsory schooling up to 16 years, the number of people of employment age, including youths and those in unsalaried employment (various artisanal trades and subsistence), is 1600.

Overall, more than 70% of the working population is employed either directly or indirectly by the tourism sector. These are the factors which help explain the acceptance by the population of the technical choices and their cost, and their understanding and acceptance of the installation of utilities where the same quality of service is available to the inhabitant and visitor alike.



88 Socio-economic background of the island of Bora-Bora

The island of Bora-Bora is located 200 km of Tahiti (45 minutes by plane).

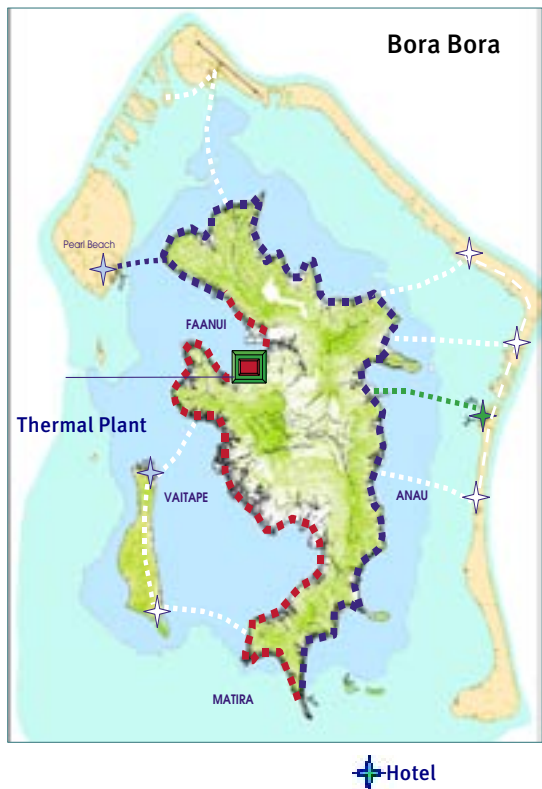
The workforce on the island has evolved as follows:

1997: 881	1999: 1279	2000: 1384
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Within this workforce were:

- 408 salaried workers not directly dependent on the tourism sector,

Electricity Supply



1989: Incomplete Network

1995: Total Networking

1998: Construction of a New Plant

2001 - 2005: Achievements

Extension to the Islet

A concession was signed in 1976 between EDT and Bora-Bora local authorities, whereupon the first power station and the first grid was immediately installed. Initially, the concession was intended to operate in isolation, and its expenses had to be financed by income from contractual tariffs. Because of the small size of this electricity supply operation, tariffs were higher than those on the main island of Tahiti.

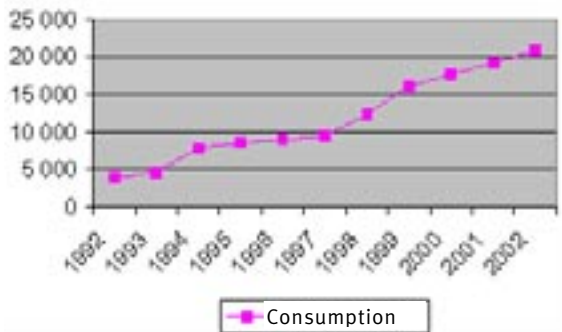
The zone covered was approximately one third of the island of Bora-Bora, and none of the motu

(small barrier reef islands) were included at the time. The Town was aware that a high-quality service could not be provided to the sparsely-inhabited remainder of the island without entailing increased tariffs.

Using this concession agreement as a basis, the municipality of Bora-Bora was able to research and suggest ways of removing the tariff differences between Tahiti and the islands, in a co-operative fashion involving the concession-holder and the Territory of French Polynesia. Thus in 1990, following an invitation by the Territorial Administration, the Bora-Bora local authorities joined the concession, which resulted in a significant reduction (-25%) in its tariffs, due to an adjustment of prices.

