

Integrated Water Resources Management (IWRM)

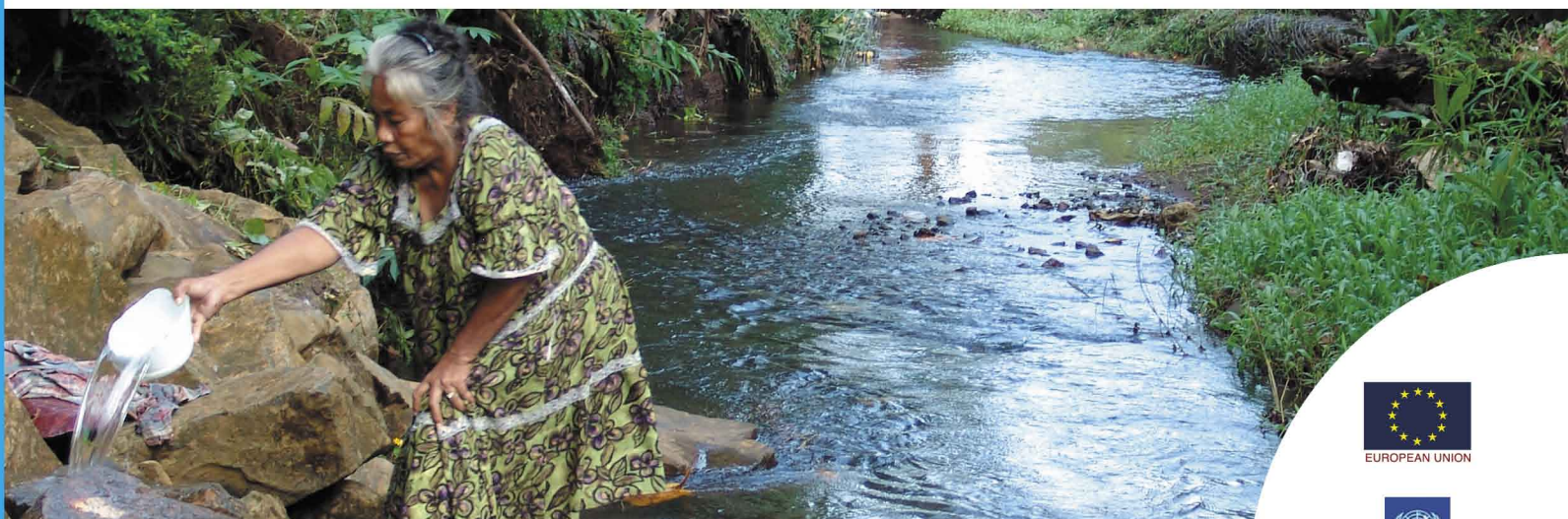
Considers all the interactions of water with nature and humans, along its route from raindrop to ocean

Recognises water as a finite and vulnerable resource with an economic value

Works towards balancing water demands for environment, human health and economic development, to ensure optimal, equitable and sustainable use

Brings together stakeholders from different sectors and social groups, to plan and manage water in a coordinated, gender balanced and participatory manner

The Pacific Integrated Water Resources Management Programme



What? The Pacific Integrated Water Resources Management (IWRM) Programme will assist Pacific Island Countries to establish and implement effective IWRM and Water Use Efficiency (WUE) plans based on best practices and demonstrations.

It consists of two main projects: 1) The EU funded "IWRM National Planning Programme" and 2) the GEF funded "Sustainable Integrated Water Resources and Wastewater Management Project in Pacific Island Countries" (Pacific IWRM Project)

Where? Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Why? To help Pacific Island Countries:

- Balance conflicting uses of scarce freshwater resources
- Improve public and environmental health by ensuring consistent water availability and quality
- Reduce effects of soil erosion, inadequate sanitation and other harmful activities on the quality of fresh and coastal waters
- Reduce vulnerability to droughts, floods, landslides and pollution
- Implement the seventh Millennium Development Goal (www.un.org/millenniumgoals/) on environmental sustainability including the aim "all countries to develop Integrated Water Resources Management and Water Use Efficiency plans by 2005" and the Pacific Regional Action Plan on Sustainable Water Management endorsed by the governments of 14 Pacific Island Countries



EUROPEAN UNION



SOPAC



How does IWRM work?

