

# Water Operators' Partnership Case Study

**GWOPA**  
Global Water Operators' Partnerships Alliance

**UN HABITAT**  
FOR A BETTER URBAN FUTURE



**UNESCO-IHE**  
Institute for Water Education

HWA  
Australia

WAF  
Fiji

**BEWOP**



# HWA and WAF

Water Operators' Partnership Case Study





**HWA** Australia ▶

**WAF** Fiji ▶

# KEY FACTS



## Partners

**Mentee:** *Water Authority of Fiji (WAF). National water and sanitation utility of the Republic of Fiji*

**Mentor:** *Hunter Water Australia (HWA). Water management consultancy firm of Hunter Water Corporation*



## Facilitators

Asian Development Bank  
Pacific Water and Wastes Association



## Duration

2012–  
(ongoing at time of printing)



## Cost

US\$50,000 from the Asian Development Bank and in-kind contributions for travels and staff time from both partners.



## Aim

Build the in-house capacity of the recently created WAF to reduce non-revenue water, use water system modeling to streamline operations and planning, improve wastewater treatment, boost energy efficiency, develop first-class laboratories, improve system performance assessment and prepare business cases to strengthen the reasoning for initiating projects.



## Approach

A dynamic and participatory diagnostic process led to an ambitious one-year work plan. The management of the WOP was informal but followed the initial plan. Classroom and on-the-job training, frequent remote exchanges and operational assistance visits allowed for the expected objectives to be achieved.



## Results

The mentee used new technical and managerial knowledge, know-how and working methods to improve the quality of service delivery.

Non-revenue water was reduced by focusing on water flow monitoring through an intensive meter replacement plan and on better integration with IT-based tools, improving collaboration between desk and operational workers.

Staff capacity developed on water system modeling allowed WAF to re-establish water service continuity in some areas and to boost the overall efficiency of the utility.

Laboratory review and assistance supported WAF in making cost-effective investments in new equipment and to improve laboratory work processes.

New business case planning skills contributed to increased capital funding by the Fijian government from FJ\$39million to FJ\$71 million (from approximately US\$18million to US\$33 million) in 2014, although not solely attributable to the WOP. Business case planning is now applied for all capital expenditure decisions above US\$1000, resulting in more strategic allocation of resources.

Energy saving measures were implemented, contributing to reduce costs by more than US\$1.3 million between the creation of the WAF Energy Unit in 2012 and 2014.

Wastewater sampling improved at the plant and funds have been made available to further implement the work plan.



## Success factors

Managers' leadership and inclusive approach.

Participatory analysis of needs.

Few obligations, high commitment.

Application and diffusion of newly acquired capacity.

Alignment with ongoing priorities.

Effective use of distance communication tools.



## Challenges

Too many improvement tracks to implement in a short period.

Technical fixes sometimes prioritized over capacity development.

Potential over-reliance on a few individuals to manage certain improvement tracks.

# INTRODUCTION

A Water Operators' Partnership (WOP) is a collaboration between two or more water or sanitation operators, conducted on a not-for-profit basis, in the aim of developing their capacity. These partnerships are being used as a way of helping the world's public operators to sustainably deliver adequate water and sanitation for all.

This narrative WOP case study has been produced as part of the Boosting Effectiveness of WOPs (BEWOP) project, a collaboration between UNESCO-IHE and UN-Habitat's Global Water Operators' Partnerships Alliance, and is funded by the Netherlands Government. BEWOP is a 5-year research, operational guidance and outreach initiative aimed at boosting the effectiveness of Water Operators' Partnerships around the world.

The full case study from which this narrative report was produced, is part of a series of cases being documented under BEWOP using a common framework to facilitate analysis and comparison. The case studies, together with other research, are leading to the development of tools and guidance materials to support operators, facilitators and funders to do WOPs with greater ease and confidence in their effectiveness.

The present report analyses the Water Operators' Partnership between the Water Authority of Fiji (WAF), headquartered in Suva, Fiji, and Hunter Water Australia (HWA), located in Newcastle, Australia (see Map). WAF is the mentee partner, while HWA is the mentor utility. The partnership aims to build hands-on knowledge and share working methods to rapidly improve water service performance.

The analysis is informed by a week-long field visit to Suva in September 2014, supporting documentation (agreements, activity reports, work plans, presentations) and a dozen interviews with employees of WAF and HWA, as well as with key facilitators at the Pacific Water and Wastes Association and the Asian Development Bank.

Many thanks are extended to all those who shared information and experience on this WOP, especially to Jim Keary, General Manager of HWA, and Opetaia Ravai, Chief Executive Officer of WAF.





Suva Harbor, Fiji Islands

# BACKGROUND

Since Independence from Britain in 1970, the Republic of Fiji has experienced four military coups driven by political and ethnic rivalries in less than 20 years: two in 1987, then again in 2000 and 2006. Dictatorial periods were marked by limited freedom of speech and assembly, and widespread media censorship. Military leader Voreqe “Frank” Bainimarama, who ousted the democratically elected prime minister in 2006 on charges of corruption, organised democratic general elections on September 17, 2014 and was voted in.

Fijians are divided in two main ethnic groups. The original and native settlers of Fiji called iTaukei are predominantly Melanesian and Polynesian, and represent roughly 57% of the total population. Indo-Fijians, brought in as labour force from India by the British during the 19th century, account for 28% of the population. Other minority ethnic groups are of European, Chinese and other Pacific island origins. Official languages are English and Fijian. The main religious groups are Protestant (45%), Hindu (28%), Roman Catholic (9%), other Christian faiths (10%), and Muslim (6%).

The capital of Fiji is Suva, which is located in south-east of Viti Levu, one of the two main islands of the archipelago nation. The country is divided into four

major divisions (Central, Eastern, Northern and Western), and subdivided into 14 provinces. The executive power is represented by the Chief of State (President), the Head of Government (Prime Minister) and the Cabinet (appointed by the Prime Minister). The legislative branch is composed of two chambers: the Senate and the House of Representatives. The judicial branch is composed by the Supreme Court and a set of other courts (court of appeal, high court and magistrates’ courts); the legal system follows the common law model.

The Water Authority of Fiji (WAF), headquartered in Suva, is closely linked to the political realm. Historically, water and sanitation services were under the responsibility of the Department of Water and Sewerage, within the Ministry of Works, Transport and Public Utilities. The WAF was created in 2007 as an arm’s-length entity and officially took over water provision responsibilities in 2010, but official authorities have maintained significant influence over the utility’s operations. The Department of Water and Sewerage acts as the official regulator, providing sectoral policy and administrative direction to the WAF in addition to monitoring compliance with international quality standards. The Board of Directors, composed of state officials and representatives of private corporations,