This electricity tariff reduction was however implemented in a sensible fashion, at the same time as the first bills for water supplies were issued (as explained later). This made it possible for the inhabitants of Bora-Bora to develop their electrical appliance usage, according to the following trend in yearly consumption from 1992 to 2002.

Year	Consumption	Year	Consumption
1992	4 007	1998	12 314
1993	4 641	1999	16 048
1994	7 817	2000	17 598
1995	8 536	2001	19 158
1996	9 980	2002	20 846
1997	9 389		



Drinking water supply



The resource

The geology of the island of Bora-Bora, particularly its small size and low topographical profile, and thus meagre cloud-forming properties, is the primary unfavourable factor. Bora-Bora is dry compared to neighbouring islands. Its extremely broken landforms are not favourable to the development of significant aquifers, and the volume of groundwater is relatively small. As a result, the water resource is not abundant, and has limited replenishment capacity.

The situation thus encountered stimulated a preliminary geological investigation of the aquifers to determine their usable capacity and identify the most promising sites, including those whose capacity were of 1l/s, which is extremely limited. It should be noted that these studies were carried out in 1990 towards the end of a powerful El Niño event, and thus constituted a very optimistic evaluation. On these results, the water resources of the island could supply a maximum of 3,600 cubic metres per day.

On completion of this investigation, given this knowledge of the limitations of the resource, the municipality agreed that it would eventually be necessary to seek water-production solutions that would supplement the natural resource.

Although it was inefficiently distributed around the island, in 1990 this natural water resource appeared sufficient to satisfy the demand from hotels and private houses alike for at least 10 years, given two conditions:

Improvement and addition of infrastructure

It was immediately obvious that, if the inequalities of water access amongst the population of Bora-Bora were to be ameliorated, it would be necessary to improve the performance of the facilities.

Vaitahi carried out the following work:

- Repair of pumping systems, drilling of new boreholes and installation of new pumping systems;
- New water pipes;

The drinking water problems faced by Bora-Bora in 1990 were of three types:

- a manifestly scarce resource;
- non-existent or inefficient infrastructure;
- selfish behaviour by individuals under a system of tariffs unrelated to the volume of individual consumption.

- Increase in capacity and better distribution of tanks;
- Repair of PVC water delivery networks;
- Installation of chlorination systems;
- Installation of water-meters.

The first programme of works, amounting to US\$ 5.5 million, immediately permitted:

- Demonstration that the joint “EDT / local authorities” enterprise was able to finally provide a solution to an age-old problem;
- Improvement in the performance of facilities (the network efficiency rose from 58% to 90%);
- Optimisation of natural water resource utilisation;
- Provision of drinking water.

Modification of water-user behaviour

The speed with which Vaitehi had made it possible to offer an efficient service was a very favourable factor during subsequent attempts to modify the behaviour of water-users.

From the start of the 24-hour standard service, bill simulations in relation to effective consumption made it possible to quickly correct “open tap” behaviour.

This syndrome is typical in situations where water is not available on demand, or when water utilities provide water according to daily usage patterns. This results in the practice of placing containers under open taps, and leaving them there even when the containers overflow. It accentuates inefficiencies in supply and increases inequalities (depending on the distance of the consumer from the supply tank). It is a poor water-use practice, and unnecessarily exhausts the natural water resource.

This syndrome disappeared very quickly once prices were linked to the volume of supply (as measured by the water meter), and there was real consumer satisfaction resulting from the clear and immediate improvement in the service, in particular the assurance of permanent

availability; all this was also reinforced by weekly local press publication of hygiene analyses carried out by the territorial services.

The only consumers who continued to resist this method of charging for services (some of whom continue to resist to this day, 10 years later) were those asserting statutory rights of ownership of the sites on which infrastructure was installed (drilling, piping, etc.).

Network extension

After the first few years of operation, with individual consumption habits under control, and water better appreciated as a resource, the decision was taken to extend the water supply network to the whole island. This decision was put into practice with a complementary programme in 1993.

The investment budget for this second stage was US\$ 1.7 million.