Integrating sectors

As we can see in the table below, water connects and links to the responsibilities and activities of actors from many different sectors and interest groups. It is therefore important that national development planning involves and coordinates all these sectors and groups in order to avoid duplication of effort and make sure that all aspects of water management are covered in a cost-effective manner.

This can be facilitated by IWRM planning processes (see diagram on facing page) where representatives from different sectors and stakeholder groups can outline common plans, strategies, policies and legislation for how to manage water. Common strategies and planning can help governments to better coordinate the responsibilities of different institutions, the contributions of externally funded projects and collaboration with non-governmental organisations and other stakeholders.

Tourism & Trade	<ul style="list-style-type: none"> Plan tourism activities with consideration for increased water use and wastewater load Regulate export or import of bottled water considering local water needs and increased waste load from bottles
Industry	<ul style="list-style-type: none"> Balance industrial and public water resources demands Ensure effective industrial water use and avoid wastage Regulate industrial pollution to protect water resources
Utilities & Energy	<ul style="list-style-type: none"> Install and maintain infrastructure for water supply and sewerage to ensure that water gets from source to intended use in good quality and sufficient quantity, and to prevent wastewater pollution Monitor water availability and use in order to match water supply to demand. Mitigate effects from hydropower installations on ecosystems and communities through integrated watershed management, and balance water demands for energy generation and public supply
Fisheries & Marine	<ul style="list-style-type: none"> Monitor effects from run-off and land-based activities on coastal ecosystem health and fisheries production Protect important fisheries spawning and nursery areas in coastal waters and rivers
Agriculture & Forestry	<ul style="list-style-type: none"> Adapt agricultural and forestry practices (species, land-use practices and agrochemicals) to rainfall, land features, soil quality and water availability, in order to ensure efficient water use, soil conservation and reduction of run-off of sediment, nutrients, pesticides, etc.
Environment & Planning	<ul style="list-style-type: none"> Monitor and protect the health of water environments and create protection areas where necessary Regulate impacts of developments on water resources (e.g. in Environmental Impact Assessments) Consider water resources in urban, rural and land-use planning, and minimise flooding Include water harvesting and wastewater standards in building codes
Mineral Resources	<ul style="list-style-type: none"> Regulate extraction of mineral resources to protect aquifers, ensure effective water use and reduce polluted run-off Regulate extraction and allocation rights to ground water Survey and monitor groundwater resources
Education	<ul style="list-style-type: none"> Integrate the basics of water resources management into the school curriculum Cater for the education of technical experts to support water management
Finance	<ul style="list-style-type: none"> Integrate the economic value of water into national finance planning, Allocate budget and develop tariff systems to cover costs for water resources management, including services, monitoring, research, planning and governance
Health & Social Welfare	<ul style="list-style-type: none"> Control safety of public water supply Promote basic understanding of sanitation and hygiene Ensure easy access to water to ensure more time for other activities Ensure clean water environments for recreational uses, swimming, washing and fishing



How will the EU-funded IWRM National Planning Programme help?

When? 2008-2010

Who? Executed by SOPAC and funded by the European Union through the European Commission Water Facility

How? By supporting the development of IWRM planning processes and Water Use Efficiency strategies in all 14 Pacific island countries, including legislation, policies, intersectoral coordination committees, watershed partnerships, awareness, consultation, advocacy, expertise, exchange, best practice, etc. depending on the needs and situation of each country.

Integrating Scale

Water resources need to be managed both on the local, catchment and national level, and even international in cases when rivers, lakes or aquifers cross national borders (and on island level in the Pacific).

This can include both traditional and conventional governance frameworks. The IWRM process should ensure effective communication and coordination between interests, institutions, legislation and policies on all these levels.