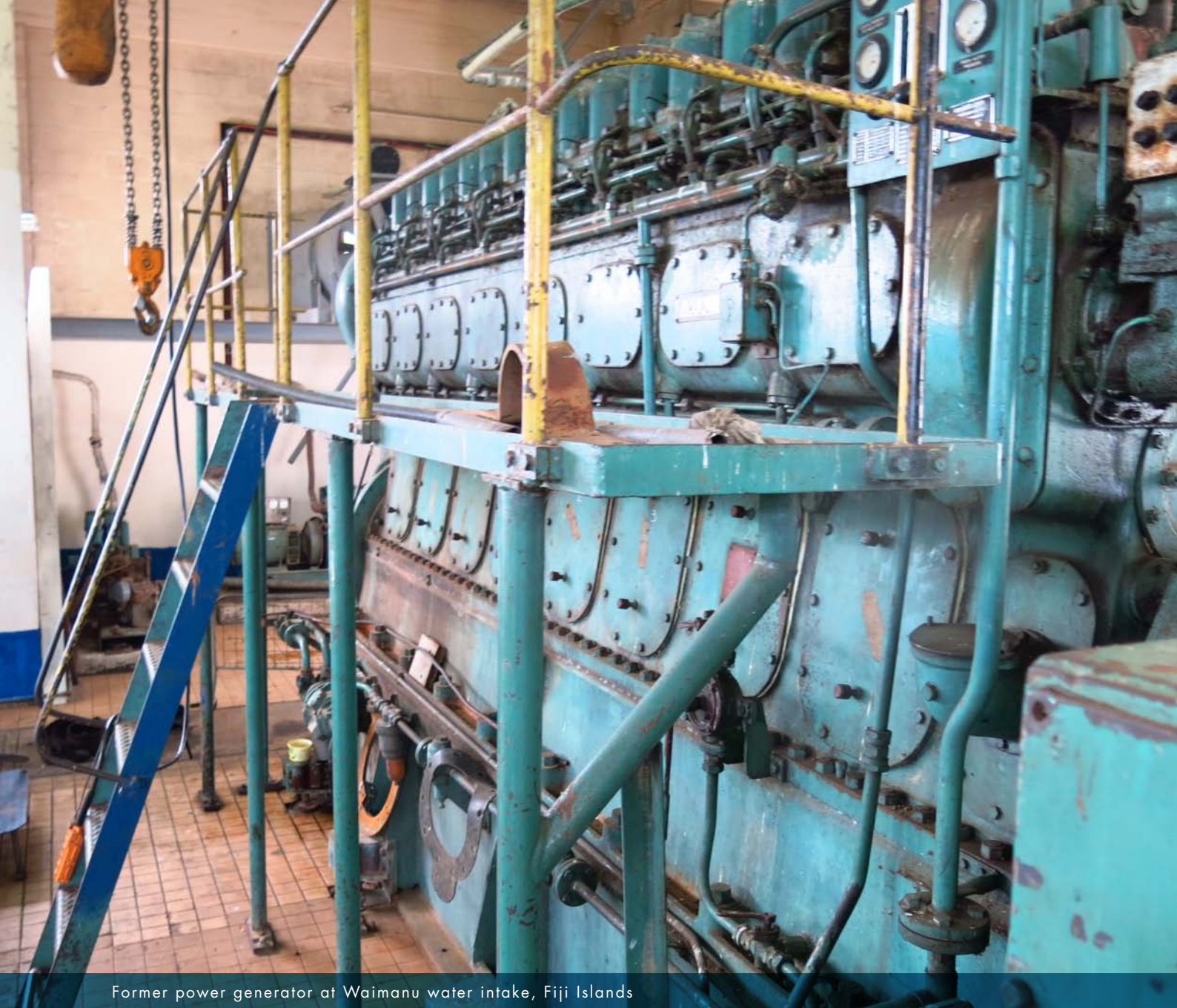


Tamavua Water Treatment Plant, Fiji Islands

is directly appointed by the government and guides all strategic decisions. The WAF is mandated to provide water and sanitation services to the entire population of Fiji, which is equally distributed between cities and rural areas. Drinking water service coverage is significantly higher in the urban context (98% compared to 58% in rural settings).

According to the World Bank, the GDP for this country of 903,207 inhabitants reached US\$4 billion in 2013 (compared to US\$1,561 billion

for Australia), with an average economic growth of 2%. The United Nations' Human Development Index 2014 ranked the country 88th among 193 nations (Australia ranked second). Socio-economic inequalities are rife, as shown by Fiji's Gini index score of 42.8 in 2009 (0 representing equality, and 100, total inequality). Nearly 30% of the population lives under the poverty line. Nonetheless, Fiji's economy is one of the most developed among the South-Pacific island states.

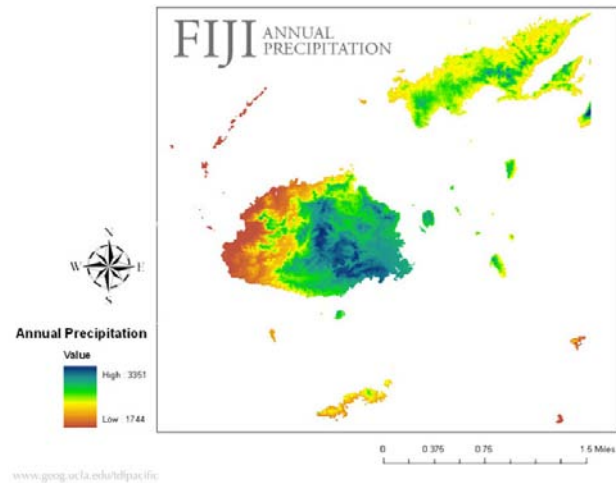


Former power generator at Waimanu water intake, Fiji Islands

The Republic of Fiji has abundant forests, mineral, and fish resources. Sugar processing represents one-third of industrial activity. Sugar exports, remittances from Fijians working abroad, and a growing tourist industry – with 400,000 to 500,000 tourists annually, yet negatively affected by political uncertainty – are major sources of foreign exchange. Following the 2006 coup, the EU and other Western nations suspended aid until the interim government took steps towards new elections. Long-term economic problems include low investment in infrastructure and public services, uncertain land ownership rights, and the government’s difficulties in balancing its budget. Fiji’s current account deficit peaked at 23% of GDP in 2006, and declined to roughly 12% of GDP in 2013.

Fiji is a volcanic archipelago of more than 332 islands (110 are inhabited) with tropical marine climate. The wet season from November to April is also cyclone season; the dry season runs from May to October when rainfalls are scarce and unevenly distributed geographically (20% of the 2000 mm annual precipitation). As shown in Figure 1, the central island receives most of the precipitation. Fiji has recently been experiencing longer droughts compared to historical records. In 2014, the dry season lasted longer than usual, posing challenges for continuous water delivery in some areas.

**Figure 1:** Annual precipitation in Fiji



# THE PARTNERS

## WAF

The 2007 national water sector reform that established the WAF as a Commercial Statutory Authority aimed to “provide efficient and effective water and wastewater services in an environmentally sound and sustainable manner” according to the utility’s website. The new utility’s legal status puts stronger emphasis on autonomy, cost-recovery, and cost-effectiveness. As previously explained, the utility’s strategic decisions are approved by the Board of Directors, which is directly appointed by the government.

Financial income from WAF operations is transferred to the Government of Fiji, and a budget to cover infrastructure investments is submitted annually. A 20-year strategic master plan to improve water and sanitation service delivery guides its development.

The newly created operator provides water and sanitation services to over 700,000 people through more than 144,000 metered residential and industrial customers, mostly in urban areas. The current water and wastewater network comprises 4,200 kilometers of pipe (see Table 1 for more indicators).

The Water Authority of Fiji is in charge of all aspects of water and sanitation services, from raw water resources storage (except groundwater which is managed by the Ministry of Land and Mineral Resource), intake, treatment, and distribution to wastewater collection, treatment and discharge.

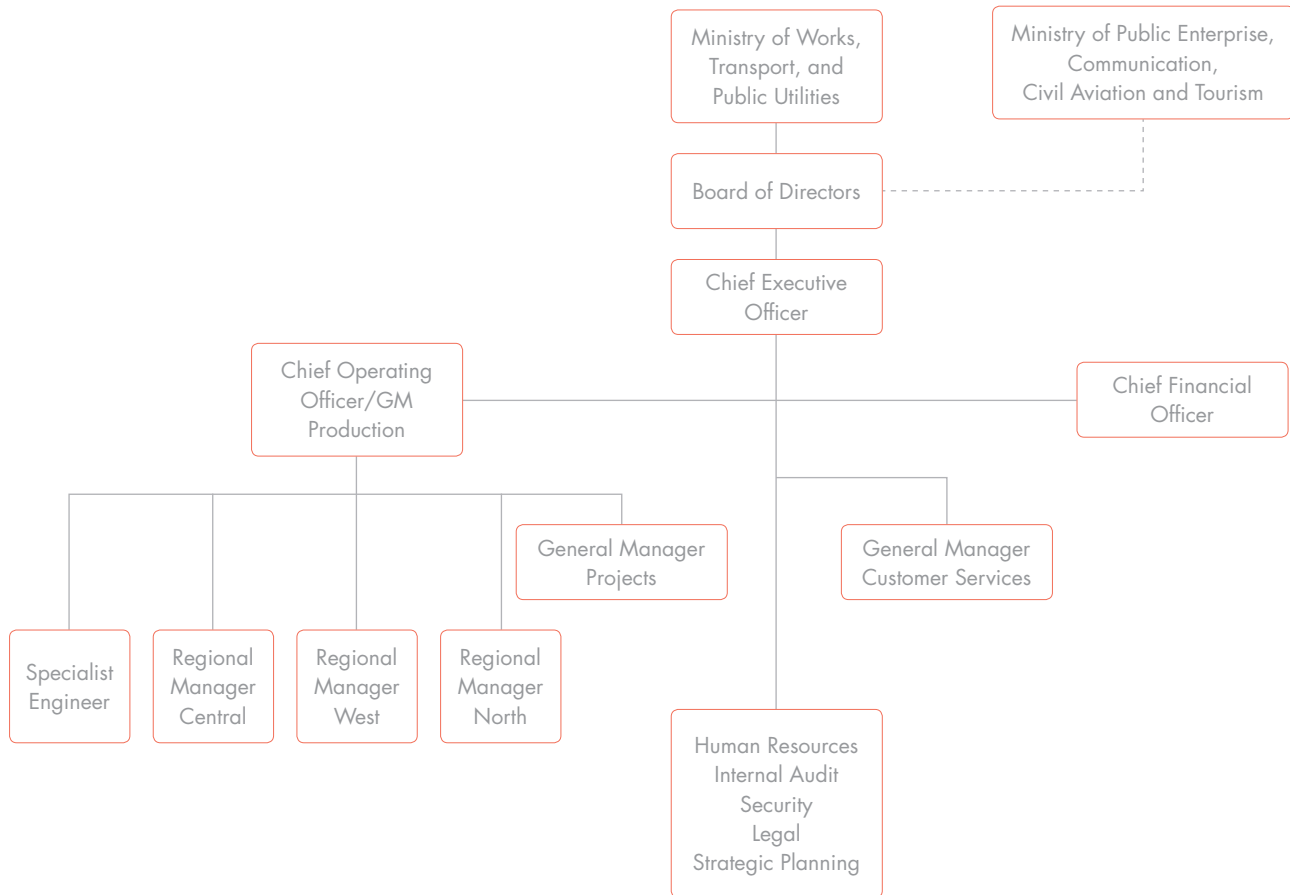
The WAF draws water principally from rivers and reservoirs (66%), and groundwater sources (3% from springs and 31% from boreholes). The utility produces and delivers around 114,500 mega liters of water a year (2013) to households and industries. The average daily water consumption per person is roughly 217 liters (similar to the average water use in Europe, based on UN-Water data).

