Integrated Water Resource Management
Demonstration Project

Ridge to Reef:
Protecting Water Quality from Source to Sea in the

Federated States of Micronesia

Federated States of Micronesia

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Country: **Federated Sates of Micronesia (FSM)**

Title: **Ridge to Reef: protecting water quality from source to sea in the FSM**

A. Brief summary of Project

Overall Objective: Sustainable Integrated Water and Wastewater Management in the Federated State of Micronesia

Project Purpose: Improved drinking water quality and a significant reduction in pollutants entering fresh and marine waters around Pohnpei and Chuuk States.

Components: (C1) Watershed protection and improvement; (C2) Protecting Fresh and Marine Water Quality (including bio-gas demonstration); (C3) Water Safety Planning; (C4) Policy Support.

The project will address pollution through a ridge to reef approach through further supporting and expanding ongoing activities in watershed management such as fencing of protected watershed reserve areas, working with farming communities to 'grow-low' sakau on minimal slopes to reduce soil erosion and rapid run-off and the movement of sediment and agricultural pollutants into the streams and coastal waters. Working with shoreline communities pollutant surveys will be conducted to improve water quality monitoring activities with EPA, and to work with communities to identify, and then reduce land based pollution sources. Mitigation effects to consider with communities include dry-litter pig pens, further development of existing sanitation and sewage systems, and piloting bio-gas generation for poorer communities. Working with the Pohnpei Utilities Corporation and the ADB the project will support and assist in the development of a Water Safety Plan for Kolonia and a Harbour Water Quality and Management Plan. Policy support and development will be provided through the EU IWRM National Planning Programme co-financing support.

B. Executing Agencies

The two lead agencies will be the:

1. Department of Transportation, Communication, and Infrastructure (DTC&I); and
2. Pohnpei Utilities Corporation (PUC)

Other agencies involved in the implementation will be

1. Conservation Society of Pohnpei
2. Pohnpei Environmental Protection Agency (EPA)
3. Department of Land (Pohnpei)
4. Local Government (Sokehs, Kitti, Madolehnimw, Uh, Nett and Kolonia)

C. Cost of Project

GEF Funding: US$500,000 **Co-Funding:** US$8,853,836

D. Linkage to GEF Criteria

Within the GEF Operational Strategy for International Waters this project tackles water and environmental problems using an IWRM approach across GEF Strategic Programme III: Balancing overuse and conflicting uses of water resources in transboundary surface and groundwater basins (*with a specific focus on SIDS to protect community surface and groundwater supplies while reducing sewage releases*).

The geographical nature of small island developing states (SIDS) allows IWRM approaches to rapidly demonstrate the multiple benefits of tackling water resource management in an institutionally horizontal manner, whilst applying a ridge to reef approach, tackling technical and socio-economic issues with communities and civil society at large to demonstrate equity, efficiency and environmental sustainability.

The project will also tackle, through IWRM approaches, many of the issues under GEF Strategic Programmes I and II through identifying and understanding multiple stresses on fragile coastal environments and linking these to freshwater and land management, especially upstream practices; IWRM will contribute to improving coastal and marine fishstocks and biodiversity. IWRM approaches will include methods to reduce economic and ecologic dead-zones of oxygen deficient water as a result of watershed mis-management, agricultural and industrial pollution and human and animal sewage waste

The project consists of five main components:

Component 1 – Watershed protection and improvement

Component 2 – Protecting Fresh and Marine Water Quality (including bio-gas demonstration)

Component 3 – Water Safety Planning

Component 4 – Policy Support

E. Linkage to National Priorities and Programmes

Under the FSM IDP (Infrastructure Development Plan) for FY 2004 to FY 2023 water development and management was considered as a top priority. Surface Water and Ground Water management is crucial in terms of supplying a sustainable water resource to the people of Micronesia facing an increasing population and wider economic development. Numerous consultations across FSM all reiterate the problems associated with poor water quality (such as the FSM/UN Water Resource Management Assessment and Development Project).

F. G. Name and Post of Government Representative endorsing the Demonstration Activity:

1. Mr. Marion Henry

Assistant Secretary

Division of Resource Management & Development

Department of Economic Affairs

2. Mr. Philip Komor

Assistant Secretary

Department of Transport, Communications and Infrastructure

G. Project Background and Context

The Federated States of Micronesia (FSM) is a grouping of 607 small islands in the Western Pacific about 4000 km southwest of Hawaii, lying just above the Equator (Fig. 1). FSM comprises what is known as the Eastern and Western Caroline Islands. While the country's total land area amounts to only 700 km^2, it occupies more than one million square miles of the Pacific Ocean, and ranges 2700 km from East (Kosrae) to West (Yap).

FSM consists of four separate states: Chuuk; Pohnpei; Yap and Kosrae. Chuuk State has a total land area of 127 km^2 and includes seven major island groups. Pohnpei State has 344 km^2 of land area, of which 98% is accounted for by Pohnpei island, the largest in FSM. Yap State is made up of 4 large islands, 7 small islands and 134 atolls, with a total land area of 120 km^2. Kosrae is essentially one high island of 109 km^2.

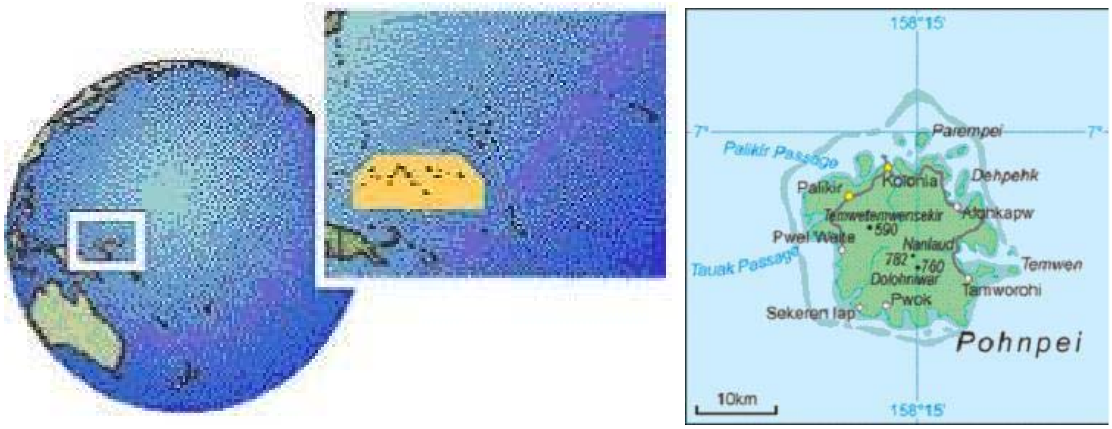


Figure 1: Location of the FSM in the Pacific Ocean and map of Pohnpei

The FSM IWRM Diagnostic Report identified two key issues of concern FSM:

1) Poor sanitation systems and practices, leading to ground, surface and marine waters contamination; and,

2) Deforestation of the watersheds leading to sedimentation within the lagoons. As forests are cleared for cultivating *sakau* (*Piper methysticum*) as a cash crop, creating employment and important export revenue, the cleared forests allow the encroachment of invasive plant species. Intense rainfall causes the loss of vital topsoil, creating high sediment loads in rivers and streams which silt up mature mangroves and lagoons, covering coral reefs in fine sediment.

The FSM hotspot analysis identified the island of Pohnpei as being the major geographic hotspot for both of these issues, but noted that there is a need to ensure lessons and successful approaches are shared across other States of FSM. In particular Chuuk, with a high population density and small land area is vulnerable to water pollution issues.

Pohnpei is a steep and mountainous volcanic island. Vegetation is mainly upland forest (56%) predominantly in the interior. The coastal areas and lower slopes are characterized by agro-forest (33%) and secondary vegetation (5%). Agro-forestry has been expanding rapidly in the last decades, replacing forest and secondary vegetation. A barrier reef and a lagoon surround the island, with extensive mature mangrove forest development around most of the shoreline. The native forests of Pohnpei contain an astonishing variety of plants and animals, including 767 plant species, 111 of which are endemic to Pohnpei. Upland forests are vital to preserving water quality and in maintaining the landscape of Pohnpei.

The state of Chuuk is the most populated state in FSM. It is made up of 5 regions namely the Nomwunweito, Halls, Pattiw, Mortlocks and Chuuk Lagoon and has a population density of 422 per km^2 (Chuuk Census, 2002), slightly higher than the Netherlands. Chuuk makes up half of the total FSM population.

An IWRM approach to resolving the two issues in the IWRM diagnostic report is to utilise a “ridge to reef” management approach that promotes integration in the following areas:

1. Integration between different agencies so that government departments and management agencies (e.g. public utilities) are working together to achieve an improvement in surface and ground water quality.

2. Integration between local community and management agencies to achieve an improvement in surface and ground water quality.

3. Integration between different science disciplines (e.g. hydrology and marine ecology) to provide data to managers working towards an improvement in surface and ground water quality.

4. Spatial integration within the catchment/watershed. A recognition that different management actions occur in different places within a watershed, it cannot be treated as a single unit but recognizes the differences in different parts of the watershed. This is also concerned with the interaction between the land and coastal areas.

By taking an integrated approach to improving water quality the problem becomes solvable, whereas by having disjointed management by different agencies and with different levels of scientific backing the present problems with ground and surface water quality are likely to remain the same.