Government, national law, policy and legislation

Catchment, river basin, aquifer/groundwater or watershed management organisations, strategies, plans, policies and regulations

Community organisations, municipal or council authorities, local and customary by-laws

Planning Tools for IWRM

Water Use Efficiency Planning is a development tool for countries to make the most of their water resources water through:

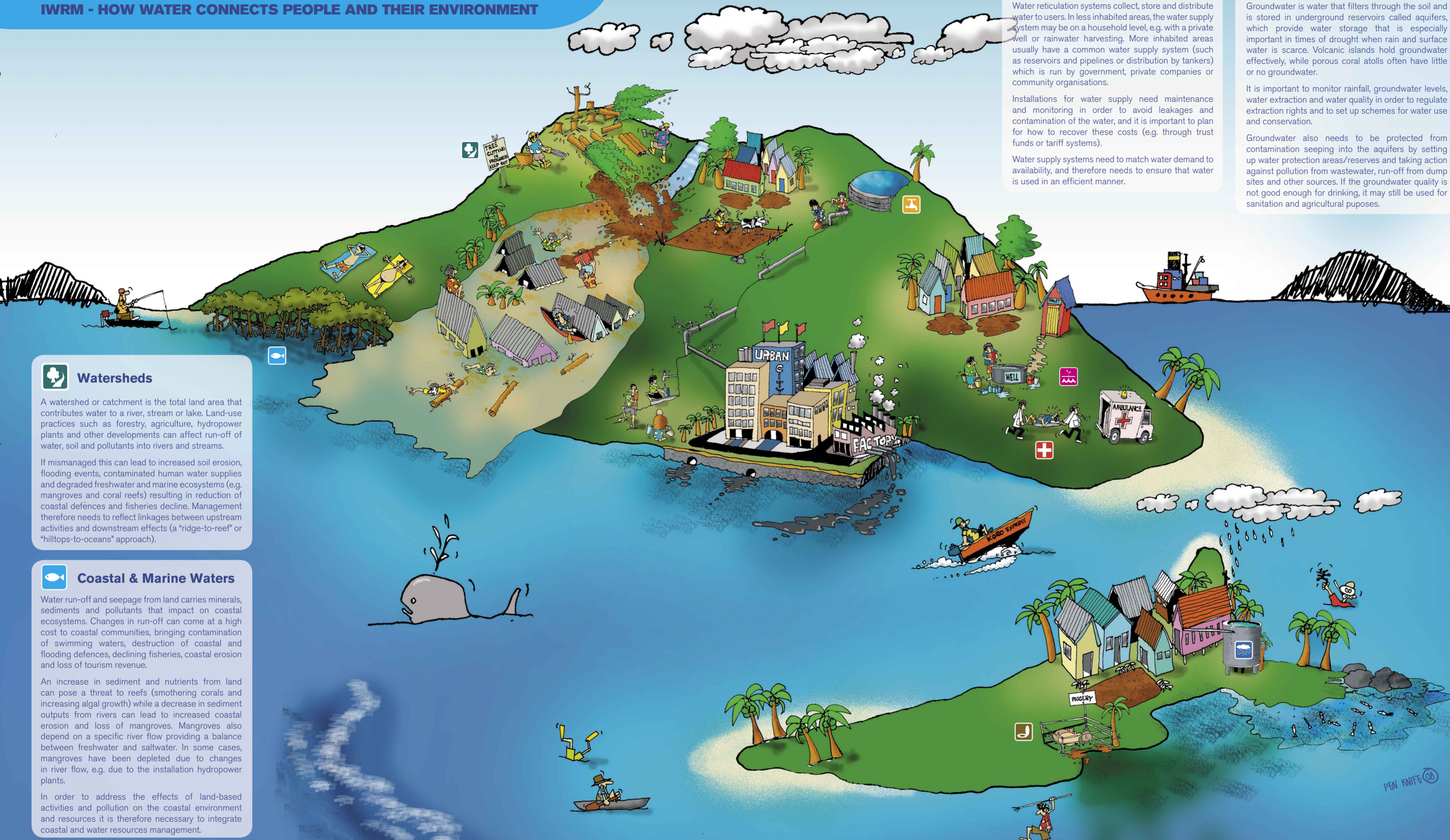
- Technical efficiency – water demand management to reduce leaks and wastage to maximise resource use, and
- Allocative efficiency – assessment of how to prioritise the uses of water to optimise economic benefits whilst maintaining social equity and the environment.