Water service delivery to Fiji’s numerous mountainous islands is complex. The two islands with the highest population density have freshwater resources, but other smaller islands have limited supply. WAF combines diverse access modalities for raw water: from exclusive reliance on groundwater and rainwater harvesting to desalination plants and freshwater diversion from one island to another (e.g. 32-km transportation pipe from Drana, Lekutu District, Vanua Levu to Galoa island, commissioned in June 2014). The utility uses a large number of pumping stations and intermediate reservoirs in

order to offer a continuous service. Managing pressure in the network is also a challenge on the hillsides. The quality of upstream raw water resources is generally good (although it decreases during droughts) and thus traditional treatment processes without excessive use of chemicals is

usually sufficient. Nevertheless, poor sanitation services and the relatively low coverage of wastewater treatment (40% in urban areas), coupled with industrial and agricultural activities, affects the quality of downstream water bodies.

**Figure 2:** Organisational chart of WAF



WAF engaged in this WOP with the clear objective of strengthening its human resources capacity. When a CEO was appointed in 2009 to prepare the launch of the new utility, developing management and technical capacity was a key challenge. In the initial stages WAF relied greatly on external consultants, but after the official transfer of responsibilities from the Department of Water and Sewerage the priority became to build in-house capacity in order to be autonomous. The WOP with HWA offered a welcome opportunity to develop this internal capacity by linking up with an experienced utility partner.

## HWA

Hunter Water Australia Pty Limited (HWA) was established in 1998 to provide specialised technical and operational support on an independent commercial basis, servicing its parent company, the regional, government-owned Hunter Water Corporation (Newcastle, State of New South Wales), as well as water agencies, local government and industry across Australia and abroad. At the end of 2014, the company was sold to an independent Australian water testing firm. HWA took the name of Hunter H2O.

HWA operates separately from its parent firm under Australian corporate law, although they

form a jointly owned group and are under the supervision of a Board of Directors composed of the same four members. Therefore, HWA is not in the business of delivering water and sanitation services; rather it supports the water utility through a wide variety of services in three main areas: Operations (e.g. capital works planning and procurements, plant optimisation, asset management, etc.) and Partnering, Consultancy (e.g. design of new plants, environmental services) and Laboratory services (e.g. sampling, chemical, organics and microbiological analysis of waters). Through these areas of support, the HWA has contributed to the good performance of its parent utility, HWC.

HWA is a specialist in water and wastewater process design and operational management support. Through numerous partnership arrangements with councils and water agencies, an experienced team handles infrastructure management and operations for 25 water and wastewater treatment plants in the Hunter region, and elsewhere in Australia. HWA works to optimise their water and wastewater management processes, trains operators and improves capabilities, at the same time as solving specific service problems for customers. HWA's environmental testing facilities are certified to meet the strict testing requirements of large urban water supply and wastewater systems (as well as testing regulations of the mining industry).



HWA was involved in its first WOP with Water Papua New Guinea in 2011 with funding from the Asian Development Bank. Achievements so far include increasing the collection ratio, reducing losses in the water supply system, improving water quality monitoring, and system operations and maintenance (including through mentee staff training events in the Hunter region). Following this initial success, the Asian Development Bank extended this WOP to other pilot areas in Papua New Guinea until early 2013 when WOP activities were completed. Furthermore, HWA conducted a small exercise with the Pacific island of Nauru's Utilities Commission in 2012, and in June 2014, started a new partnership with the Yangon City Development Committee in Myanmar to improve processes and procedures at the wastewater treatment plant and its laboratories.

The mentor engaged in the partnership with WAF following a direct request during a Pacific Water and Wastes Association conference. HWA General Manager, Jim Keary, recalls the unforgettable moment of "getting a tap on the shoulder on the final day of the conference from a big former front rower from a Pacific nation saying 'how about we twin'."<sup>1</sup>

HWA considers that WOPs within the Pacific region are natural given the bonds that the water utilities have developed through their frequent encounters

as members of the regional water association. This explains why HWA has been so responsive to the demand of its regional counterparts. HWA management also thinks that WOPs are a good mechanism to boost staff development and motivation. As HWA's General Manager has stressed in an interview: "There was no commercial interest. Everybody genuinely wants to do more. It's a massive personal development. We have become friends." HWA also recognizes that WOPs do strengthen their corporate image, although they maintain that this is not a driving factor.<sup>2</sup>

## Facilitators

The Pacific Water and Wastes Association together with the Asian Development Bank have been the main facilitators for this WOP.

The Pacific Association, which was set up in 1994 with the goal of supporting utilities in the region to sustainably manage their water and wastewater services, fosters collaboration among utilities in the region through its various regional events and activities. Since 2010, it has been a member of the Global Water Operators' Partnerships Alliance and has been helping WOPs funders identify and broker partnerships between its members.

The Asian Development Bank provided the funding. Supporting governments to upgrade and expand their public infrastructure is a central activity of the Asian Development Bank. Facilitating WOPs more specifically is part of a larger program initiated in 2007 that promotes capacity-building initiatives in the region. Since its inception, it has helped to establish 60 such partnerships, 30 of which are now completed, while 15 are ongoing and 15 more are planned.

In recent years, the Bank has linked up infrastructure investments with WOPs to ensure their durability and added value. The program has gained momentum and expanded to the Pacific islands to create strategic alliances between utilities, creating potentially longer term professional partnerships to achieve universal water and sanitation coverage.

The Asian Development Bank consultant interviewed for this case study sees WOPs as valuable instruments that can be integrated at various stages of the loan process.<sup>3</sup> Through partnerships, utilities

acquire new capacity, get access to finance, and are better equipped to repay their loan. It is a win-win situation for the lender and the borrower. For this reason, the Bank increasingly promotes the use of WOPs in technical assistance project preparation. When fellow practitioners make recommendations in the context of a WOP, there is often more professional commitment to success. According to the consultant, there is a substantial added value in having practitioners' insights at earlier stages of the loan preparation.

The WOP has been entirely financed by the Asian Development Bank. The budget of the first phase was US\$50,000, earmarked to cover expenses for activities (e.g. travels and general meeting costs). Later, the Bank decided to finance a second phase for this partnership by committing an additional US\$50,000. Staff time and other expenses of the WOP have been covered by the mentor and recipient partner. As a not-for-profit partnership, no entity has received any payment for their services.



Interim Power Generator at Waimanu water intake, Fiji Islands

# PARTNERSHIP DESIGN

In October 2012, the heads of WAF and HWA, Opetaiia Ravai and Jim Keary, first met during a conference organised by the Pacific Water and Wastes Association in Auckland, New Zealand where they discussed partnership possibilities. Soon after, they asked the association to facilitate the formalisation of the partnership, and within a few months the Asian Development Bank was brought on board to fund the implementation of this proposed WOP. The Bank decided to support this partnership as part of the expansion of its WOP program to the Pacific region. As a result, the first visit by HWA to Fiji was held in Suva in February 2013 and informed the first agreement signed the following month.