In SIDS the majority of the population dwells on and earns a living from the coast. This concentrates pollutants and other environmental degradation along the coastal strip, the estuarine environment and inshore marine areas. As experienced by other SIDS, the small and fragile ecosystem nature of the islands of FSM has resulted in low ecological resilience to pollutants and changing land-use practices. This is of immediate concern to countries that are endowed with naturally rich terrestrial, coastal and marine biodiversity.

Principal amongst these areas is the loss of biodiversity, demonstrated by the commitment of the Micronesian Countries to the GEF funded Micronesian Challenge. This IWRM Demonstration project would support burgeoning Micronesian Challenge activities by feeding information and lessons learned into appropriate networks, especially by sharing lessons between FSM States and then on to other PIC's involved in this IWRM project. Possible funding options for long term protection of near shore marine and forest resources are options which many PIC countries are considering within their IWRM Demonstration Projects and this project will contribute and learn from that endemic and new regional knowledge. Embedded within project components will be community driven development approaches to ensure sustainable interventions are implemented and continued after project completion – embedding approaches in communities and State and National level institutions.

Furthermore, the FSM, along with Fiji, Palau, the Solomon Islands and Vanuatu are all involved in this regional IWRM project, as well as other initiatives within the region. As countries which border the 'Coral Triangle'[1] they are working together to help preserve tuna and coral ecosystems within a habitat protection and poverty reduction framework. Waste from coastal cities and harbours causes pollution in the coastal water environment and also the wider marine ecosystems in which they are eventually discharged. Ocean currents along the coasts on which human development occurs carry pollution through deeper waters, affecting neighbouring islands (often neighbouring countries in the Pacific) and further to the continental shelves. The impact of this pollution can cause public health hazards, destroy breeding grounds of coastal and marine fishes and have serious negative effects on biodiversity. The full impacts of these pollutants are not well known[2]. What is clear is that the use of agricultural fertilisers, increasing livestock numbers, increasing coastal dwellings and human sewage all impact the nitrogen cycle, increasing the loading of pollutants into coastal waters and creating marine 'dead zones' where oxygen is depleted and water quality is severely restricted.

[1] The Coral Triangle Initiative is an area of ocean spanning Malaysia, Indonesia, The Philippines, Papua New Guinea, the Solomon Islands, Fiji, Northern Australia and other countries of Micronesia, covering an area of 5.7 million square kilometers.

[2] The impact of land based pollution is most often visually seen and therefore understood in coastal and shallow water areas. However, the area of ocean comprising the Coral Triangle contains 75% of all the coral species known to science, more than 3,000 species of reef fish and commercially important pelagic species, six of the seven species of turtle, migrating populations of whale sharks and manta rays and a number of marine mammals, the effects on which land based pollution is not well known (*WWF – The Coral Triangle – The centre of marine biodiversity*)

A number of on-going activities on Pohnpei and pipeline projects set the scene and identify possible entry points for this GEF funded IWRM project.

Under the Omnibus Infrastructure Development Project Loan[3], the Asian Development Bank seeks too:

1. Improved public health through enhanced quality and access to potable water for Kosrae and Yap;
2. Enhanced public health and environmental quality and ambient water quality through provision of wastewater infrastructure for Pohnpei;
3. Support for economic growth and environmental improvements in power generation and distribution and environmental remediation for the power station in Chuuk.

The Project also aims to advance private sector development by providing improved infrastructure and an enhanced business environment. Of particular interest to this demonstration project is the work planned for Pohnpei which includes:

- Installation of new sewers
- Rehabilitation of the existing sewer network including lift stations
- Expansion of the sewerage system to Sokehs district (450 new connections)
- Design, construction and operation of a secondary wastewater treatment plant with a capacity of 1.2 million gallons per day and constructed wetlands for tertiary treatment
- An inflow and infiltration study

The project also intends to complement infrastructure inputs with a sanitation and hygiene training and awareness program. This will include government staff and community training on individual sanitation systems, as well as education and awareness programs

H. Project Objectives and Activities

Pacific communities retain considerable traditional knowledge but are often an under utilized project resource as ultimate stewards of the environment. This projects aims to empower communities through direct involvement in refining project design during the first 6-12 months of the project, and then through active engagement as implementers of many of the activities.

The range and diversity of projects going on in FSM will result in some having positive and others having negative impacts on water resources, water quality and marine waters. There is often little hard data produced at the end of these projects. This reduces their impact and the ability for others to build on successful approaches as a point of entry for future interventions and investments. Collaboration between Government and project interventions, between projects, and between the communities involved and the 'projects' needs to be genuine – entailing both reciprocation and cooperation to help build solid datasets and permanent collaboration.

Tackling a number of issues along the ridge to reef water transect, the project will demonstrate IWRM principles through promoting integration of freshwater, groundwater, marine resource management and public health. This provides an ideal opportunity for promoting integration between agencies currently managing water resources and local communities.

This IWRM project takes a programmatic approach, dovetailing into other state, national and regional initiatives to ensure on-the-ground interventions have impact. Driven by local community involvement, the project aims to improve water quality and promote *Sustainable Integrated Water and Wastewater*

[3] Loans No.2099 and No. 2100

Management in the Federated State of Micronesia (using a ridge to reef approach) through five different components described below.

- ***Component 1: Watershed Protection and Improvement***

Deforestation of the islands watersheds is a major concern in the FSM. Pohnpei's native forests have been reduced by two thirds in the last two decades due to expanding population pressure and general economic growth. Degradation of watersheds may damage future economic growth due to the potential impact on tourism, fisheries, agriculture and aquaculture practices. Approaching the problem in a holistic manner now will allow key lessons to be learned and sustainable practices identified which can be replicated in the other States as wider economic growth continues. In the mid-1980's deforestation of the interior of Pohnpei and pollution of the watershed resulted in the creation of a 5,100 ha Watershed Forest Reserve (WFR) (Figure 2). When survey teams tried to mark out the boundaries of the reserves they were threatened by angry villagers. The Government reversed the approach to formalise boundaries of the WFR, and deforestation, largely to plant *sakau* continued. The intense rainstorms have little impact on the heavily vegetated steep slopes of Pohnpei. However, once the slopes are cleared for growing *sakau* and bare soil is exposed rapid soil erosion occurs during high rainfall events. Furthermore, mis-management of the soils reduces the fertility of these cleared areas, as the most productive soils are found on the steeper slopes on Pohnpei.

In 2002 the Conservation Society of Pohnpei (CSP) was supported by UNDP and State Government to undertake consultations to work with communities in demarcating the Watershed Forest Reserve in the Uh and Madolenihmw municipalities. At present the Watershed Forest Reserve covers around 20% of Pohnpei Island. CSP are currently planning to expand the demarcation of the WSR to the Nett municipality under a new project. The project aims to:

1. survey, demarcate and delineate the Watershed Forest Reserve in Nett municipality and transfer the management of the area to community members;
2. continue and improve forest management and enforcement by implementing an improved forest monitoring process;
3. enhance the existing outreach and education programme with stewardship programs that build support for management and enforcement of the Watershed Forest Reserve.

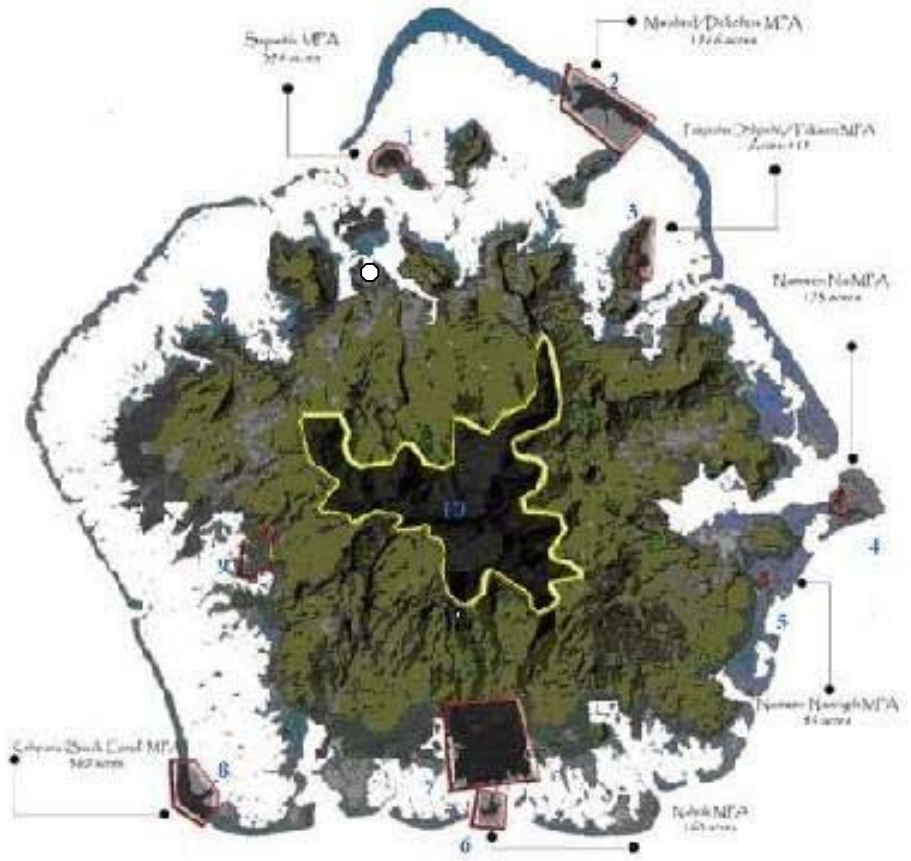
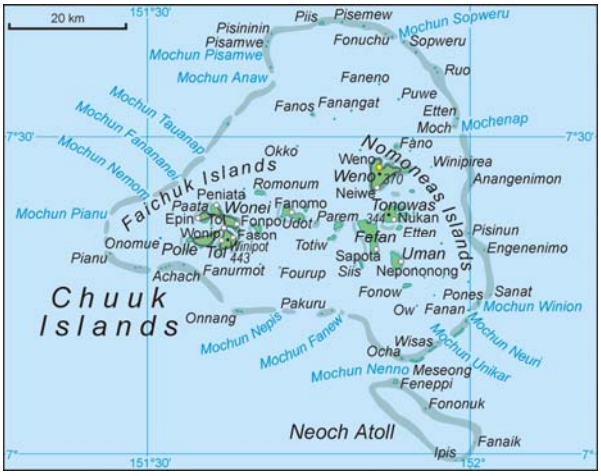