Drought: desalination and recycling of treated water for irrigation

This framework functioned normally until 1999, when a strong dry episode associated with a La Niña event resulted in a rainfall deficit even more significant in Bora-Bora than elsewhere. This situation was aggravated by the length of the drought (1999, 2000, 2001 and 2002) reducing the combined capacity of borehole supplies to 2,500 cubic metres per day. Although the service was suspended at night, the Vaitehi company decided, in agreement with the town council, to construct and operate a reverse-osmosis desalination plant.

This decision had two objectives:

- to ensure a regular supply of water;
- to reduce the amount of water extracted from aquifers through boreholes, to permit major overhauls, and to preserve the balance of the water table and permit progressive replenishment if possible.

Vaitehi was able to implement this investment project in 2001 with funds from its shareholder EDT, and with assistance from the town and the Territory of French Polynesia for the reservoir necessary to feed the reverse osmosis system.

The system comprised 3 osmotic units each of 350 cubic metres per day capacity, ensuring at peak approximately 1,000 cubic metres per day. This augmented the natural supply to a total minimum of 3,500 cubic metres per day and has made it possible to satisfy current needs under all climatic circumstances.

The alternative solutions studied (wastewater collection and treatment, transport of water from neighbouring islands by tankers, etc.) did not provide answers to the water-shortage problem within the economic constraints faced by users. This assessment of the limits of the natural water resource is definitive, and has already justified the installation of an additional desalination plant on the island.

In the meantime, in order to limit the use of natural water in irrigation, the town has decided to improve the quality of water treatment and purification, and to create a network to distribute this water to hotel gardens. Now the town plans to extend the distribution network for treated water across the whole island and to improve its quality to the specification of industrial water.

Sanitation Utilities

Since our joint operations with the municipality had started as a sanitation service concession, our partnership made it possible to launch the first operations in the tourist zone in the south of the island, connecting to the closest hotel establishments.



Waste Management

- 1989: house waste collection on part of the municipality
- 1997: Extension to the whole municipality
- 2002: Creation of a green waste composting unit

service made it possible for the town to develop a plan for more comprehensive infrastructure and to request national, territorial and international financing. We then withdrew as an operator from this enterprise, and the facilities were integrated into the town authority's properties. At the same time, considering the difficulty in fulfilling the requirement of balancing the contract, and with the town lacking the capacity to ensure the technical management of this facility, it has allotted this task, after an invitation to tender, to a specialist company (SPEA) through a leasing contract.

Characteristics of the financial and contractual arrangements

This way, according to the nature of the services and depending on the degree of difficulty in integrating all or part of the cost into a system of charges, we have made our expertise, financial resources and human resources available to the town, through appropriate financial and contractual arrangements.

The table below explains the characteristics of these contracts:

	Electricity (concession)	Water (concession)	Sanitation (lease contracts)
Duration	40 years	40 years	40 years
Financing	Company	Company and local authority	Local authority
Renewal	Company	Company	Local authority and company
Responsibility	Company	Company	Local authority and company
Payment	Client	Client	Client/Water

These various types of partnerships are adapted to the level of difficulties in each one of these contracts:

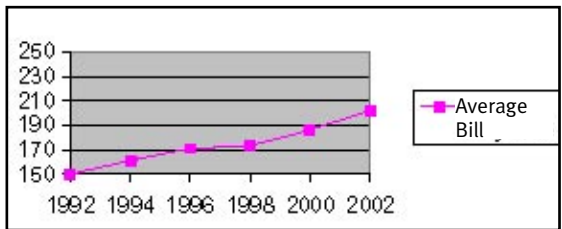
Electricity has, since its installation, been paid for by the user and so it did not pose a particular problem, subscriber contracts being entered into by customers with full knowledge of the facts. The level of tariffs was also compatible with the level of income of the population of Bora-Bora.

Structural investments in power and extension and/or development of distribution networks are financed by the concession-holder, whilst a small component of the costs of extension to private homes are borne by the customer, including the cost of connection.