## Analysis of needs

The analysis of needs was conducted during the first visit to Suva, Fiji, with the collaboration of three Asian Development Bank staff and consultants. Some key areas had been identified by the partners prior to the visit, which enabled HWA to select the appropriate experts to participate in the analysis. The Australian delegation was led by HWA's General Manager who was accompanied by a specialist in non-revenue water and an expert in

wastewater treatment. They were hosted by a group of 20 staff from WAF for these initial meetings.

Although the exchange was very informal and interactive, it was also well-structured and effective according to the partners. A first set of improvement tracks was quickly identified: non-revenue water, water system modeling, wastewater treatment, energy efficiency.

Partners identified the Nadi-Lautoka water and wastewater systems as a pilot area (two neighbouring cities on the central island, with 23 areas experiencing intermittent supply) in order to rapidly achieve concrete results. Nadi-Lautoka is the second largest urban area in Fiji after the capital Suva (located on the same island). Site visits took place and teleconferences were held with various experts from HWA's headquarters in Australia.

By the end of the visit, they presented the results of their joint work on non-revenue water and the issues to be addressed at the Navakai wastewater treatment plant located in Nadi. Two additional improvement tracks were included as priorities for the WOP: reviewing laboratories and building business cases (preparing a capital expenditure plan to be submitted to the Fijian Government).

A draft work plan with clear objectives was then developed to support initial activities on the agreed six improvement tracks, which served as the basis for the formal Memorandum of Understanding signed in the following months.

The governance structure of the partnership was not formalized but evolved over time. The partners agreed to maintain frequent communication and exchange WOP reports to ensure efficient project implementation, financing and accountability. The WAF committed to closely coordinate with other donors to avoid redundancy on tracks addressed through this WOP.

## The agreement

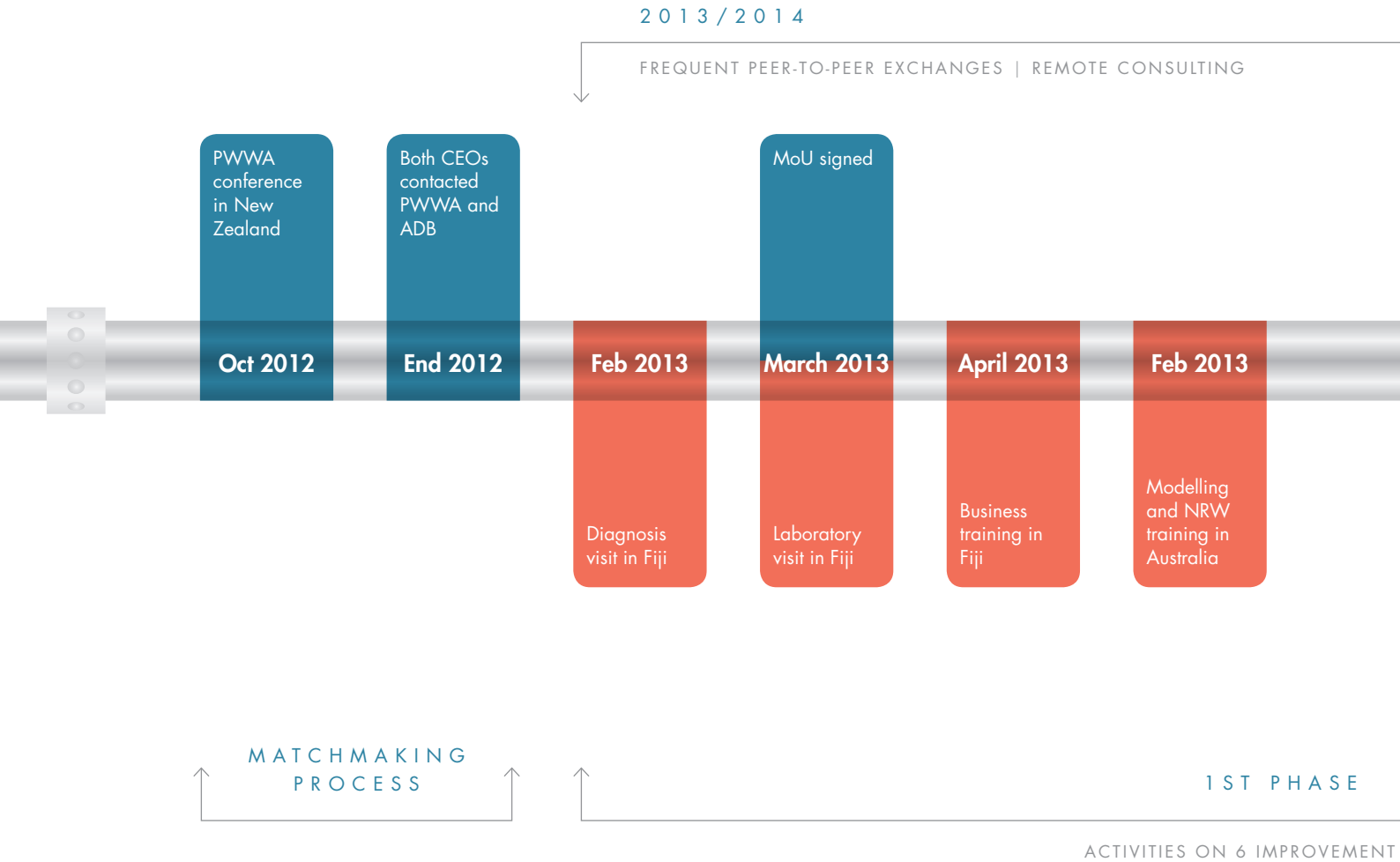
The WAF, HWA, and the Asian Development Bank signed a Memorandum of Understanding on March 21, 2013. It presents succinctly each partner and joint implementation actions; it does not address questions linked to the general administration of the WOP (objectives, governance structure, etc.). The 12-month work plan details the planned activities (mostly remote consultation, study visits and on-the-job training) and designated experts for each improvement track, but overall the agreement leaves room for adaptation.



Pumping system at Tamavua Water Treatment Plant, Fiji Islands

# Timeline

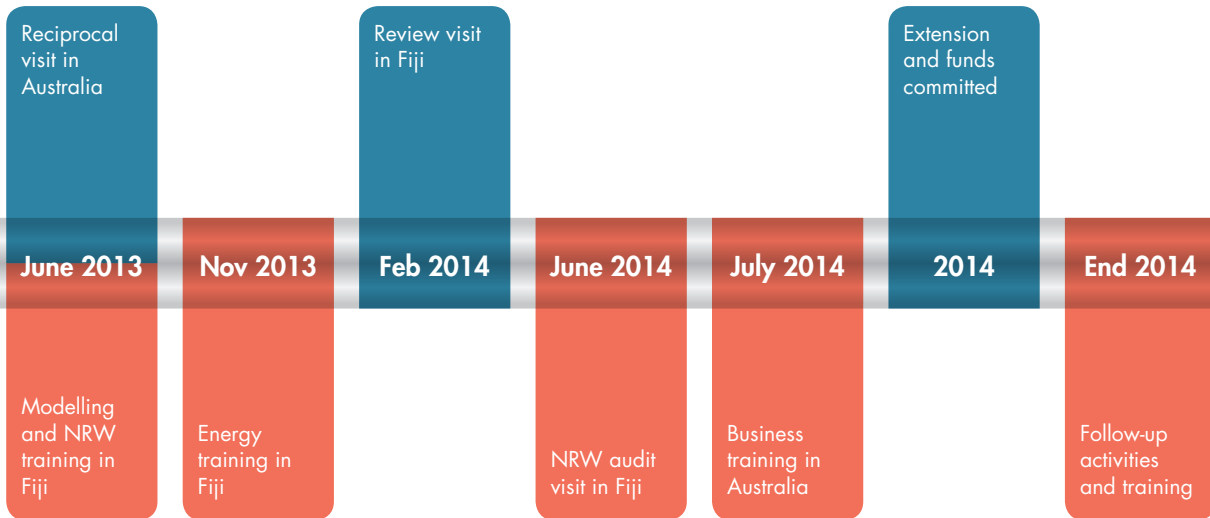
This timeline is not exhaustive, but highlights some key events in the WOP.



- MANAGEMENT MILESTONES
- PROFESSIONAL PEER-TO-PEER EXCHANGES

2013 / 2014

FREQUENT PEER-TO-PEER EXCHANGES | REMOTE CONSULTING



2ND PHASE

TRACKS

FOLLOW-UP ON THE 6 IMPROVEMENT TRACKS

# PARTNERSHIP IMPLEMENTATION

The agreement details general WOP activities and the overall orientation of the partnership, but it mostly served to secure access to funds. It is the good management of the partnership by the heads of the utilities that has truly steered the development and implementation of the WOP activities.