Figure 2: Protected Areas on Pohnpei

Funded through the Micronesian Conservation Trust, a re-granting agency recently established in Pohnpei, the CSP are also implementing a project which focuses on creating alternative income sources for communities based within the Watershed Forest Reserve Area[4]. This includes promotion of lowland *sakau* cultivation and small-scale market garden ventures to reduce deforestation and limit bare soil areas on steep slopes. The aim of this is to provide income for communities, whilst maintaining biodiversity, preventing aggressive non-native species encroaching into de-forested areas, and reducing rapid erosion events and sedimentation of coastal waters. The lessons learned from the "grow low" project and integrated watershed management in Pohnpei need extending to other states such as Chuuk which face mounting water quality problems. Chuuk's geography of lower flatland agriculture means that different approaches may need to be used in Chuuk to tackle water management issues. Lessons will be learned from and shared with Kosrae which has a unique watershed situation.

[4] This project is funded by the GEF Micronesia Small Grants Programme. The Micronesia Conservation Trust is the host organisation for the GEF Programme.

A key activity in this component of work is to assist CSP in the development of how payments for ecosystem services (PES) can be used as a long-term revenue stream for the Watershed Reserve Area on Pohnpei. In recent times, PES schemes have emerged as an innovative option to provide incentives for sustainable ecosystem management. PES schemes require the valuation of selected ecosystem services, the identification of beneficiaries and providers of the services, and the set up of a payment scheme that regulates the transfer of payments from beneficiaries to providers in return for maintaining the supply of the ecosystem service[5]. The major benefit from PES schemes is that they can provide a long-term flow of funds necessary to protect certain ecosystem services[6].



In Chuuk there has not been the same pressure to move *sakau* cultivation into the upland, inland areas. Hence the transfer to Chuuk of lessons learned from the watershed protection programme on Pohnpei is more likely to be around community engagement and implementation strategies than a direct transfer of "grow low" principles. Of particular concern in Chuuk is groundwater quality. A recent ADB water and sanitation project on Weno (an island in Chuuk Lagoon) drilled 16 water supply wells of which only 2 are still functional. The remaining 14 have been shut down due to contamination. ADB are currently investigating reactivating the wells. As part of the watershed protection and improvement project this component will work with local communities to protect the groundwater recharge zones in order to improve the groundwater quality on Weno and to prevent future deterioration of the water in the wells.

Fig 3: Chuuk Lagoon

In most parts of FSM the underground water sources potentially have naturally high iron content. The Environment Protection Agency (EPA) are responsible for monitoring water quality, both that supplied through the Pohnpei Utilities Corporation (PUC) reticulated system, and water extracted from groundwater. Based on the recent HYCOS project scoping mission, there appears to be an acute need for hydrological data collection in FSM. Few skills in hydrological sciences are available in National or State Government. The HYCOS project will be proactive in the FSM with the supply of a database, instrumentation, equipment and training, enabling FSM to have control over their data collection, archiving, analysis and reporting to improve decision making and water resource management.

[5] Environmental Economics Toolkit: Analysing the Economic costs of Land Degradation & The Benefits of Sustainable Land Management. UNDP-GEF. www.gsu.co.za

[6] Significant consultation needs to be taken with communities as active participants in projects planning to introduce PES schemes. Where communities are already poor and disposable funds are limited or unavailable, PES schemes may require significant national support and subsidisation with private sector involvement before they become self-funding mechanisms.

IWRM Component 1 Activities:

A) Facilitating links between existing and pipeline projects to ensure lessons are learned and mainstreamed into current and future practices for Pohnpei and recommendations made to other States. This will include supporting CSP in community engagement and ensuring that awareness of the HYCOS project is raised and communities are educated in the need for hydrological data and the relevance of this information to watershed protection and wider water management issues. This will include supporting links between coastal and forest communities following the ridge to reef concept so that community awareness is raised on sedimentation issues in the coastal fringe and the impact upland development has on their livelihoods, supporting both sustainable forest and coastal waters management.

B) Development of payments for ecosystem services (PES) as a revenue stream to ensure the long-term sustainability of the Watershed Forest Reserve Area on Pohnpei. This will include support in valuing forest ecosystem services and in working with stakeholders and community groups to ensure a workable PES scheme can be implemented. This activity will work with CSP to develop PES concepts to a workable demonstration on Pohnpei and lessons transferred to Chuuk by the end of the project.

C) Initiating a Watershed Protection and Improvement project in Chuuk State. This will start with a community engagement process to identify the key issues around water quality for islands in Chuuk Lagoon (the main population centre). An approach that focuses on the integration between surface and groundwater will be used to design effective actions to tackle the water quality issues identified through the community and stakeholder engagement.

D) Support ongoing initiatives, including the Protecting Watershed Biodiversity project, HYCOS and ADB infrastructure projects to improve the water quality of the Nanpil river. This will include endemic revegetation of clearings following eradication of invasive species. Other elements could include review of land use and planning procedures to ensure national legislation supports watershed protection and the safeguard of river/stream water quality for ecosystem health. Activities could also involve the development of community indicator sheets for 'healthy stream' species to further support CSP's activities with community forest rangers and municipal police officers.

Component 1: Local to Global Benefits

- Component 1 activities will link with existing projects on-going on Pohnpei, as well as linking with NGOs across FSM to ensure that synergies and opportunities for sustaining environmental benefits are realised.
- The cross cutting nature of watershed management works to improve land management, fresh and marine water quality, community health and socio-economic well-being, and biodiversity.
- Close consultation with relevant national institutions is integral to project success. This project has and will continue to make every effort to consult widely and closely with national level institutions and existing approaches.
- Communities are a central part to this project – the project will not view communities as homogeneous units but will ensure the different interests of community location, gender, socio-economic standing, livelihoods and other locally relevant criteria are taken into account.
- The socio-economic elements of this project are crucial to project success and sustainability. A key element of the approach will be the inclusion of relevant socio-economic experience on the project team through involvement with other local projects.

- *Component 2: Protecting Fresh and Marine Water Quality (including bio-gas demonstration)*

As identified in the IWRM Diagnostic Report, water quality and the resulting impacts on health are major concerns for FSM. In April 2000, an outbreak of cholera affected approximately 3,500 persons and caused 20 deaths on Pohnpei. The outbreak was caused by poor waste water control.

The four main urban centers of FSM are on a mainline sewer system. Outside the urban centres the population relies on different forms of septic tank systems. Many of the septic tanks are substandard; an EPA study on Pohnpei has shown that over 2000 homes exist with either no or substandard sanitary facilities. Pohnpei has one working sewage treatment plant located in Kolonia with over 500 homes connected via the sewer network. This is a trickling bed filter system with the treated discharge going directly into Sokehs Harbour (Kingston, 2004). However, the existing wastewater treatment plant operates at or near full capacity, is at the end of its original engineered lifespan, and is difficult to maintain. The location of the plant requires significant lift pumping of effluent and this prevents the connection of certain low-lying areas to the mainline sewerage network. Sewerage system leaks and overflows due to the entry of rainwater during heavy rains results in raw sewage flows into the environment, increasing the risk of human exposure to infectious diseases and poses a significant threat to the fresh and marine water environments. The area due for sewerage expansion under the ADB Omnibus Infrastructure Development Loan suffers from poor environmental living conditions due to lack of adequate sanitation, exacerbated by rainfall and geological conditions that restrict the correct functioning of individual household systems.