Thus as an example, taking into account the isolation of the island and the major increase in power required, 3 successive power stations had to

be built to fulfil the changing demand. This clearly represented an improvement of living standards for individual customers, according to the evolution of the amount of electricity used per consumer.

Year	Average bill (kWh)
1992	150
1994	162
1996	171
1998	173
2000	186
2002	202



Water: practically no water was paid for before the creation of Vaitehi. Once services were in operation, and after some billing trials to familiarise users, billing per unit volume was practised, with some infrequent but lasting difficulties related to questions of land ownership rather than the outright refusal to pay bills. Except for some cases in this category, 99.5% of water bills have been paid (the same percentage as for electricity bills).

Tariff levels have not allowed the cost of service to be completely covered, and the company is still in deficit 12 years after its foundation. This has resulted in an inability to cover necessary new investments, such as the recent osmosis plants. EDT has thus been financed by an advance of US\$ 1.5 million on its current account for this facility, and the town, with Territory assistance (US\$ 0.35 million) has financed the associated reservoir.

In fact the situation of Vaitehi, which enjoys no assistance in terms of Territorial adjustments or subsidies, necessitates a search for alternative sources of financing for infrastructure. The town, conscious of this situation but worried about social services, has adopted the solution of

participating in investments, thereby reducing any justification to raise tariffs.

Sanitation: structural investments will henceforth be supported through international financing (EDF) and classified as communal goods. Whether or not tariff charges for these services are linked to investments and to their renewal, will depend on the commune. The tariffs that have been put into place are very diverse. The contractual framework of our Group provides for simple leasing, with no responsibility for investment. Debiting of these charges to household budgets does not pose a particular problem since they represent a negligible amount compared to the charges for electricity and water.

The response to qualitative as much as quantitative needs

In parallel with these contractual and legal adaptations, the particular situation of Bora-Bora led our Group to research adaptive technical solutions in response not only to quantitative needs (as demonstrated by the augmentation of the power supply, and desalination units) but also qualitative needs.

Qualitative technical adaptations

Two examples are provided:

1. An adaptive willingness to support the establishment of hotels on the motu (small islands on the barrier reef). The desire to reduce the impact of high-volume tourism on local lifestyles led the town to recommend that new hotels be established in areas away from the principal island. In order to achieve this it has been necessary to provide adaptive technical solutions and underwater channels, 2 to 3 kilometres long, have been built to carry electricity, gas, drinking water, sanitation and irrigation water.

These solutions are now systematically used by hotel promoters, who are relieved of problems

which are not their “core business”, but which formerly had to be addressed in-house.

2. The search for synergy started with the design of the water concession project. The “parent company/subsidiary” structure of our companies made it possible to avoid structural costs at various stages of the project. Thus, the Vaitehi company has never had any staff and has always relied upon EDT for the organization phase of the project, including:

- Relations with the project manager;
- Relations with the contracting authority;
- Relations with supervisory administrations (Sanitation Services, Infrastructure Services);
- Negotiation with the Bora-Bora authority on the concession contract;
- Negotiation with the contractors.

In the production phase, EDT and Vaitehi sought the support of one of the subsidiary companies of the group. This company was in charge of the management of public services in islands other than Tahiti, a task which required mobile and multi-skilled personnel.

This company, which normally handles electricity generation in other places, was delegated the task of providing all services including: the identification of clients, the drawing up of contracts, the management of works under concession, and maintenance. The company simultaneously managed the water and electricity contracts, which greatly facilitated its establishment.

In addition, this particular contractual situation made it possible to use integrated means for communicating with customers, especially during the learning phase when the first billing systems were introduced. It is interesting to note that the first water bills were issued coincidentally with a drop in the price of electricity -a drop that corresponded to the average amount of the new water invoice. The simple message, “for the same price as before, you get both electricity and water,” was thus disseminated to customers.

This synergy was complemented at the time of the implementation of sanitation infrastructure, by the arrival of specialists with the objective of improving performance, the technical management of works, and the optimisation of the measures henceforth in place.