Information-sharing and regular communications have strengthened professional ties between partners at different levels of the organization, from management to operations personnel. The monitoring and reporting processes have been conducted directly by the managers of the WOP based on their experience and feedback of the participants. A WOP review report was produced by HWA's General Manager, Jim Keary, in February 2014.

The improvement tracks described below constitute the backbone of the partnership.

## Non-revenue water

Reducing non-revenue water is a crucial challenge for the WAF and thus is the foremost strategic objective for the recipient utility. During the analysis of needs, the WAF shared its internal water audit

assessment that evaluated non-revenue water at 51% on average in Fiji and concluded that physical losses in the piped network, through leaks or inadequate pressure management was the main problem. HWA conducted complementary water audits for some systems, estimating a similar level of losses in the networks but identifying different causes (larger proportion of apparent vs physical losses due to metering issues). The partners agreed to conduct a non-revenue water reduction pilot program in Nadi focusing on meter replacements.

The initial plan was to train a team to undertake the non-revenue water calculations, identify priorities for action and implement the program. During the first WOP visit, HWA started to work with the WAF team (an engineer, two junior project managers and a general manager) on non-revenue water. Their objectives were to:

- Determine the current level of non-revenue water
- Complete a water balance to assess the flow of water going in and out of the system, using international methodology and terminology
- Identify the major sources of loss
- Develop an action plan to reduce losses



Over a few days the team completed a water balance for the systems in Suva and Nadi, identified the factors that may be impacting non-revenue water, outlined an action plan and selected the Nadi-Lautoka urban area as the pilot site for implementation. The action plan presented by the team was to:

- Develop an integrated non-revenue water reduction strategy
- Establish a formal non-revenue water team structure and reporting guidelines
- Pilot test the plan in Nadi
- Raise awareness of the importance of non-revenue water among WAF staff
- Conduct the water balance exercise regularly

Planned actions included:

- Replacing 80,000 failed and inaccurate customer meters over the next three years
- Confirming calibration of bulk meters
- Completing tenders for 120 new bulk meters
- Prioritizing the repair of all visible leaks
- Completing the water model project if possible before continuing with Pressure Reducing Valve installation

The action plan was to be implemented by WAF and monitored by the Australian partner, and once significant progress had been made, the HWA specialist in non-revenue water would visit Fiji again to review progress.

WAF had studied the non-revenue water problem prior to the WOP, but collaboration with the Australian partner changed the focus from fixing physical losses to improving metering. The international water balance methodology showed that replacing meters would potentially lead to a 15% gain in total revenue, which can eventually support the reduction of physical water losses. Thus, the WOP contributed to a better understanding of the causes of non-revenue water, changing WAF's line of action.

To enable the implementation of these recommendations, the WAF had to seek appropriate funding. Significant investments were made by the utility itself to purchase 300 bulk meters (FJ\$2 million for bulk meters, approximately US\$1 million) and more are planned to replace 80,000 household meters (worth FJ\$5 million, around US\$2.5), decisions that were facilitated by support from top management, broader political buy-in and the legitimacy gained from collaborating with a recognized international partner.



Wailada Wastewater treatment plant

Two years after the inception of this WOP, a comprehensive strategy to reduce non-revenue water is in place and large investments have been made to implement it. Improved coordination with IT-based tools has allowed the WAF to advance rapidly on this priority. Now any work is tested in the hydraulic model before being actually implemented in the field. It has increased the collaborative approach between desk and operational workers.<sup>4</sup> As HWA's General Manager sums up in the one year report: "The effectiveness of the partnership on non-revenue water over the past 12 months exceeds expectations." As a follow up to activities on this improvement track, the non-revenue water team received a new visit from the HWA expert in June 2014 to review achievements on set objectives.

## Water system modeling

Before the WOP, the WAF's in-house skills in water system modeling were very limited. Utilities use hydraulic models to plan, build, maintain and manage water systems. Some models had been developed by external consultants, including by technical assistants from the Asian Development Bank, but these remained incomplete for lack of internal capacity to validate and use them for major infrastructure planning and day-to-day operational processes. The WAF understood the strategic need

to build internally reliable models for all major water systems in Fiji.

During the analysis of needs, the partners jointly identified the need to develop internal human capacity in water modeling. The managers organized a teleconference with the water modeler in Australia and they decided on how to proceed with knowledge sharing.

They set as the objective for this track to develop a pilot model for the Nadi-Lautoka systems and to train WAF staff so they would be able to build and use such models themselves. Two main activities were planned: the visit of HWA modeling expert, Daniel Alexander, to Suva in April 2013 (followed up by a visit in October 2013), and the training visit in Australia later that same month of two WAF junior staff chosen by WAF's CEO Opetaiia Ravai based on their enthusiasm and willingness to learn.

The activities in Fiji were successfully conducted and during this model development process, considerable deficiencies were discovered with the GIS system used by WAF, leading to important no-cost corrections by the contractor in charge. This saved WAF some substantial costs according to a report by the partners.

The two trainees who travelled to Australia in March 2013 had no previous experience with water models. Participants recall that “the training was extremely intense, with about eight hours of training and four hours of homework daily, without interruption during 14 days.” However, they consider that “the training has been extremely helpful.”<sup>5</sup> Over the two weeks, the trainees received substantial new technical knowledge and working methods to develop water models, alternating on-the-job and classroom training.

Afterwards they went back to Fiji to put their newly acquired knowledge into practice. In May 2013, the two new water modelers started to build and test a first hydraulic model for the area of Nadi-Lautoka, one of the largest service coverage areas with roughly 36,000 connections (180,000 users). During the design of the test model, they had frequent remote exchanges with HWA experts to overcome different hurdles. By August 2013, the first in-house model was completed. They then fine-tuned the model together with field workers and the GIS department, which in turn enabled the GIS unit to complete its own mapping of the system. From September to October 2013, they built a new model for the same area with more accurate data gathered through the testing phase. The HWA expert modeler then visited Fiji again and they finalized the model together.

Based on this joint work, the WAF started to make strategic operational and management decisions. The utility used the model to validate the reliability and robustness of planned capital works that were to be implemented in 2014. They also started to look at the intermittent supply areas to find ways to improve the continuity of the service. The model revealed important operational problems, so frontline staff verified the network to find some closed valves and were soon able to re-establish the service.

Finally, trainees eventually integrated the knowledge into the utility work routines and transferred their skills internally, becoming trainers themselves. Today there are about eight water modelers in their department and newly trained staffs have built hydraulic models for the major water systems. Their only restriction now is the limited number of licenses to run the software, of which they hope to buy more soon. They continue to learn autonomously, exchanging internally. They are extremely proud to see that the learning have benefited the entire organization and have improved the quality of the service to end-users. As one WAF staff explained, “my biggest pleasure is to see the face of a customer when water comes out of the pipe the day we re-establish the service. It is a great joy to see people with continuous supply. After one year of very intense work, we now see the real impacts.”

The first tangible impacts of this improvement track have been to allow water supply 24/7 in intermittent zones. The WAF team is now dealing with pressure management issues that require looking at the system in more detail. In addition, a reservoir that had been empty for roughly 15 years has been refilled thanks to an action plan based on different scenarios tested primarily in the model.

The set objectives for this improvement track were achieved and it resulted in many other positive, “ripple-effect” outcomes. This improvement track has also had impacts on related departments, such as the GIS unit. The entire GIS system has been improved following the HWA expert’s visit and throughout the development of water models in collaboration with other services and field workers. The WOP encouraged them to develop a more accurate representation of water assets within the GIS. Further work involved identification of the importance of operational (flow level) data in determining system performance and establishing design scenarios within the model. The WAF has since installed flow meters and pressure sensors on reservoirs to collect system data on an ongoing basis. The water loss unit continues to improve the water models and extend the process to further areas. This process also directly supports the reduction of non-revenue water. The WAF modeling team now has advanced problem recognition and

solving capabilities and continues to collaborate with HWA experts on ways to improve the constructed model and analytical processes.

The WAF is now using the water and wastewater system models to help prepare their Master Plans. Staff are establishing processes to record asset, operational and customer data and are also making this theoretical information available for operational purposes. As WAF’s CEO says: “Nothing goes in the ground before it goes in the model”.<sup>6</sup> WAF has moved to a management culture that privileges decisions backed by data and modern computer-based analysis. Models have become a tool to effectively support operational decision making.