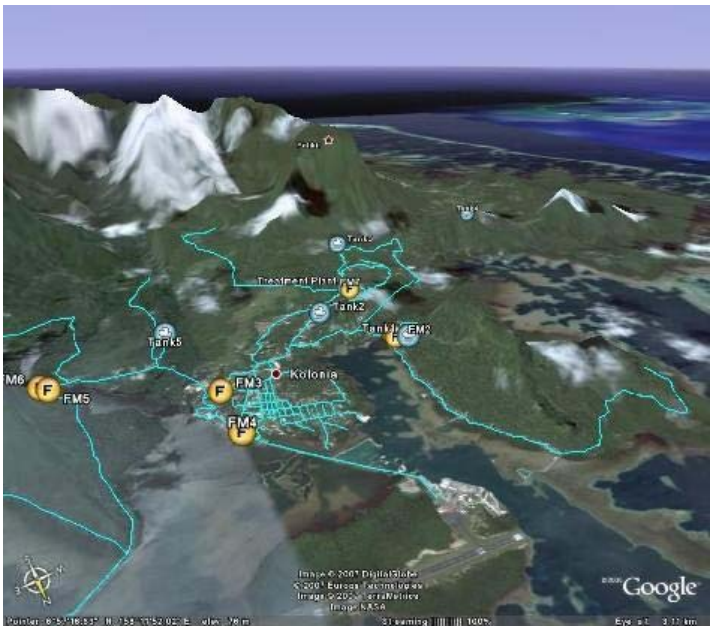


Fig 4: Kolonia Harbour and Reticulated Water and Sewage System

There are also possible constraints in term of the total volume of freshwater available due to low groundwater recharge resulting in saltwater intrusion during drought periods. Throughout FSM, many surface and groundwater systems supply sufficient volumes of water, but suffer for inadequate water treatment practices. Sound technical and appropriate design is vital for these systems in the FSM.

In the majority of Pacific Island Countries, as the population of animals has increased public pressure has forced farmers to move from a system of free ranging animals to one where animals are penned and waste is concentrated in and around specific areas[7]. If livestock waste is not collected or managed it may lead to human health risks including zoonotic diseases (such as leptospirosis) and the loss of potential nutrients

[7] SPC/ACIAR. 2001. Project Document. ACIAR Project No. LWR2/2001/038: *Management of animal waste to improve the productivity of Pacific farming systems.* Secretariat of the Pacific Community, Suva, Fiji.

and energy such as biogas. Some countries have high livestock densities and as a result livestock waste has become an important source of pollution when not properly managed or treated.

Studies along the Coral Coast in Sigatoka in Fiji have revealed that pig waste is one of the root causes of high nutrient (nitrates and phosphate) levels. A study conducted by the University of the South Pacific estimated that hotel sewage contributed around 20 percent of the nutrients entering the sea. Neighbouring community wastes were responsible for as much as 45 percent along the Coral Coast in Sigatoka (Tanner and Gold 2004). One surprising element of this research was that piggeries and pig pen areas were responsible for most of the remaining sewage entering the sea.

Pig Pens with no effluent collection

Water bodies need to be protected from the many pressures and contaminants created by increasing human and livestock populations. Certain districts of Pohnpei Island, including around Kolonia (Sokehs municipality in particular), contain dwellings immediately on the shore or in high tide areas, especially in ancient mangrove areas. Protecting these areas is important as they provide natural shelter and breeding grounds for a variety of marine life and offer storm surge and natural coastal protection. Similarly, communities in Chuuk State rely heavily on the marine fringe for agricultural production which impinges on marine water quality.

These areas are currently experiencing environmental stress due to increasing human and animal populations, specifically pigs. Pollution from pig pens flows into the living areas and directly into the sea. Existing sewage systems are due to be expanded in the area under the Omnibus Infrastructure Project, but at present pit latrines and community agreed 'areas' are used as toilets. In some places people have settled on top of former landfill areas which are directly next to the sea.

Solid Waste Pollution around Kolonia Harbour (Sokehs Island)

To combat the pollution problems associated with densely populated coastal fringe communities and livestock pollution a number of activities are proposed.

IWRM Component 2 Activities:

A) Working with communities in selected project areas there is a need to conduct an assessment of pollution sources to determine the main pathogen and nutrient pathways, including from pig pens. This will involve dovetailing with existing community consultations where appropriate and mobilizing data from previous studies (if available). Support will also be given to EPA in their existing water quality monitoring program to assess the impact of any changes in water quality as a

result of different pig-rearing approaches. This activity will initially be based on Pohnpei but start to be transferred to Chuuk in year 3 of the project.

B) Mitigating the pollution sources identified in Component 2A (above). Working with communities this will include assessing the most applicable options to reduce pollution, building on existing studies performed by the ADB prior to the Omnibus Infrastructure Project. This demonstration project will therefore work to develop on-the-ground interventions with communities and support the ADB project in this respect. The location of these on-the-ground mitigation demonstrations will be determined through working with community groups to identify key issues. It is envisaged that the work will be split between Pohnpei and Chuuk. The aim of this component is to turn animal waste into a positive benefit rather than a pollutant. Specific areas where this project will focus include:

I. Portable Dry-Litter Pig Pens – successfully introduced in American Samoa in 2002. Dry-Litter Pig Pens are easy to install, and help to recycle plant residues by transforming them into nutrient-rich compost. Pigs are provided with a bedding of compostable material such as yard trimmings, crop residues, or shredded municipal green-waste from tree trimming. The bedding helps to absorb pig waste liquids, while the action of the pigs' hooves and rooting helps to break down the solid pig waste and mix it with the bedding. No wash water is used. Bedding material is added on a regular basis to keep the animals in a relatively clean environment[8]. The compost can be used for growing vegetables/fruit as pig feed[9], vegetable and market garden produce for self-sufficiency and market. Communities involved in the project will drive the development of changing pig rearing practices and compost production following extensive consultation and building on previous experiences (with the EPA). Other pig-pen options will also be considered, including dry litter systems and solid waste separation.

II. Further development of the sanitation and sewage systems will be conducted by the ADB around the Sokehs municipality. Support will be provided to the project in terms of community engagement, alternative toilet design where future connections to the new sewage mainline are not planned.

III. Bio-gas generation – working with communities and the Conservation Society of Pohnpei in order to fully understand demand for the technology a demonstration bio-gas generator will be constructed, and replicated where demand exists in both Pohnpei and transferred to Chuuk. The technique involves the washing down of pig pens into separating holding tanks where the wastewater is channeled into methane generating tanks. Training is required on how to maintain maximum production (e.g. too much liquid slows down composting). The wastewater can then be used as a fertilizer for crops grown to feed the pigs, or as a fertilizer for other market garden crops such as fruit and vegetables. The methane gas produced is an effective cooking fuel[10]. The introduction of this new technology to Pohnpei will require close consultation with the communities' involved and adequate time to trial different options to allow a new approach to pig rearing and use of the waste as a natural fuel. This will include the need to establish Community Committees and a possible Animal Wastewater Management Committee at the National and possible State level.

[8] Fukomoto, G. and Wimberley, J. (2004). *A Portable Dry-Litter Pig Pen*. Animal Waste Management.

[9] Pig feed is imported and therefore relatively expensive, representing the highest value input to pig rearing in Pohnpei.

[10] PICs almost exclusively rely on oil based fuel for their energy needs. It is estimated that each US$10 a barrel rise in the world price of oil directly reduces national income in FSM by more than 4%. Levantis, T. *et al*., *The Consequences of Surging Oil Prices for Pacific Island Countries*. AusAID.

Component 2: Local to Global Benefits

- Component 2 activities will link with existing projects on-going on Pohnpei, as well as linking with NGOs across FSM to ensure that synergies and opportunities for sustaining environmental benefits are realized.

- The source of pollution, and impacts of that pollution are across society, stakeholders, and sectors. Using a ridge to reef approach the full impact of pollutants on the environment and the wider impacts on marine water will be better understood.

- Close consultation with relevant national institutions is integral to project success. This project has and will continue to make every effort to consult widely and closely with national level institutions and existing approaches.

- Communities are a central part to this project, especially for this component. They will be encouraged and supported through all stages of the project, including being involved in project clarification and assessment within the first 6-12 months to ensure the project will address community needs.

- The socio-economic elements of this project are crucial to project success and sustainability. A key element of the approach will be the inclusion of relevant socio-economic experience on the project team through involvement with other local projects.

Component 3: Water Safety Planning

The existing problems with water quality will be tackled, in part, by the ADB Omnibus Infrastructure Project due to start in 2008. The major focus of this project is on infrastructure design and construction, although some other activities will be conducted including:

1. Tariff structure setting for cost recovery of operation and maintenance of the new sewage system, and;

2. Training on improved operation and maintenance, including operators receiving US EPA wastewater treatment plant operator certification.

New infrastructure, combined with the introduction of a tariff structure and training for operators will significantly strengthen the Pohnpei Utility Corporation (PUC). However, tariff structures are often difficult to adequately design and introducing them can be a painful experience for those expected to pay for new infrastructure.

The IWRM Project will link with the ADB project and Pohnpei EPA to assist in the development of a Water Safety Plan. A Water Safety Plan (WSP) provides a framework for understanding water supply management principles in a way that can guide the water supply managers and operators in the informed application of these principles to the management of the operation of their supply. A WSP is aimed at risk reduction through identifying weaknesses within the water supply network and the improvements required to reduce or eliminate those risks.