Thus, because of the ability of this type of organisation to call on the specific capabilities of different skills (water, sanitation, electricity), a minimal workforce of 19 people ensured the whole range of technical and commercial services -which, as well as being performance-oriented, presented a simple interface to the client:

- commercial aspects: ELECTRA
- technical aspects: SPEA.

Tariff policy

Depending on the situation the responsibility for the tariff policy is:

- within the scope of the contract:
 - territory/concession-holder for electricity,
 - town authority/concession-holder for drinking water,
- within the scope of the town authority for the sanitation service.

Generally, the tariffs reflect the political will to weight, according to the level of consumption (or the type of user), the cost, or the part of the cost, of the services that has been decided should be supported by the customer. The private partner takes part in making this decision and has the option of requesting a change in tariff burden either directly, or according to the distribution of its client-base. The price level can also define engineering constraints, and in these circumstances it is usually the private partner who must signal this concern.

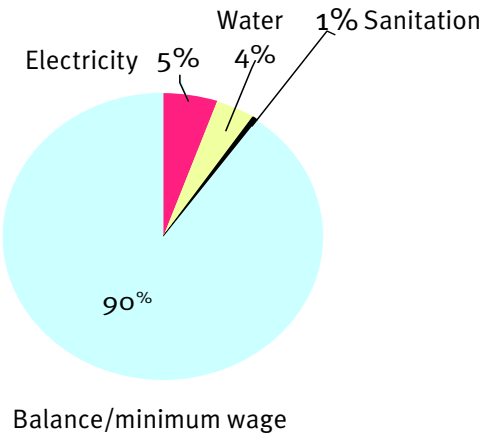
In practice, political necessity results in the continuous search for a tariff level that carries a clear “social message”. Indeed, for electricity and water, the tariff agreed by the contracting authority and the concession holder consists of progressive bands. The first band of the

domestic tariff corresponds to the volumes of energy or water considered necessary to supply the basic needs of the family. But, taking into account the scarcity of the natural water resource and its finite character, it was decided to make the third band of the domestic tariff as little attractive as possible, thus making it more expensive than the cost of production of supplementary water obtained from reverse osmosis.

By contrast, hotel tariffs are very high from the first band onward, and close to the cost of water produced by desalination. The tariff rate thus takes into account the fact that the cost for producing water from natural sources is passed on to the indigenous population and the cost of producing water from non-natural sources to the tourist population. This policy has reconciled the inhabitants of the islands with tourists, who are no longer considered to be those who take a scarce commodity away from them.

Cost of average monthly domestic consumption compared to minimum wage

Electricity	Water	Sanitation	Balance against minimum wage
5,650 F	4,500 F	600 F	95,300 F



Difficulties encountered

The scarcity of land and the fact of joint possession has prevented the Mayor from completely fulfilling its commitment to ensure full control of the sites of production and water distribution. This issue remains to be resolved.

The most significant advantages

- An island with dynamic tourist development activity;
- A mutually harmonious relationship between the project manager and the town authority;
- Complementarity of competences between the project manager and the town authority in the implementation of projects (technically, administratively, legally and financially);
- Excellent adherence to budgets and deadlines, thus promoting the confidence of financing bodies;
- Rigorous management of contracts and customers;
- The perseverance necessary to assure the co-operation of the different stakeholders (financial, administrative, etc).

Is this model transferable to other island situations?

This level and steady development of infrastructure could only be achieved thanks to the favourable factors described above. High living standards, full employment, high enough income levels to meet the charges necessary for high quality services, and willingness by hotels to pay a higher tariff rate than residents for identical services, is not a situation that is found in all Pacific Islands.

It would not therefore be realistic to transplant the Bora-Bora solution completely, and within a short space of time, to the other islands of French Polynesia and of the Pacific. This is likely to remain an exceptional example because of the large share taken by tourism in the development of the island.

However, this experience has enabled our enterprise group to develop ideas and solutions that can be used in other situations with the necessary adaptations.