## Wastewater treatment optimisation

From the onset of the partnership, the WAF had identified operational issues at the Navakai wastewater treatment plant as a priority for the WOP. Consequently, HWA wastewater process engineering expert Craig White joined the delegation during the first visit in February 2013. The partners jointly decided to conduct a technical audit to assess the capacity of the plant. The WAF team was composed by a senior process engineer and wastewater team leaders for West Fiji and Central Fiji.

The team visited several wastewater plants and laboratories. Based on these visits, HWA developed a model for the Navakai plant to assess its capacity and developed an action plan with a list of improvements, which was presented at the end of the WOP visit. Later, a detailed report was prepared identifying capacity constraints particularly in the inlet works (water abstraction). The WAF then prepared a planning report to address these deficiencies in 2014.

The main objectives of this improvement track were to develop the capabilities of the WAF staff in wastewater treatment by analyzing and reporting on the Navakai plant issues and implementing feasible recommendations.

In March 2013, the report suggesting a set of corrective actions and detailing the plant deficiencies was presented. Conclusions raised doubts on the accuracy of laboratory analyses and the partners agreed to address this issue as part of a separate improvement track. Some of the corrective actions have been undertaken such as monitoring the flow at the inlet, sampling the wastewater and sludge production, and initiating repairs of the aerators.

The outcomes of this improvement track are fewer. Although some corrective actions were completed

and funds were made available to further implement the work plan, the development of skills and capacities of WAF staff has been limited. First, the key WAF expert for this track left the utility at the end of 2013 and as a result some of the capacity and knowledge built through the WOP were lost. Second, the partners acknowledge that in hindsight the initial analysis of needs might have been too focused on the technical corrective actions needed for immediate improvements, rather than investing in training and development for a larger WAF team of experts in operation and management of wastewater treatment processes.

Hence, partners have stressed the need to develop human capacity and prepared a list of staff that should be trained through the WOP. They plan to continue to focus on the Navakai wastewater treatment plant optimization while also considering training in sewer maintenance and other relevant issues.

## Laboratories

This improvement track was only identified following the first WOP exchange visit based on observations from HWA experts at the wastewater treatment plant. The objective was set to review working procedures and support the laboratories' ongoing development activities. The Manager of



GWOPA Consultant (left) and employee of WAF (right) at Waila Water Treatment Plant

the laboratories at HWA, travelled to Fiji in March 2013 to prepare a joint assessment report on the National Water Quality Laboratory in Suva with a set of improvement actions in close collaboration with the WAF Team Leader National Water Quality Monitoring and Environment Unit.

The joint report contains a set of practical recommendations to improve testing methods, but also safety and other practical aspects of operations in a laboratory, in order to build a culture of 'precision' for eventual accreditation (ISO 17025). The visit of the HWA expert was followed by frequent remote exchanges via email and teleconferencing to support the WAF in the implementation of the report.

These activities enabled to achieve the following:

- Implementation of quality manuals
- Procurement of certified reference materials for greater accuracy
- Successful registration with global water microbiology proficiency programs

In 2014 tenders influenced by the recommendations of the WOP were released for the supply of instruments and equipment (e.g. to deal with industrial waste and to improve environmental testing, among other uses) worth over FJ\$1.2 million

(US\$0.6 million) and the National Water Quality Laboratory is now awaiting Board approval to proceed.

The WOP has given WAF the technical assistance and guidance necessary to get to this point quicker than would have been possible otherwise. It triggered action to improve processes and promoted wise and efficient investments in new equipment and in staff capacity at the National Water Quality Laboratories. However, as the Laboratory Acting team leader at WAF said during an interview, "we would need much more assistance and training in order to be confident with the accreditation process."<sup>7</sup> Unfortunately, WOP follow-up visits on this topic have been delayed.

As with the wastewater track, the recommendations report has been mainly driven by the mentor with the potential effect of weakening appropriation of the change process by WAF. But overall, the mentee is satisfied with the benefits of the WOP and acknowledges unanimously the time gained thanks to the partnership. In the second phase of the partnership, the work on this improvement track could be consolidated.



## Business case planning

This improvement track was a direct demand of the mentee during the analysis of needs. It emerged as a priority because in 2013 WAF was preparing an improved capital works budget request for submission to the Government. This theme was being pushed by top management who created the Strategic Planning Unit that year. The partners agreed to work collaboratively on this under the WOP and to train key WAF staff in understanding 'service levels' (system performance assessment) and 'business case' development (process that captures the reasoning for initiating a project or task).

This objective translated into a training course for the Strategic Planning Unit organized in Suva by HWA experts in April 2013 at the same time as a field visit to assess service levels. There were 16 WAF senior staff and 10 junior staff involved in the training program. The business case training looked at the development of three concrete priority business cases (accounting system software replacement or upgrade, Savura pump replacement options and Kinoya wastewater treatment plant upgrade options). According to the mentor, participants of the training session were forthcoming and discussed openly about the WAF's deficiencies. As a result of the training week, a work plan and a set of draft service levels were developed jointly.

Subsequently, the WAF Strategic Planning Unit set up a specialist group to build business cases. The group has developed a special spreadsheet pro forma for documenting business cases and trains staff in its use. The process of implementing business cases for all capital expenditure decisions above FJ\$2,000 (US\$1,000) is now applied. One year after the inception of this improvement track, about four business cases had been developed independently on topics that the mentee considered challenging. More have been completed since then. The WAF business cases test options ranging from 'do nothing' through to very advanced estimates of social costs for various solutions.

This improvement track assisted WAF to prepare their capital submission to government, which approved a capital funding increase from FJ\$39million in 2103 to FJ\$71 million (from approximately US\$18million to US\$33 million) in 2014 partly due to the better quality of its submission. WAF's top management is committed to developing business cases for most capital proposals in 2014 so that its submissions to government will be of ever greater quality in the future.

The WAF has also integrated key service levels relating to the continuity and quality of water supplied and compliance of the treated sewerage with discharge standards into its strategic objectives.



Switch board at Waila Water Treatment Plant, Fiji Islands

The improvement in all indicators related to these objectives is displayed in the Strategic Planning Unit office and updated monthly. By doing so, the WAF team members can appreciate the effect of their work.

Although introducing business case planning to WAF was considered ambitious in the beginning because it covered advanced topics that are difficult to implement even in modern water authorities, it appears to have been successful. This improvement track achieved its primary objective of training WAF senior staff in understanding and being able to apply the concepts of 'service levels' and 'business cases' in a short time period. As a lead Asian Development Bank consultant expressed in an interview "the business plan thematic is a recurrent key issue that goes beyond technical considerations. You need to look at the investment relevance, client needs, source of funding, etc. before any transactions happen. HWA has an excellent process to do that. And this is something we would like to push in other WOPs."<sup>8</sup>

To follow-up on this improvement track, the WAF Senior Business Analyst travelled to HWA headquarters at Newcastle, Australia, in July 2014. He received classroom training in capital expenditure (planning infrastructure investment, tenders, etc.) and used this knowledge to prepare

a key document to standardize related processes in all departments. The Business Analyst also attended a training of trainers on his area of expertise and he will later train general managers and project leaders within WAF. By the end of 2014, all of the unit's projects followed the new strategic working methods set in the context of the WOP, in addition the 20-year Master Plan and the obligations set by the government. HWA continues to provide further mentoring on different issues relating to service levels and business cases through remote communications.

## Energy efficiency

Interest in addressing energy efficiency became a clear priority during the analysis of needs. Half of WAF's operating budget is spent on energy bills for a total about FJ\$25 million dollars (US\$12 million). The partners agreed on one main objective for this improvement track: provide training opportunities to WAF staff so they would learn to conduct energy efficiency audits. WOP funds were allocated to bring a HWA energy efficiency audit expert to Suva. A reciprocal visit by a senior WAF manager to Newcastle, Australia, was also planned but has not taken place due to time constraints.

During the last week of November 2013, the HWA energy efficiency audit expert travelled to Nadi

and Suva to undertake onsite training for four WAF personnel from the Energy Unit created in 2012 (a senior manager, graduate electrical and mechanical engineers). The topics addressed during this course included:

- Preparing and conducting energy audits
- Drafting energy plans and an energy policy
- Data collection methods
- Creating an energy baseline

The training sessions by HWA helped WAF staff to implement energy saving measures. Based on this capacity-building activity and others (e.g. in India), the Energy Unit started to renegotiate energy supply contracts and to lower energy consumption, starting with four pilot sites. The WAF had achieved a reduction in electricity usage of more than FJ\$2.7 million (approximately US\$1.3) from such initiatives by the end of 2014. Further, management has simulated “competition” between all operational sites in order to create incentives to reduce energy bills.<sup>9</sup> Overall, the audit training by HWA has been helpful to WAF in identifying current energy use in its plants and in using this information to prioritize energy saving projects and identify maintenance, safety and control issues.