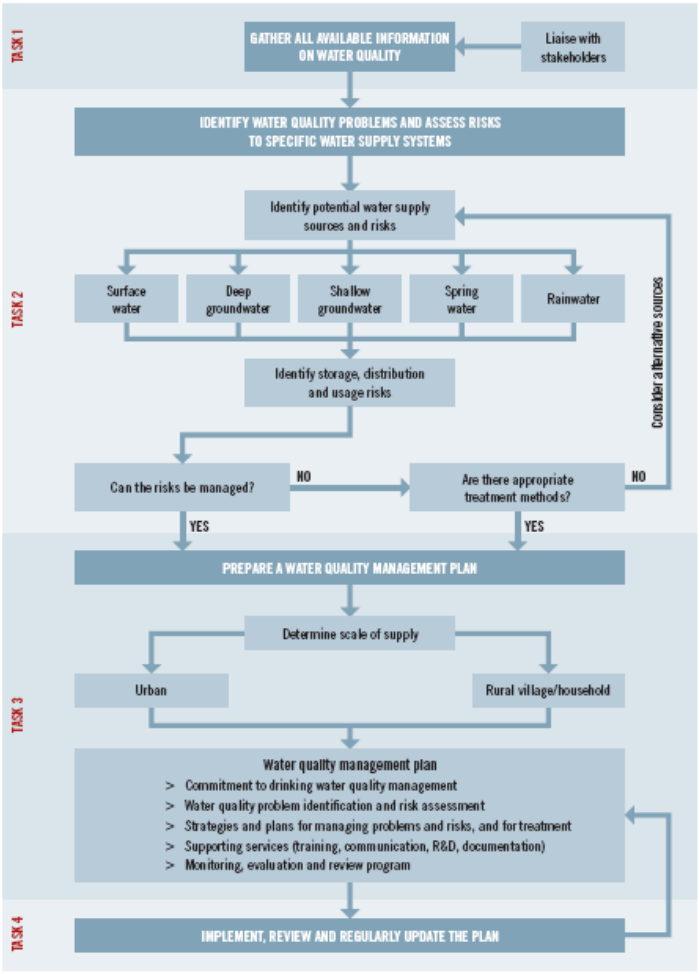


Fig 5: Water safety planning framework (from AusAid, 2007 – Managing for safe water)

IWRM Component 3 Activities:

A) Working with the ADB project and Pohnpei EPA to establish a Water Safety Plan, using current EPA water quality standards. This will include:

- Identification of key stakeholders (including Health and Environment agencies) for establishment (or strengthening) of a drinking water quality monitoring programme;
- Support provided to improve laboratory capacity to maintain a strong drinking water quality monitoring programme;
- Provision of appropriate field test kits to facilitate ongoing monitoring by water suppliers;
- Documentation of Standard procedures for basic laboratory analyses, building on existing EPA activities and approaches
- Development of improvement schedule inspection programmes for Operation and Maintenance.
- Integrated with Component 2 of the project, schools will be invited to take part in project activities where possible, school children will be involved in taking messages back to their communities on the need to protect water quality. Nature Clubs within schools may be something the project could support to instigate behaviour change.

B) Development of a Harbour Water Quality and Management Plan for Kolonia - working with a variety of stakeholders Component C3 of the project will firstly assist in developing and implementing a Water Safety Planning framework, and then takes an innovative approach to tackling a multitude of water pollution problems in an attempt to raise awareness regarding water quality and the links to economic development and pollution.

Kolonia Harbour

Kolonia harbour is an important communications hub for Pohnpei State and the FSM in general. Supporting the other components of the project tackling watershed management and water quality this component will develop a Kolonia Harbour Water Quality and Management Plan. The aim of this component is to provide a baseline of water quality and management issues in the harbour and surrounding area, and to raise awareness on pollution sources, and to provide instruments through existing agencies to reduce pollution and develop a plan to improve the water quality where required. This will involve inclusive stakeholder participation. Activities will include:

- Working Water – ensuring the observance of current regulations and procedures within the harbour, including tourism, commercial, and industrial activities.

- Conduct a number of surveys to identify appropriate species and environmental indicators to determine harbour health. This will also include developing sub-tidal environmental knowledge to match terrestrial knowledge to ensure maintenance of biodiversity and to understand the practical limitations for harbour water quality protection. The communities surrounding the harbour, especially communities living on Sokehs Island will be involved to safeguard their surrounding environment.

- Water Quality and Waste Disposal – monitoring to ensure that biological pollution is kept to a level for the safe harvesting of shellfish and other marine health indicator species/foodstuffs. Linked to watershed management practices, reducing nitrates and phosphates entering the sea as a result of drainage and run-off from agricultural land or the discharge of sewage (both animal and human) will improve the quality of water in the harbour which has clear local to global benefits in reducing pollution entering the wider marine environment[11]. Oil pollution in the harbour will also be monitored. The project will work with contractors under the ABD Omnibus Infrastructure Loan to ensure adequate environmental safeguards are in place during construction of the new wastewater treatment plant and other planned infrastructure.

- Waste management – working with all stakeholders a programme of monthly collections of shoreline litter and other solid waste will be implemented for monitoring the strandline and other areas where solid waste collects (mangrove areas etc).

- Coastal Defence and Sea Level Rise – naturally, there will be a need to 'hold the line' of ocean encroachment around key infrastructure areas. Kolonia Harbour not only is the major port for the island but also the site of Kolonia International Airport. As part of the process in developing a Harbour Management Plan there is a need to recognize and understand potential climate change effects, especially where erosion or accretion takes place. This is important to

[11] Although limited in design, the monitoring of coastal water quality around Alofi town on Niue Island indicated that land-based activities were impacting water quality. Significant increases in the nutrients, nitrate and phosphate were observed in the vicinity of Alofi, in comparison to levels at background sites. Coastal water contamination contributes to the stressing and deterioration of the coastal fishery environment. See: Mosley, L., and Carpenter, C. (2005) *Niue Coastal Water Quality and Groundwater Resources Assessment*. SOPAC Technical Report 372.

understand where protection may be required in the future, where habitat (i.e.: mangroves) can be valued as a natural environmental protection service, and to understand the impacts on the restriction of harbour and lagoon tidal flows.

Component 3 Local to Global Benefits

- Component 3 activities will link with existing projects on-going on Pohnpei, as well as linking with NGOs across FSM and the private sector to ensure that synergies and opportunities for sustaining environmental benefits are realized;

- Water Safety Planning requires the involvement of a wide range of stakeholders to adequately address pollution issues. Improvement in all water quality will have a beneficial impact on both human and environmental health;

- Streamlining – to avoid the factors which contribute to poor water quality across several administrative boundaries and organisations in an effort to reduce transaction costs and poor communications between stakeholders. This may include establishing a form of environmental stewardship group for the harbour.

- *Component 4: IWRM Policy Support*

At the request of FSM, State and National Government officials will have a variety of policy resources available to them for the implementation of integrated water resource management. This will take the form of training courses, documentation, and stakeholder workshops to promote IWRM as a key concept for managing water quantity and quality in FSM.

IWRM Component 4 Activities:

A) Through this project and the EU IWRM National Planning Programme[12] support will be provided for the establishment of the following:

- Policy review teams – to ensure that coastal resources and biodiversity are mainstreamed in other legislation and operating practices. This would strongly support other interventions proposed by the Conservation Society of Pohnpei and the aim of this component is to support existing initiatives and to build on State and National policy experience.

- National support may also include developing nested State IWRM and Integrated Coastal Zone Management (ICZM[13]) approaches within a wider National programme. This would provide a reference point for future Government and donor interventions to allow for a more strategic and coordinated approach within and between States. Activities could include supporting Government to establish an IWRM/ICZM taskforce to ensure inter-sectoral issues and impacts are considered and coordinated.

- Capacity building activities – the regional component of the GEF IWRM project will support all Demonstration Projects across the 14 countries of the Pacific to ensure that lessons are learned and shared between countries and scaling-up and replication approaches are adopted

[12] EU Water Facility Funded Pacific IWRM National Planning Programme due to start in January 2008 and run for three years.

[13] Note that ICZM is used in this project document rather than Integrated Coastal Management (ICM). This is to avoid confusion between Integrated Catchment Management – a common acronym used in watershed and catchment management projects. ICZM is also a globally used term concerned with coastal zone management issues. See OECD, (1997). *Integrated Coastal Zone Management: Review of Progress in Selected OECD Countries*, OECD, Paris, and Sorensen, J., (1993). The International Proliferation of Integrated Coastal Zone Management Efforts. *Ocean and Coastal Management*, 21(1-3): 45-80.

for successful interventions. This can specifically add value to the Micronesian Challenge where required.

- EU IWRM Planning Program – this program can support a range of objectives raised by this IWRM Demonstration Project. This approach will allow immediate follow-on support and study (where needed) of issues raised by the Demonstration Project. For example, economic understanding, support and investigation into the benefits of mangrove protection, the benefits of improving water quality and bio-gas generation. Experience has shown that successful documentation and economic review of approaches highlights the most beneficial activities for policy makers[14]. This project has a unique opportunity to implement actual practice, determine best practice, and justify the approaches direct to policy makers using a variety of support mechanisms.

Component 4 Local to Global Benefits

- Component 4 activities demonstrate the inter-disciplinary nature including the socio-economic drivers of the environmental interventions the project will take forward. This project offers the unique opportunity to provide evidence-based learning directly to policy makers – providing benefits directly to the communities involved and nation-wide, providing a benchmark for future interventions.