The corporate image of our Group has acquired new references relating to small communities - experience and credibility that demonstrate its capacity to adapt to circumstances different from “real cities”, and to be serious and competent in providing appropriate solutions. ■

Bora-Bora

Discussion

Geneviève Dubois-Taine

In French Polynesia you seem to adopt very high level environmental standards and those standards are so high that you cannot afford to implement these standards in Papeete where 50 000 people are living. What do you intend to do?

Jérôme Yansaud

Certainly, it's true that we are very late in Papeete. In 2003 we will define a program for Papeete and as far as we know it will cost half a billion euros. How will we be able to pay this...?

Clive R L Carpenter

You have taken a very ambitious and highly technological approach to addressing your water and wastewater management. This presumably costs a great deal and is reflected in the tariffs that you try to collect. I have two questions for you.

Does the tourist industry subsidize the local population tariff, and as presumably this is the case, do you think that such a high technological approach could be financially sustainable in a country or an island where there was less tourism with which to actually achieve your financial cost recovering?

Joël Allain

This is one of the questions we are asking ourselves. How to promote such ideas in other countries where the economy is not sustained by such a strong tourism development. In Bora-Bora, just to talk about the case I have just presented, the hotel companies subsidize in a certain way the local population. For instance, the average amount cashed by the hotels for one room, one bungalow, is around 500 USD per night. So this allows the hotel companies to pay the big amount of water billing. For the moment, there is no prob-

lem for the hotels to pay this amount of money, because the demand and the tourism market are reacting in a good way to these tariffs. What will the situation be when the number of rooms will double in the next 3 years? Everybody says that, for many reasons, the South Pacific islands still stay pacific - and this is one of the things to remember - is that we need to live in a pacific way in our atolls or in our islands. This is one of the major issues for developing and maintaining our tourism at a very high level standards.

You have also to compare the monthly billings to the revenues per capita, the minimum wage for instance. The minimum wage in French Polynesia is around 900 USD per month, which is very high compared to other islands: I would say Vanuatu is around 100-150 USD per month... French Polynesia has a very high level of wages and also has a very high level of social benefits, for instance, free healthcare, etc... So, people have wages that allow them to spend for such needs, water, electricity... I will also perhaps give another example: we have no billing without payment. Everybody pays his bills. There is no problem on that. Water and electricity are the wealth of the poor people. The poorer you are, the faster you pay your bill because this is your first need. So, when you compare the prices to the level of living in Tahiti, I think it is quite balanced. There is no problem on that.

Now, regarding the problem of transposition. For other situations, other economies in small islands in the South Pacific area, we think it is possible, but you have to go slowly, much more slowly than for instance in Bora-Bora, which has settled its programs on water, electricity, sewerage, etc... I think that sewerage is also a rich issue, for rich people. First of all, water. I think that in small



islands, the biggest issue could be perhaps the water issue.

Jérôme Yansaud

To complete Mr. Allain's answer, I would say that this tariff redistribution system that exists in Bora Bora between domestic users who pay very little and hotels which in fact fill in the financial gap in order to reach a balance, is in fact a will that is present throughout all of French Polynesia and in particular on the island of Tahiti, but not only regarding tourist activities.

In fact, what exists regarding human activities and water needs belongs to the same redistribution system, i.e. that a professional user/consumer is a potential major polluter, who consumes a lot of water – even though this is not always the case – so he is going to pay his cubic meter a higher price than a private person. Roughly, the aim is to offer a service at an economically viable price for the population and that the rest be covered by economic development. What we were stressing a few minutes ago regarding the “two – step” movement between tourism and environment is the “two-step” between preservation of the environment and economic development. Today, with the level of modernism human activities have reached, simply reducing pollution is not enough, one must be able to treat it efficiently.