Water Demand Management Planning is similar to water use efficiency and focuses on reduction of water wastage in the water supply system, balancing supply versus demand, and in some cases setting up metering and pricing schemes for cost-recovery to ensure sustainable water supply and management

Water Safety Planning focuses on ensuring consistent and safe water supply to protect human health, by assessing and minimising risks for water contamination and supply cuts.

Water is everybody's business

IWRM - HOW WATER CONNECTS PEOPLE AND THEIR ENVIRONMENT



Watersheds

A watershed or catchment is the total land area that contributes water to a river, stream or lake. Land-use practices such as forestry, agriculture, hydropower plants and other developments can affect run-off of water, soil and pollutants into rivers and streams.

If mismanaged this can lead to increased soil erosion, flooding events, contaminated human water supplies and degraded freshwater and marine ecosystems (e.g. mangroves and coral reefs) resulting in reduction of coastal defences and fisheries decline. Management therefore needs to reflect linkages between upstream activities and downstream effects (a "ridge-to-reef" or "hilltops-to-oceans" approach).

Coastal & Marine Waters

Water run-off and seepage from land carries minerals, sediments and pollutants that impact on coastal ecosystems. Changes in run-off can come at a high cost to coastal communities, bringing contamination of swimming waters, destruction of coastal and flooding defences, declining fisheries, coastal erosion and loss of tourism revenue.

An increase in sediment and nutrients from land can pose a threat to reefs (smothering corals and increasing algal growth) while a decrease in sediment outputs from rivers can lead to increased coastal erosion and loss of mangroves. Mangroves also depend on a specific river flow providing a balance between freshwater and saltwater. In some cases, mangroves have been depleted due to changes in river flow, e.g. due to the installation hydropower plants.

In order to address the effects of land-based activities and pollution on the coastal environment and resources it is therefore necessary to integrate coastal and water resources management.

Water Supply Systems

Water reticulation systems collect, store and distribute water to users. In less inhabited areas, the water supply system may be on a household level, e.g. with a private well or rainwater harvesting. More inhabited areas usually have a common water supply system (such as reservoirs and pipelines or distribution by tankers) which is run by government, private companies or community organisations.

Installations for water supply need maintenance and monitoring in order to avoid leakages and contamination of the water, and it is important to plan for how to recover these costs (e.g. through trust funds or tariff systems).

Water supply systems need to match water demand to availability, and therefore needs to ensure that water is used in an efficient manner.

Groundwater

Groundwater is water that filters through the soil and is stored in underground reservoirs called aquifers, which provide water storage that is especially important in times of drought when rain and surface water is scarce. Volcanic islands hold groundwater effectively, while porous coral atolls often have little or no groundwater.

It is important to monitor rainfall, groundwater levels, water extraction and water quality in order to regulate extraction rights and to set up schemes for water use and conservation.

Groundwater also needs to be protected from contamination seeping into the aquifers by setting up water protection areas/reserves and taking action against pollution from wastewater, run-off from dump sites and other sources. If the groundwater quality is not good enough for drinking, it may still be used for sanitation and agricultural purposes.

Water and Health

Clean drinking water, water for sanitation and water for food crops are all key to human health and survival. Water quality monitoring is needed to ensure that water is safe and sufficient to demands for these uses. Storage and supply systems need to be maintained, and water sources protected, in order to prevent contamination of the water.

Water also needs to be used efficiently to ensure that there is enough water through times of water scarcity (i.e. droughts). To enable this, users need to get involved and have a basic understanding not only of the importance of clean water to their health, but also of the water cycle and the links between human activities, the environment and water supply.

Rainwater

As long as the levels of air pollution are low, rainwater is one of the purest sources of water. It is a simple system that can be run on individual household level, and is especially important in areas where there is no surface or groundwater available.

Rainwater harvesting requires investment in a catchment area (e.g. a roof with guttering), tanks for storage and a tap or pump for access. In order to ensure safe and clean water, all these parts need to be maintained and kept clean to ensure there are no leakages or contamination of the water.