Audits carried out as part of the WOP were at two major facilities, the Navakai wastewater treatment plant and the Regent wastewater pumping station. This activity has strengthened the skills and confidence of WAF to complete energy efficiency audits of major assets. The deeper understanding of energy efficiency options has generated a lot of interest and a special group has been established to undertake more audits at targeted facilities.

The visit to HWA headquarter is expected to take place during the second phase of the WOP. WAF staff look forward to this exchange visit in order to gain from HWA’s experience with innovative technologies (e.g. speed variator, new switchboards, etc.) that help save energy. Further gains are expected by implementing a systematic energy audit program that could be assisted by HWA through remote communications. The General Manager of HWA thinks that the Fijian experience could lead to further skills sharing among Pacific water utilities.

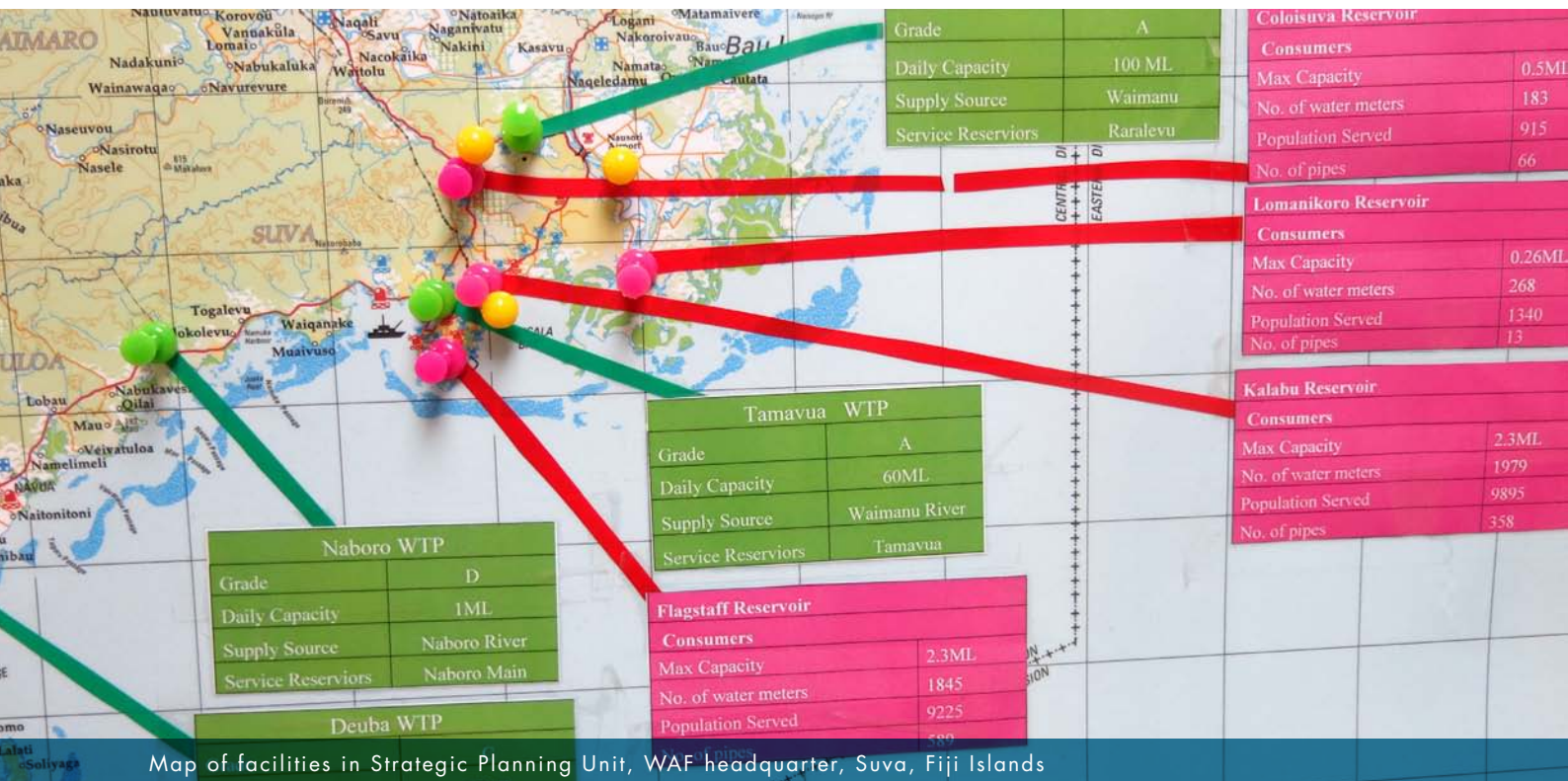


Waimanu water intake, Fiji Islands

# OUTCOMES

The WOP between Water Authority of Fiji and Hunter Water Australia has been showcased as a best practice in the Pacific region by all stakeholders including the Asian Development Bank and Pacific Water and Wastes Association. This case study demonstrates the successful achievement

of most planned objectives as well as unexpected positive spin-offs over a relatively short period of time. At the time of writing (January 2015), key outcomes include better performance and stronger staff capacity.



## Better performance

Over the duration of the WOP, the key performance indicators of the WAF have evolved positively, including non-revenue water, although this cannot be attributed exclusively to the partnership. The WOP activities have been aligned with the priority needs of the mentee as they relate to six improvement tracks:

### Non-revenue water

WAF's reduction strategy was reoriented to focus more on water flow monitoring with an intensive meter installation plan. Large investments and better integration with IT-based tools have allowed the WAF to advance rapidly on this priority. Hydraulic models developed as part of another track are also consulted prior to any new operational work. Finally, the WOP has contributed to improving collaboration between desk and operational workers. The partnership may have contributed to the fact that non-revenue water levels were reduced from 51% to 49% between 2013 and 2014.

### Wastewater treatment plant optimisation

Changes in operational performance of the Navakai Wastewater Treatment Plant at Nadi have not been reported to date. However, wastewater sampling has improved, some repairs have been made and

upgrade works are still pending approval. But these results appear limited compared to other tracks.

### Laboratories review and assistance

The WOP has enabled cost-effective investments in new equipment while developing laboratory staff capacity in the process. In addition, new working modalities have been adopted (including some required to obtain ISO accreditation).

### Water system modeling

While centered on building staff capacity, the work on this track has led to observable improvements in drinking water service delivery on the ground: there is continuous service in previously intermittent areas in part thanks to the operational use of the models (e.g. better management of water flows, levels and pressure, as well as rehabilitation of an old reservoir). Two WAF staff were directly trained through the WOP, and have transferred their skills and know-how to another six employees internally. According to the General Manager of WAF, "the models are being used every week in various types of operating decisions and the master plan that is now being finalized could not have been done without the models" (update from March 2015). In terms of process changes, all works are now being tested through the model before implementation and it is hoped that this will improve the overall efficiency of the utility as well as its performance level.

## Business case planning

This improvement track has had an impact on the restructuring of the organisation of WAF, which created a unit that focuses on such strategic planning to boost service delivery performance. One noticeable outcome is the increased capital funding for WAF from FJ\$39million to FJ\$71 million (from approximately US\$18million to US\$33 million) in 2014, although this is certainly not solely attributable to the WOP. Business cases for all capital expenditure decisions above FJ\$2000 (US\$1,000) are now commonly applied following the methods set by the Strategic Planning Unit, resulting in more strategic allocation of limited resources.

## Energy efficiency

This improvement track helped WAF staff to implement energy saving measures. Training opportunities have helped WAF implement initiatives that have reduced its electricity consumption saving more than FJ\$2.7 million (approximately US\$1.3) in less than 2 years.

## Stronger capacity

This WOP aimed primarily at strengthening the capacity of WAF. The knowledge and working methods acquired through WOPs have contributed to positive changes in mentee performance. As explained previously, attribution of performance

improvements to the WOP is not straightforward; nonetheless, processes of individual, organizational and institutional capacity-building do drive these positive changes. The mentee implements new technical and managerial knowledge, know-how and working methods gained through the partnership to improve the quality of service delivery. But this case study shows that changes in capacity are less likely to be measured. At the beginning of this WOP, staff capacities were not formally identified and it is hard to precisely evaluate the progress made thanks to this partnership, as both partners recognize.