End of Project Landscape

At the end of the five year implementation period it is envisaged that FSM will have reduced environmental stress through the following activities:

- Improved watershed management in Pohnpei and Chuuk including the development of a payment for ecosystem services scheme on Pohnpei;
- Demonstrated water pollution mitigation measures such as agricultural waste treatment in a bio-gas plant and other practical stress reduction measures;
- A working water safety plan for Pohnpei;
- A water quality management plan for Kolonia harbour including establishing pollution monitoring and mitigation measures;
- An improved institutional framework and human resource capability to instigate integrated natural resource management over the next 30 years.

It is expected that during the lifetime of this project there will be a significant environmental stress reduction through improvement of water quality entering the lagoons and harbours of Pohnpei and Chuuk. The community involvement in the watershed management and pollution mitigation initiatives will ensure the longer term commitment to continuation of good water quality. The end of project landscape from the first two project components will be improved water quality in the freshwater and lagoon; a sustainable watershed forest reserve on Pohnpei based on a new payment for ecosystem services scheme; working water pollution mitigation measures such as dry litter pig pens and a bio-digestor; and community participation in reducing water pollution to ensure continued uptake of mitigation measures.

[14] It is estimated that Rarotonga, the largest of the Cook Islands by area and population could potentially avoid costs amounting to US$5.7 million per year, or US$2,250 per household. The best estimate of potentially avoidable costs as a % of GDP (yr. 2003) was 3.12%, and the high estimate was 7.41% of GDP. Impacts of watershed pollution included in the study were: healthcare and illness costs (gastroenteritis, diarrhoea, dengue and fish poisoning), costs of household and public water filters, bottled water, household rainwater tanks, mosquito control, loss of lagoon fishstocks, water pipe upgrades, lost tourism revenue. Hajkowicz, S., and Okotai, P. (2005). *An Economic Valuation of Watershed Management in Rarotonga, The Cook Islands*. CSIRO Sustainable Ecosystems.

A second major stress reduction following this project will be achieved through the water safety and water quality management plans for Pohnpei. This will ensure there is adequate planning for emergency and long-term changes in water quality and quantity. It will also set in place mitigation measures to ensure improvements in water quality in Kolonia Harbour. As part of the project the identified agencies will set out a strategy (both plan and budget) to ensure these measures are continued well beyond the life of this project.

A third significant stress reduction following this project will be an increased degree of co-operation and integration between governing agencies and local communities in the area of natural resource management in FSM. This will allow for implementation of new solutions to the upcoming complex problems facing Pacific SIDS using an integrated framework of stakeholders and governing agencies.

Table 1 sets out the activities in the Demonstration Project.

I. Project Management Structure and Accountability

A Project Management Unit (PMU) will be established building on existing capabilities within existing institutions. The PMU will deal with day-to-day management activities, but will also be heavily involved in implementation of the project activities.

PMU staffing needs will be decided by the Water Advisory Group of the FSM. Generic Terms of Reference have been prepared for both a Project Management and Project assistant position for the PMU. These ToR will be tailored by the Advisory Group to fit with the requirements of the project. The host organisation for the PMU will be the Department of Transport, communications and Infrastructure. Based on the identified needs of the project a project assistant may not be required, and the activities could be conducted by existing project staff (i.e.: CSP and others) and by short term local consultancies. Using existing staff in agencies and local NGOs not only supports the NGOs in their existing work programmes, but also helps build and maintain local capacity, rather than solely relying on external consultants from outside of the FSM. Where assistance is required from outside of FSM this will be at the discretion of the PMU, with supporting consultation with the Regional Support PMU based in SOPAC, Suva.

A Project Steering Committee consisting of the following will be established:

- Water Advisory Group members (where the WAG overlaps with the project steering committee members of the WAG will take priority)
- Watershed Steering Committee
- Community Committees
- Animal Wastewater Management Committee
- Project implementation organizations
- Pohnpei Port Authority

Figure 6 shows a proposed project management approach.

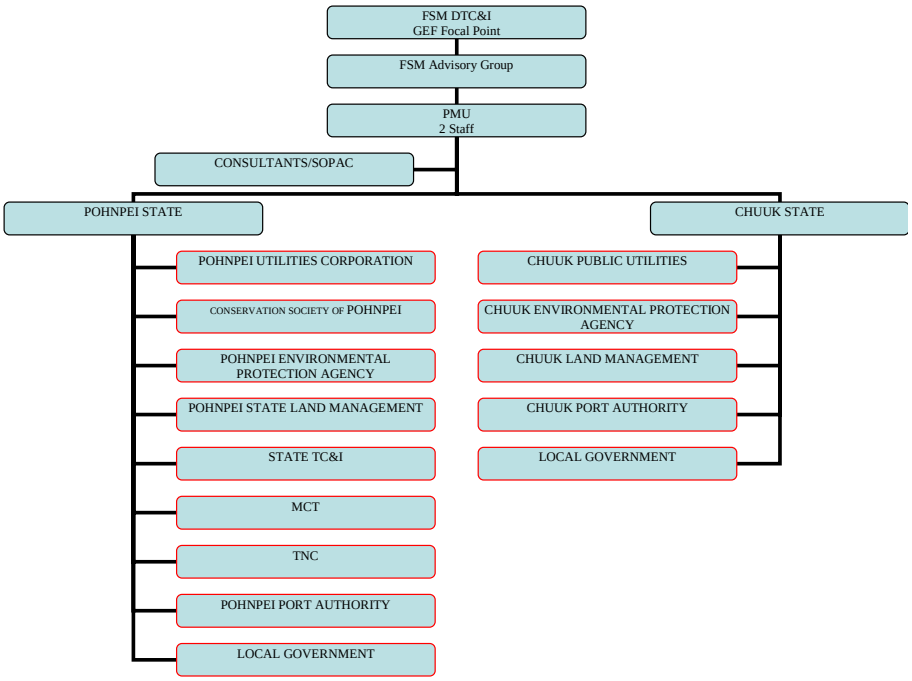


Table 1: Activities and Organisations Involved in Implementation

Project Objective:	***Sustainable Integrated Water and Wastewater Management in the Federated State of Micronesia***					
Project Purpose:	***Improved drinking water quality and a significant reduction in pollutants entering fresh and marine waters around Pohnpei and Chuuk States***					
Component	**Activity**	**Priority & Timing**	**Location**	**Lead Organisation(s)**	**Outputs**	**Indicators**
1: Watershed Protection and Improvement	1A: Supporting community engagement in Pohnpei	High – start Yr 1	Pohnpei with lessons transferred to Chuuk	Conservation Society of Pohnpei (CSP) The Nature Conservancy (TNC)	1.1 Capacity of CSP strengthened 1.2 Community mobilization improved	(1.a) 50% increase in forest wardens by year 5 (1.b) Payment for Eco-system services(PES) introduce into municipalities by year 5 (1.c) Three additional municipalities participate in Watershed Forest Reserve by year 5 (1.d) IWRM principles integrated into basic science curriculum reaching 500 students by year 5
	1B: Developing PES scheme for Pohnpei	High – start Yr 1	Pohnpei	Micronesia Conservation Trust (MCT)	Generation of long-term income for the communities we work	No current scheme exists
	1C: Chuuk State watershed protection	High – start Yr 1	Chuuk	CSP, GATA,		

	project			Chuuk EPA		
	1D: Improving water quality in the Nanpil River	Medium – start Yr 2	Pohnpei	CSP, EPA, TNC	2.1 Capacity of Pohnpei Utilities Corporation Improved 2.2 Hydrology of rivers in four Municipalities improved	Water quality data available from Pohnpei EPA and PUC
2: Protecting fresh & marine water quality	2A: Pollution source assessment and options to reduce pollutants	High – start Yr 1	Pohnpei with transfer to Chuuk later in project	CSP, GATA, Pohnpei EPA Chuck EPA		(2.a.) Water Quality and Quantity Data available in all rivers by year 5 (2.b) 5% reduction in NTU in 2 rivers by year 5 (2.c) Doubling of PUC water testing frequency by year 5
	2B: Pollution mitigation measures including bio-gas generation	Medium – start Yr 2	Split between Pohnpei & Chuuk	CSP, Pohnpei EPA	4.1 Management of pig waste improved 4.2 Bio gas generated	(4.a) 70% of pig waste utilized for bio gas generation in 2 pilot communities (4.b) 70 % reduction in leaching of pig waste into water ways in the 2 pilot communities by year 5

3: Water safety planning	3A: Establish Water Safety Plan for Pohnpei	High – start Yr 1	Pohnpei	CSP, Pohnpei EPA, Health Sector	.1 Water safety palns developed 3.2 Harbour water quality and management plan developed	No water Safety Plan exisits
	3B: Kolonia Harbour Water Quality and Mgmt Plan	Medium – start Yr 2	Pohnpei	Kolonia Port Authority, Pohnpei EPA		Water Quality Data required from EPA, and no comprehensive survey's conducted
4: IWRM Policy support	4A: Policy support activities	Medium – start Yr 3	All FSM	Dept TC&I	4.1 80 % of population has access to safe drinking water (current baseline is 60%) 4.2 Principles of IWRM institutionalized in government policy 4.3 5 % reduction in sedimentation in rivers	(3.a) 5% reduction in sedimentation by year 5 (3.b) Plans adopted by state government and included in water policy and practice by year 5