One often hears “no tourism without environment” but today, on Bora Bora, there's no environment protection without tourism. This means that tourism allows to bring in its means and its redistribution system in order to acquire the equipments and the financial necessary to treat these pollutions. This is what we're trying to implement in Polynesia. Of course, in remote islands where there isn't much activity, it is very expensive to bring services such as water supply. And this is why the Territory, by setting up mixed economy companies which can work on all of Polynesia or concessions on all of Polynesia, tries to implement this tariff redistribution between the islands so that those who benefit from a more important economic development in fact

subsidize the users living in the other remote islands. This is a fundamental axis of the Government. We call it de-concentration in the islands. It is essential to bring these urban services, the social services, in the islands to maintain these populations in the remote islands and thus limit the migratory flow which we would not be able to contain, towards Papeete, the capital. All this is a question of balance and I think that these tariff redistribution systems where those who can pay, those whose activity requires more services, pay in an exponential way (are a solution). But it's true that if you break the economic development, all this collapses. This means that the system that was working one way, starts working the other way round. So, it's true that the balance is perilous, but we have no other choice

Gaston Tong Sang

Before handing out the floor to the other participants, I just want to complete the previous interventions, specially when I hear that tourism subsidizes. The word subsidize scares me because no public service construction based on subsidies is sustainable. One must understand that as soon as you work with subsidies, you know it's not going to last. It suffices that the subsidies be cut for those services to stop. And this is clearly what we want to avoid in Bora-Bora. I was saying earlier that for drinking water we had started with private funds, public funding started only last year to help us build a reservoir and, then again, only for two-thirds of its cost. We could thus imagine that we could assume/take charge of this cost. Regarding sanitation, we started it with private funds, public funding let us do our thing saying “maybe they'll break their neck”. When they saw that it worked, we were able to obtain public funds, for this project, for the investment part only, not for the exploitation/maintenance. For the maintenance part, we want absolutely that the balance be found through the own efforts of the population, for every body pays, that is important, and of course by relying on economic activities. We have the chance of having this card, tourism, that enables us to pay the bill.

Today I said that these services were showing a deficit because we don't want to have the population paying too high a price. We believe that the population can support the prices we are charging today, even if this means adopting a certain improvement in time because we are going to improve our equipment/facilities. Thus the functioning cost will increase proportionally and, of course, on the other side, proportionally, the hotels will also participate to this increase. In any case, achieving a balance means we accept more hotels, I don't know exactly how many, 100, 200, 300 more rooms, until we reach the balance where finally the network becomes self-sufficient and we can save enough funds to maintain the network and specially renew it so that the future generation can also benefit from these services and not only the present generation. This is the real aim we had set for ourselves when implementing public services. I think the tourist pays the price, a rather expensive one, but he must, as a counterpart, benefit from quality services, quality facilities and we work together to ensure they obtain them, without of course forgetting our population.

Alf Simpson

Are there really limits to the development of Bora-Bora? From your presentations, it would seem that there is no limit, there is unlimited demand and people are willing to pay to provide the services to meet that demand. It also seems that local people are subsidized to be there. Are there any limits? The resources seem to be unlimited, you can convert salt water for your water supply, you've got sanitation, you've got the treatment plants set up and I guess you can take the outflow way out beyond the reef to the ocean. But are there any limits, is there a ceiling, are there any constraints? I sit here listening and I think, "God, it can go on forever! They have all those huts all over the island and does it matter because they all come at 500 USD a night and at that price you can pay for any solution!"

Gaston Tong Sang

If I understand you well, this is the major ques-

tion we are asking ourselves, you are not the only one. We are asking ourselves up to where can we develop our municipality/town. And I partly answered this question when I said "must we have more hotels to satisfy the growing demand from tourist agencies". Because I'm also told that there are not enough hotels in Bora-Bora to sell the airline's seats. We cannot either have the whole tourist development of the island of Polynesia depending on Bora-Bora alone. We are totally unable to fulfill this mission, but we are the small wheel that makes the big one turn.