The water quality needs to be monitored to ensure that it is safe for consumption. By measuring water consumption in the household and with the help of meteorological information on expected rainfall pattern, it is possible to determine the appropriate size of rainwater harvesting catchment area and storage tanks in order to meet the water use demands of the household.

This is especially important to do this in areas with a variable climate, with long drought periods interspaced with short periods of intense rainfall. In some cases it may be necessary to set up common emergency reserves of rainwater to be used during droughts.

Wastewater

Sewage, drainage, industrial effluents, storm water, run-off from agriculture containing pesticides, fertilisers and animal waste, dissolved air pollution, run-off from roads and urban areas, seepage from dumps, liquid hazardous waste, and other types of wastewater accumulate in streams and rivers, leak into aquifers, and wash out to sea.

If not properly treated, it can damage human health by contaminating drinking water supplies and water environments used for washing, fishing and swimming. Untreated wastewater also provides an overload of nutrients that can threaten biodiversity and ecosystem functions.

If properly treated, wastewater can be recycled for flushing toilets or watering plants, while sewage, human and agricultural waste can be used as fertilisers or to produce biogas.

By ensuring that waste doesn't mix with water, techniques such as composting and dry toilets save precious drinking water and prevent environmental degradation.

It is important to protect wetlands which act as natural "treatment plants" and help reduce to impact of wastewater.

How will the GEF-funded Pacific IWRM Project help?

WHEN? Preparation 2004-2007 and implementation 2008-2013 **WHO?** Executed by SOPAC with support from UNDP and UNEP, and funded by the Global Environment Facility (GEF)
HOW? By reviewing the water resources management status and needs in 14 Pacific island countries and implementing activities to demonstrate how IWRM approaches can be used to address these issues

Cook Islands

Integrated freshwater and coastal management on Rarotonga
Aims: To improve groundwater, freshwater and lagoon water quality using an IWRM framework and to gain information on the availability of groundwater for drought relief.
Activities: Technical assessment of water quality and quantity information measures; Knowledge dissemination to promote community knowledge and understanding; Institutional strengthening and human resource capability development measures

Federated States of Micronesia

Ridge to reef: protecting water quality from source to sea in the FSM
Aims: To improve drinking water quality and significantly reduce pollutants entering fresh and marine waters around Pohnpei Island and in Chuuk State
Activities: Improvement of forest management and strengthening a Watershed Forest Reserve Area; Linking communities to create awareness on upstream to downstream impacts; Water quality monitoring programme; Assessment and mitigation of wastewater and pollution sources; Development of a Water Safety Plan and a Harbour Water Quality and Management Plan

Fiji

Environmental and socio-economic protection in Fiji: Integrated flood risk management in the Nadi River Basin
Aims: To improve flood preparedness and integrate land and water management planning within the Nadi Basin using an integrated flood management approach
Activities: Improvement of rainfall and hydrological events monitoring to improve flood forecasting; Development of a Nadi Basin Catchment Committee and Flood Management Plan; Awareness raising on flooding resilience for local communities and other stakeholders.

Kiribati

Kiribati will be supported through the regional component of the GEF-funded IWRM project and will develop a national IWRM demonstration project in due course.

Nauru

Enhancing water security for Nauru through better water management and reduced contamination of ground water
Aims: To adopt a working and affordable system for sustainable integrated water resource and wastewater management in Nauru

Niue

Using integrated land use, water supply and wastewater management as a protection model for the Alofi town groundwater supply and nearshore reef fishery
Aims: To protect the Alofi groundwater, well field and near shore area from over-abstraction and land-based pollution through an IWRM framework
Activities: Improving management of hazardous waste, solid waste, wastewater to reduce run-off from industries, fisheries processing, agriculture and roads; Awareness raising and planning for water conservation and demand management; Establishment of groundwater protection zones; Hydrogeological and water quality surveys for maintenance of well field; Water policy and planning

Palau

Ngerikill watershed restoration for the improvement of water quality
Aims: To reduce land degradation while preserving ecosystem stability, functions, and services of the Ngerikill Watershed