J. Stakeholders and Beneficiaries

Stakeholder	Relevance to IWRM Project	Role in Project
Local Communities	Primary stakeholders in the project activities and final beneficiaries of interventions	Actively taking part in project interventions
State Environmental Protection Agency (EPA)	Responsible for water quality monitoring and safety	Providing water quality monitoring services
Department of Transport, Communications & Infrastructure	Responsible for managing and assisting in the design of infrastructure investments	Providing overarching support with the ADB Project Management Unit, and for the EU IWRM Policy Planning co-financing project
Micronesia Conservation Trust	Responsible for protecting the environment and providing funds to communities and NGOs	Providing support to project delivery
Conservation Society of Pohnpei	Responsible for conservation work and supporting communities manage the forests and waterways	Expanding watershed reserve area and working with communities
FSM Health	Responsible for Public Health	Providing support to EPA in water quality issues and in promoting the Water Safety Plan
WERI	Responsible for collecting hydrological data and information	Provision of hydrological data
The Nature Conservancy	Responsible for supporting community watershed work	Expanding watershed reserve area and working with communities
Kolonia Port Authority	Responsible for monitoring and managing Port activities.	Working with EPA etc on water quality

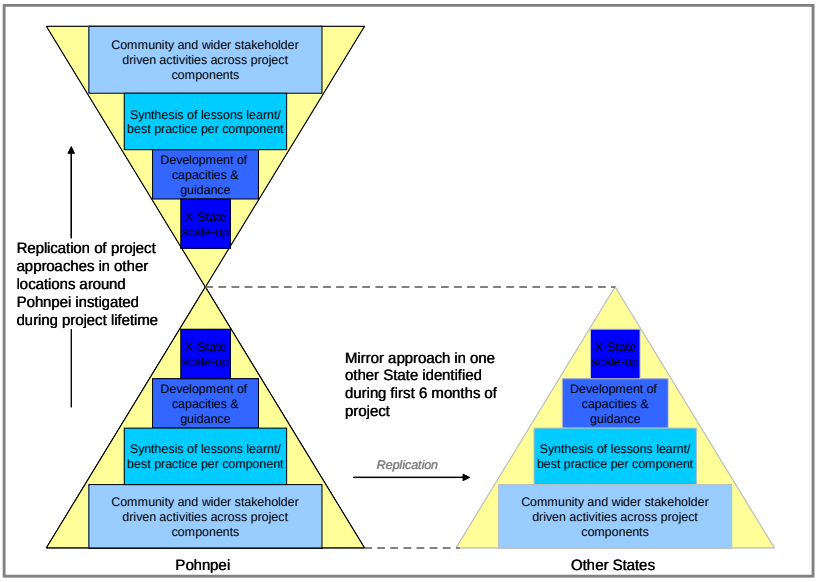
K. Replicability

This project will support initiatives already underway in Pohnpei and will introduce other elements determined with project stakeholders. The project will capture the experiences in terms of project process (for example: engaging with communities), and also the actual impact of the interventions. Through a structured reporting and feedback process key locations for replication will be identified in the hope that, over the 5 years oft his project tangible benefits can be seen and valued so that policy makers are made aware of the need and the benefit of the interventions. It is hoped that communities themselves can take these messages forward to each other and wider society.

Within the first six months of the project, as the project logframe is developed and activities refined with all stakeholders, one other State will be identified for replication activities. It is hoped that, whilst this project will focus on Pohnpei, over the five years timeline similar activities can be started in at least one

other location in Pohnpei, and at one location in one other State – most probably Chuuk provided stakeholders can be identified[15][16].

The wider benefits, and true links from local to National, State wide, region and global will be drawn out of the lessons learned and shared across the 14 countries involved in the project under the Regional Components of the project, supported by the IWRM PMU in Suva.



L. Monitoring and Evaluation Process

The project will support and strengthen existing initiatives and seeks to determine baseline information on ecological, hydrological and socio-economic background and parameters in order to define some initial baselines. This will then be linked to the physical and economic changes caused by this project, and the other initiatives working on Pohnpei in an attempt to provide information for decision-making purposes. Community involvement is critical to the success of the project, and through active involvement serves to provide an effective monitoring approach, feeding in information on what works, and what does not work over the lifetime of the project to allow best practice to be identified, and a range of different approaches to be indentified of use to the other States of FSM, and SIDS in general.

For this project to be successful it must monitoring change over time against a base line set of evidence. As a result of linkages made with existing on-going initiatives some baseline data is already available. Other data will be captured at the beginning of the project (Year 1). Project activities will be refined during the first six months of the project in close consultation with stakeholders. One approach is to ensure that the project includes communities and wider stakeholders as part of a participatory monitoring and evaluation plan. Community level approaches and the impacts of these need to be understood to ensure that the project learns the lessons and shares these up to National level.

Communities will be asked to report (using appropriate mediums) on project process – to ensure ownership of their own actions and understanding of cause and effect. Often, unless the actual impact of negative actions can be seen it is difficult to convey the 'right' message to people. Using technology

[15] Although Kosrae has a unique and active watershed mgmt approach which could link well with the project.

[16] Chuuk State grassroots NGO *Guide and Assist Through Awareness* (GATA) have been working with Chuuk State EPA, supported by The Nature Conservancy to improve community education to protect coastal receiving waters. Chuuk EPA.

support such as RS and GIS images, photo and video media this project will highlight different impacts on the environment, along the ridge to reef transect.

An annual meeting, in which communities will be encouraged to present their own findings will be arranged. Other communities and States will be invited to attend. Standard reporting will follow by the Project Manager. Support fro M&E will be provided by the Regional Support PMU, but also through links to existing projects and tailored support where required (through consultancies).

M. Co-funding

Omnibus Infrastructure Development Project Loan[17], Asian Development Bank

Despite continuous work by the National and State Government of FSM to continuously improve infrastructure, generally across all four states additional support is required. Recent development such as the recent cholera outbreak in Pohnpei due to inadequate water and wastewater infrastructure. Infrastructure deficiencies have threatened human health and the environment, and impeded economic growth.

In Pohnpei the existing wastewater treatment plant operates at or near full capacity, is at the end of its original engineered lifespan, and is difficult to maintain It's location requires significant lift pumping of effluent and this prevents connection of certain low-lying areas to the swerage network. Sewerage system leaks and overflows due to the entry of rainwater during heavy raisn results in raw sewage flows into the environment, increasing the risk of human exposure to infections diseases and poses a significant threat to the fresh and marine water environments. The existing outfall discharges effluent into a narrow channel and degrades water quality. The area due for sewerage expansion suffers from poor environmental living conditions due to lack of adequate sanitation, exacerbated by rainfall and geological conditions that retrcit proper functioning of individual systems.

In Kosrae, despite abundant fresh water resources drinking water is not treated. This seriously affects human health. Furthermore, tap water often display brown discoloration and foul odour, which causes concern to the islands inhabitants and impacts on the developing tourism industry.

In Yap, the water supply systems of municipalities Maap and Rumung are inadequate and do not treat the water, also providing a unreliable service. Several villages remain unserved and rely on rainwater.

The project also intends to complement infrastructure inputs with a sanitation and hygiene training and awareness program. This will include government staff and community training on individual sanitation systems, as well as education and awareness programs

Protecting Watershed Biodiversity on Pohnpei Island, FSM through Improving Community Compliance

The Conservation Society of Pohnpei (CSP) was founded in 1999 by a group of local individuals concerned with the need to preserve Pohnpei's natural heritage while encouraging sustainable development. Over the past eight years we have grown to become one of the region's premier conservation groups, leading the way in Pohnpei's environmental movement through our myriad of partnership work with local communities, government agencies and organizations. We strive to mobilize community participation in resource management, promote conservation policies and laws, and develop successful alternatives to resource exploitation.

In 1987, the Pohnpei Watershed and Mangrove Act (IL-128-87) was created to protect Pohnpei's fragile WFR area. In an effort to create more public awareness and visual boundaries around the reserve, CSP with several partners, started the WFR boundary line survey and delineation. In 2001-2003, a survey team completed the demarcation in U and four sections of Madolenihmw. The survey and demarcation team placed reference points, permanent concrete markers, and signs at all entrance points to the WFR. The visible demarcation of the WFR boundary line has proven to be an effective strategy in lessening encroachers in the watershed area. CSP's terrestrial team has been working with government partners to secure funding to complete the WRF boundary line in the Kitti, Sokehs and Nett municipalities.

Pacific HYCOS

[17] Loans No.2099 and No. 2100)

The Pacific HYCOS is a regional water resources management initiative to improve management and protection of Pacific small island states freshwater resources, through the provision of appropriate water resources management systems to demonstrate sustainable catchment and aquifer management. The Pacific-HYCOS is one of the regional components of the World Hydrological Cycle Observing System (WHYCOS), a World Meteorological Organization (WMO) programme targeting the improvement of basic observation activities, strengthening regional and international cooperation and promoting free exchange of data in the field of hydrology.