Let me explain. If tourism works out fine, in a well-balanced way in Bora-Bora, it is all of Polynesia that will benefit from this image. In fact, the essential point is to have tourists come over because of the name of Bora-Bora and making it so that they can stay longer with us and visit other islands, all as beautiful in fact, the Mururoa Islands, the Salomon Islands, the Islands under the wind, the Tuamotus, Languiroa and why not the Marqueses Islands, that famous land cherished by Gauguin. We are aware of this role we have, we must develop, but up to a certain point. We were talking about the limit set by the necessary balance to be found for the maintenance of services. This is indispensable. But this will lead us to how many more beds, how many more hotel rooms? Right now, I have no economic data, but my real limit, in my opinion, is that of how much can the natural environment of Bora-Bora support. It is a quite delicate calculation to make and I think no scientist on this earth can tell me "Here, for your lagoon not to be totally saturated, this is how many tourist you can accept". I'd love it if someone could make this scientific calculation, if someone could tell me "Bora-Bora can support only so many rooms". Then I'd say "OK. I stop" If scientists give me the ideal capacity so that my lagoon preserves its quality, besides preventing polluting the lagoon with wastewater, then I'll stop at this limit. But behind this idea, there is this thrust from the young generation wanting jobs. We were talking a few minutes ago about the population is increasingly settling on its islands and that we thus have an increasing

demand for jobs every year. Before, it was easy for me to say “go to Mururoa to find jobs and come back to Bora-Bora to spend the money you will have earned. Go to Nouméa and work in the nickel industry.” But today, it is the opposite. “Stay in Bora-Bora because you can find jobs here” and the population growth/increase is here to prove this.

So I think that the real challenge for tomorrow, and this is what I often tell journalists specialized in tourism, is the environment card that we have to play. I think tomorrow tourist destinations will be classified according to the quality of their environment, the quality of their air, the quality of their water. I think we will not be able to escape from this, we’ll forget the “stars”, the “forks”. I am convinced/certain that this is the challenge of the third millennium.

Alf Simpson

By the way, I happened to visit Bora-Bora when we came for the SPC meeting three years ago, and I was extremely impressed. What is the final carrying capacity is the real key issue and what I earlier was trying to ask. You have a waste disposal lagoon. My one concern is with the environment: Some pollutants’ negative indicators take 5 or 10 years before they manifest themselves and by that stage the impact might be irreversible. So it is really important that we invest in environmental studies. Somebody has to do it. We need to monitor, we need to know what are the key indicators, otherwise in 15 years you will discover that something has been happening for 15 years and it is too late to change and you’ve destroyed the goose which is laying the golden egg. We need to understand the carrying capacity of each of our environments throughout the study. This is what we have invested in and who is going to pay for that? You can, because you obviously can charge 500 USD, and I was really impressed by the fact that the French Polynesian Government, maybe I have misheard the exact figure, but something like 10% of your budget goes into environmental development projects and understanding. If that is the case, this is really a model because your

whole economy is based on tourism and I think this is an example for the rest of us. You have put your money where your mouth is; this is what some of us need to do. But these longer-term environmental issues that we do not even know about and that somebody has to study, these are things which are very specific to the small islands because of their fragile state. We have to invest in these specific studies. Lots of off-the-shelf environmental issues, even your water quality standards - you mentioned you comply with European Union and WHO standards - are they really relevant to small lagoon situations? Developing our own environmental standards in the region is a key factor for us.

Gaston Tong Sang

I totally agree. It’s quite true and this is the reason why I had given my approval to the CSP (which is not called the CSP anymore) to turn Bora-Bora into an observatory, that is to say to send scientists here to observe the evolution of the ecosystem during 5, 10, 20 years so that we can say “it is a fact, this project has had this result, good or bad.” Unfortunately, there are no theories, no scientific calculation to allow us to say “Be careful, this project will have this and that impact.” Of course, many impact studies have been made, but as far as the real impacts of this project on the ecosystem are concerned, nobody can predict anything. On the other hand, if the CSP, through its World Environment Organization was to send observers, scientists here to measure the state of the lagoon, I am fully open to this. This would allow us to better programme our future developments. ■