## Increased Access

The partnership has contributed to improved services. According to the partners' conservative estimates based on WAF's intermittent supply list, the quality of drinking water services improved for 12,732 people who moved from receiving intermittent supply to 24/7 water delivery. Furthermore, 400 people who were previously not connected to the WAF network but located in close proximity to pipes receiving intermittent supply, gained access to drinking water services. According to the HWA modeling expert, these intermittent supply pipes were effectively inactive (i.e. no water supply), however once the intermittent supply issue was rectified and supply was restored, the adjacent customers were then able to connect.



## WHAT THE PARTNERS SAY

*"It has been a spectacular WOP. The results were impressive in only 12 months."*

*"It is about promoting direct and ongoing contact with the people you are supporting, and this is rewarding. It is also about your soft skills development as there is another country and organization to unravel and understand, and some of what goes on is guaranteed not to be obvious."*

Jim Keary, General Manager of HWA

*"We have seen big changes. You feel happy when these changes are happening, and especially when customers' lives change."*

*"Water modelling is the biggest success of this WOP. Before, in some places, people weren't getting water although the infrastructure was there. With the WOP and with little investment, they now have access to water."*

Manasa Tusulu, Head of Strategic Planning Unit at WFA

*"I love this partnership. It's amazing to see the results."*

Opetaiia Ravai, CEO of WAF

*"My biggest plus is to see the face of a customer when water comes out of the pipe the day we open it again. It is a great joy to see people with continuous supply. After one year of very intense work, we now see the real impacts."*

*"I feel my work and knowledge can have a real impact on citizens' lives. Our skills are needed here and right now."*

Seru Soderberg, Acting manager for bulk water production and hydraulic modeller at WAF

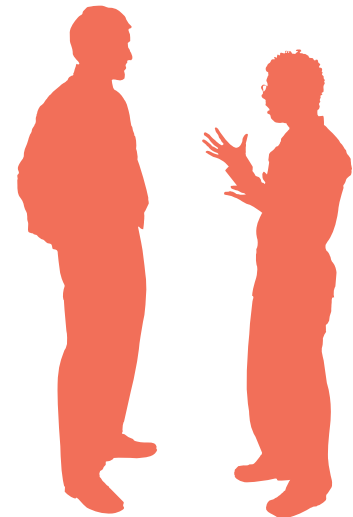
*"The management has been very supportive in our learning process."*

Nanise Lanqere, Hydraulic modeller at WAF

*"WOPs are excellent to whet the appetite of recipient utilities, to see that things can be done differently."*

*"They built up their capacity in water modelling over a short period, I was very impressed. It's all home grown, and this is the key in capacity building. You can guide the recipient with technical and organizational assistance, but you don't do things for them."*

Niels van Dijk, Asian Development Bank consultant



# SUCCESS FACTORS

## Managers' leadership and inclusiveness

This WOP was born from a good relationship between the heads of WAF and HWA, developed through their encounters in the context of the Pacific Water and Wastes Association. This personal trust was key to getting the program started and ensuring continued support throughout activities. Whenever hurdles arose there was a quick and open discussion at the top. This confidence at the management level translated into good relations among all employees involved in the WOP.

The managers also favoured involving a large number of participants from diverse positions (manager, engineer, technician) and levels of experience (CEO to recently graduated) in training events. The WOP activity teams had diverse cultural backgrounds too and there was an effort to involve women.<sup>10</sup> This has been critical to its success and has fostered its sustainability.

## Participatory analysis of needs

Priorities were jointly identified from the outset by more than 20 participants involved in the first exchange visit, and thematic teams were established swiftly as were the pilot areas. Early use of teleconferencing to exchange with HWA staff that could not travel to Fiji resolved initial bottlenecks and further focused the discussion on priority capacity-building activities. A work plan was immediately presented to the board of directors to map gaps and recommended actions. Thus, before the first exchange had ended, the initial findings were already available.<sup>11</sup> The approach during the analysis of needs visit, which combined broad participation, straightforward interaction, management-driven demands and spontaneity, has proven very effective.

Furthermore, formulating objectives and proposing activities before the formalization of the collaboration ensured that the WOP would be truly based on mentee needs. It allowed the partners to address specific themes and make the most efficient use of resources available.

## Few obligations, high commitment

The Memorandum of Understanding signed between the partners in March 2013 was very simple, including a declaration of intent and a work plan with detailing activities. The agreement was not constraining in terms of responsibilities and obligations. This left space for informal interactions and adaptability through the WOP. It is worth noting that even with this level of flexibility the partnership remained generally in line with the initial work plan and objectives. A strong dedication was apparent during the analysis of needs and this created a sense of self-discipline to achieve agreed-upon goals. A climate of trust and helpful supervision from management also contributed to this. This kind of experience shows that a highly binding and comprehensive agreement is not always necessary when other favourable factors are present.

## Effective use of distance communication tools

The extensive use of web-based communication technologies such as video conferencing has added value to the partnership. For example, visiting HWA experts were able to videoconference with the head office to consult on outstanding problems that had frustrated WAF for a long time and

chart meaningful ways forward. This early effort to “clear the decks” allowed WAF staff to better focus on other improvement tracks thereafter. Once the partnership was officially off the ground, the partners maintained frequent monthly conference calls to monitor progress. This project management approach functioned well, training WAF staff to use it at the same time.

A designated web portal was also developed to enable the safe and swift transfer of very large modeling data files so that HWA experts in Australia could check modeling progress and discuss problems using the same data sets. The web portal was also used to store common WOP files for use by all authorized staff.<sup>12</sup> The Asian Development Bank is very enthusiastic about this approach and is encouraging utilities to use such technologies.<sup>13</sup>

## Application and diffusion of newly acquired capacity

Building in-house capacity remains a top priority for WAF. This WOP has allowed the mentee to strengthen the knowledge and know-how of key employees on a variety of themes. Once these staff had gained new knowledge and effectively applied it in their daily work, they started to disseminate new methods internally by training other colleagues.

The trainees made significant efforts to assimilate complex expertise (e.g. water modeling). The mentor's trainers needed appropriate pedagogical skills in order to help them in that process. This is not always the case in WOPs given that trainers are water professionals who may have little training experience. In this case, alternating theory and practice, namely classroom and on-the-job training, allowed the trainees to get necessary background information and operationalize it over a short period of time. This raises the importance of selecting the right experts to take part in capacity-building activities, both for 'learners' and 'teachers'.

Although the partners did not assess formally the initial in-house capacity, it is reasonable to say that overall the partnership has helped the mentee to build a large pool of experts on different themes, reducing dependency on consultants. The WOP has offered a high level of specialist support through occasional onsite training and visits, and via remote communications.

## Alignment with ongoing priorities

The total budget for this WOP was very small in comparison with the investments made by the mentee. A key lesson learned is that if the initial analysis of needs serves to align WOP activities with ongoing operational interventions and priorities of the mentee, there is greater buy-in and limited funding can go far. Management and political buy-in on the mentee side is essential to access the funding necessary to implement changes. For instance, the partners in this WOP decided to put a strong focus on the reduction of non-revenue water, which was backed up by large investments to upgrade the infrastructure and replace bulk and household meters. The partners also collaborated on investment planning and used business cases to make more strategic decision. Capital investment and capacity-building efforts are not always sufficient if made on their own; combined they can have a resounding impact.



Levelling works at Waimanu water intake, Fiji Islands

# CHALLENGES

This partnership has not faced major challenges during implementation. However, some aspects of the WOP may have generated some obstacles. First, the partners decided to address six different thematic areas in only one year. The donor exceptionally accepted knowing that conditions were favourable for implementation. Although most planned objectives were achieved (and more), the ambitious scope of this partnership has implied less intensive activities on some improvement tracks. This created some frustration as some training activities were being put aside temporarily for some improvement tracks, mostly due to time or budget constraints. This may have been disappointing for some units. Finding the right scope and objectives for the WOP is a difficult balancing act.

Second, the recommendations and work plan may have overstated the capacity of the mentee. In other words, on paper the mentee can have the appropriate resources to achieve similar results as the mentor but the reality of implementation can prove different due to other factors (e.g. staff capacity, context). Similarly, an action too focused on technical corrective actions rather than on investing in staff capacity has the potential effect of weakening appropriation of the change process by the mentee. This must be taken into consideration by top management during the implementation. Finally, the reliance on a few individuals to manage the activities of an improvement track can be risky in the case that staff member leaves the company as happened with the wastewater improvement track of this WOP. It is difficult to anticipate such an event, but the partners could prevent this by involving several managers in the implementation of all activities.

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