The Pacific-HYCOS project, which builds on the NZAID-supported Hydrological Training Programme (2004-2006), aims for each of the participating island nations to:

- attain a common level of ability to assess and monitor the status/trend of their water resources, and to provide the water-related information and hazard warnings needed to support national social and economic development and environmental management;

- have established databases and information archives, maintained to acceptable standards that form the basis for sustained future data capture, information processing and dissemination for informed cross-sectoral decision making;

- improve the capacity to mitigate and plan for climate change and land-use impacts on freshwater resources at the catchment and national level.

The Project focuses on several core activities to be carried out including flood forecasting, water resources assessment in major rivers, water resources databases, drought forecasting, groundwater monitoring and assessment and water quality monitoring and assessment.

Water Demand Management

NZAID has sponsored a SOPAC led Water Demand Management Project in the Pacific. SOPAC and regional partners are helping Pacific countries develop urban water management plans, and to repair and maintain reticulation systems over the long-term. The aim is to enhance capacity for water demand management over the course of the project, involve governments in the development of plans and raise awareness of the benefits of better water management.

SOPAC are coordinating a programme of training and capacity building among Pacific water authorities. This will include developing national water demand management plans, providing public education, and encouraging the development of a regional network of demand managers who can share lessons and experiences. It will also include some basic demand management equipment, including leak detectors and meters.

Water Safety Planning

A Water Safety Planning project is being run across the Pacific. The project is being implemented under the Partnership Initiative on Sustainable Water Management as contribution to the implementation of the Pacific Regional Action Plan. The aim of the project is to promote a comprehensive risk assessment and risk management approach in the Pacific region that encompasses all steps in the water supply, from catchment to consumer, to ensure the access to safe drinking water.

The project has started with case studies initially but replication in other countries will follow. Lead organisations are the South Pacific Applied Geoscience Commission (SOPAC) , the World Health Organisation (WHO) and Institute Of Applied Sciences (IAS) (USP).

EU ACP IWRM National Planning Programme

This project focuses on supporting the develop0ment of IWRM Planning Processes and Water use Efficiency Strategies across the Pacific Island Countries in line with the MDG targets. This will include supporting countries to strengthen and develop legislation, policies, inter-sectoral coordination committees, watershed partnerships, awareness, consultation, advocacy, expertise and exchanging best practice. This EU project will co-fund activities in this GEF funded project.

Micronesia Conservation Trust

The Micronesia Conservation Trust (MCT) is a regional organization chartered under FSM law to support biodiversity conservation and related sustainable development for the people of Micronesia. The trust has a vision for a Micronesia wide system of protected areas which enhances the lives and livelihoods of people by ensuring a healthy living environment and providing sustenance and economic benefits, while contributing to the region's ongoing commitment to global conservation. MCT accomplishes this by providing long-term, sustained funding through a grants program that encourages people to adopt sustainable and appropriate solutions to local environmental challenges.

The MCT is set up as a private corporation with a governing board of 9 members, including members from national, state, and municipal governments, NGOs, business, and academic institutions. The Board members represent the two major eco-regions of the Micronesia - the low islands (coral atolls) and the high islands (volcanic islands). The MCT is working to mobilize funding from a variety of public and private sources to build an endowment of US $20 million to provide long-term support for sustainable biodiversity resource management in Micronesia.

EPA Water Quality Monitoring Budget

The Environment Protection Agency are responsible for water quality control, monitoring and public education. The Pohnpei EPA operates as a State government agency receiving its funding from United States FSM state allocation (compact). Whereas Pohnpei Conservation society operates at more of a community level, EPA operate at the State level. For example, EPA indicated that at Palakir, there are issues with the borefield during extended dry period, pumpage causes the stream to dry up, thereby effecting stream dependant families. But there is no data available to undertake a resource management based approach.

PUC

Pohnpei Utilities Corporation (PUC) was established in 1991, its primary goal was to bring reliable power to the people of Pohnpei, and over time, remove government subsidies. In 2005 the Government of the Federated States of Micronesia has transferred ownership of the nation's capital utilities to the Pohnpei Utilities Corporation. Under the Agreement, the water services that had previously been provided free of charge by the national government would be subjected to PUC procedures and standard tariff rates. PUC is responsible for improvement, rehabilitation, operation, maintenance, and management of urban and rural water supply systems. The Water Services Section of PUC has an annual turnover of $2.8M.

JICA

Japan International Cooperation Agency (JICA) is the Government of Japan's central agency responsible for the implementation of technical cooperation schemes and grand aid activities in Micronesia and more than 165 other developing countries globally. Through JICA numerous development objectives for the FSM have been implemented. Among its more visible state projects are: Port Expansion in Chuuk; Fisheries Port Expansion and Power Generator Electrical Upgrade on Pohnpei; Yap State Road Paving improvement project.

Pohnpei Port Authority

Pohnpei Port Authority (PPA) is a public corporation which manages the airport and seaports of Pohnpei State. Amongst other regulatory powers PPA has the authority to adopt and enforce rules and regulations for the orderly, safe, and sanitary operations of its ports.

N. Time line for project –

Component	Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1: *Watershed protection & improvement*	1A: *Supporting community engagement*																				
	1B: Pricing ecosystem services																				
	1C: Chuuk water shed protection																				
	1D: *Improve WQ Nanpil River*																				
2: *Protecting fresh & marine water quality*	2A: *Pollution pathways*																				
	2B: *Pollution mitigation measures*																				
3: Water safety planning	*3A: Water safety plan Pohnpei*																				
	3B Kolonia Harbour WQ																				

	management plan																		
4: IWRM policy support	*4A: Policy support activities*																		

O. Project budget

Output	Budget Item	Description of Expenditure	USD Baseline	USD GEF	USD Co-funding In-kind	USD Co-funding Funds	USD Co-funding Donor	USD Alternative
Project Management	1.1 Project manager & staff appointed	2 staff members (0.5 FTE) in project management unit	340,000	50,000	50,000		ADB	**440,000**
	1.2 Project offices provided in				25,000		ADB	**25,000**
	Office equipment		45,000	5,000	10,000		ADB	**60,000**
	Communication		20,000	10,000				**30,000**
Project Mgmt			***405,000***	***65,000***	***85,000***	***0***		***555,000***
1. Watershed Protection & Management	1.1 Facilitating Links	Community engagement with CSP using "ridge to reef" principles		40,000	30,000	10,000	HYCOS (10k) CSP (30k)	**80,000**
	1.2 Watershed Biodiversity Project Support	Support to CSP for extension of reserve and develop ecosystem service payment concepts		50,000	30,000	10,000	CSP (30k) HYCOS (10k)	**90,000**
	1.3 Establishing Watershed Protection Project in Chuuk			65,000		6,440	HYCOS (6.4k)	**71,440**
	1.4 Support WQ improvements in Nanpil River	Hydrological monitoring	200,000	10,000		50,000	WDM (20k) CSP (30k)	**260,000**
Component 1			***200,000***	***165,000***	***60,000***	***76,440***		***501,440***
2. Protecting Fresh & Marine Water Quality	2.1 Pollution Assessment	Consultancy reporting and community engagement	220,000	20,000	20,000		EPA	**260,000**
	2.2 Mitigating Pollution:	Community consultation and demonstration projects	267,000	10,000	20,000		EPA	**297,000**
	2.2a Pig management options	Construction of dry litter pens ($10k); training & promotion ($25k)		35,000	17,396		EPA	**52,396**
	2.2b Support for existing Water Quality Monitoring	Water quality analysis equipment & training	122,000	15,000	10,000		EPA	**147,000**
	2.2c Support to the ADB project on Community Engagement	Community engagement & training. New toilet trials		15,000	145,000	1,050,000	ADB	**1,210,000**
	2.2d Bio-gas Consultations, Construction and Demonstrations	Equipment for 3 biodigestors ($10k); Consultation from Univ. Hawaii ($20k); Construction, training & promotion ($20k)		50,000	25,000		ADB	**75,000**
Component 2			***609,000***	***145,000***	***237,396***	***1,050,000***		***2,041,396***
3. Water Safety Planning	3.1a Support the ADB Project for Water Safety Plan	Stakeholder engagement, Water safety planning	375,000	10,000	85,000	380,000	ADB	**850,000**
	3.1b Support to Water Quality Lab & Monitoring		250,000	25,000		30,000	ADB	**305,000**
	3.1c Inspection and Operation & Maintenance Support	Establish inspection for opetation & maintenance of sewage treatment facilities	124,000	25,000	50,000	6,500,000	ADB HYCOS (50k)	**6,699,000**
	3.1d Working with Communitiies and Schools	Education initiatives around WQ		50,000				**50,000**
	3.2 Harbour Water Quality & Mgmt Plan	Establish committeee and plan	15,000	15,000	20,000	200,000	EPA (20k) ADB (200k)	**250,000**
Component 3			***764,000***	***125,000***	***155,000***	***7,110,000***		***8,154,000***
4. Policy Support	4.1 Policy Support Review Teams		14,000			40,000	EU (10k) ADB (30k)	**54,000**
	4.2 Nested State IWRM & ICZM					10,000	EU	**10,000**
	4.3 Capacity building in IWRM					10,000	EU	**10,000**
	4.4 IWRM Planning		8,000			20,000	EU	**28,000**
Component 4			***22,000***	***0***	***0***	***80,000***		***102,000***
Total			***2,000,000***	***500,000***	***537,396***	***8,316,440***		***11,353,836***

P. Co-financing Letters

See co-financing letters in country file.