Papua New Guinea

Rehabilitation, management and monitoring of Laloki River system for economical, social and environmental benefits
Aims: To promote the sustainable use of the water resources of Laloki catchment
Activities: Establish a participatory mechanism to support integrated catchment planning, management and monitoring; Improve waste management and reduce human-induced contamination; Develop site-specific water quality criteria; Establish a hydro-meteorological network for the catchment

Republic of the Marshall Islands

Integrated water management and development plan for Laura groundwater lens, Majuro Atoll
Aims: To improve water resources management, reduce groundwater pollution and improve water supply around the Laura area
Activities: Provision of wastewater, sanitation, solid waste and recycling facilities;

Samoa

Repair Maintenance of infrastructure for groundwater supply; Water resource use planning and monitoring using Geographic Information System (GIS); establishment of a Laura Lens Integrated Water Resource Plan
Payment for Ecosystem Services scheme; Awareness raising on watershed protection

Solomon Islands

Managing Honiara City water supply and reducing pollution through IWRM approaches
Aims: To ensure sustainable water supply and wastewater services in Honiara City
Activities: Assessment of water abstraction, land-based activities impacting water resources, water leakages and wastages

Tonga

for the formulation and establishment of Water Safety, Water Use Efficiency and Watershed/Aquifer Protection Management Plans; Designation of an aquifer/well field; Raising awareness and training for IWRM

Tuvalu

Integrated Sustainable Wastewater Management (Ecosan) for Tuvalu
Aims: To ensure drought proofing and prevent sewage pollution of fresh and marine waters by reducing demand on primary drinking water supply for sanitation systems
Activities: Review and

Vanuatu

Sustainable Management of Sarakata Watershed
Aims: To ensure sustainable management of the Sarakata watershed by formulating and implementing a land use management plan for the watershed
Activities: Participatory ecological and socio-economic surveys, mapping and resource valuation; Establish watershed management strategies, policies, plans and monitoring; Promotion of alternatives to de-forestation, agricultural and coastal management practices; Establish community managed protected areas; Develop and implement Water Safety Plans; Mitigate flooding; Manage watershed for sustainable hydro power.

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IWRM in Pacific Island Countries

How are we doing?

IWRM component	CI	FSM	FJ	KI	RMI	NR	NI	PA	PNG	SA	SI	TO	TV	VA
Intersectoral water coordination body	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing
National water resources policy	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Formally adopted	Not existing	Not existing	Not existing	Not existing
Overarching water resources legislation	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Formally adopted
IWRM Plan/Strategy	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing
Water Use Efficiency Plan	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing	Not existing

■ Not existing ■ Draft/interim – not formally adopted, functions outlined, fully intersectoral or proactive
■ Formally adopted, fully intersectoral and active

CI - Cook Islands, FSM - Federated States of Micronesia, FJ - Fiji, KI - Kiribati, RMI - Republic of Marshall Islands, NR - Nauru, NI - Niue, PA - Palau, PNG - Papua New Guinea, SA - Samoa, SI - Solomon Islands, TO - Tonga, TV - Tuvalu, VA - Vanuatu

The Pacific Island Countries have started working at different stages of the IWRM process, whether it is revising policy and legislation, forming a water coordination committee, developing a Water Safety Plan, creating water protection areas or catchment management committees, raising awareness on water and health, promoting sustainable alternatives for sanitation and wastewater, setting up hydrological monitoring programmes, or looking at economic efficiency of water use. The EU-funded IWRM National Planning Programme will support the different countries based on their specific situation and needs.

Challenges and opportunities for Water Governance

Kiribati, Fiji and the Solomon Islands were chosen to pilot governance processes for integrated and sustainable water management with support from the regional Programme for Water Governance (PfWG) funded through the European Union (2005-2007).

The programme helped the three countries to initiate a process for effective water governance.



Fiji

Through the PfWG process, Fiji developed a draft water policy and a draft Water Resources Act. Fiji also formed a National Water Committee and formulated a draft strategy to support the IWRM process. The Cabinet has since adopted the draft Policy as Interim, subject to an ongoing consultation process. The future IWRM process in Fiji will need to raise awareness and understanding of IWRM to ensure political commitment to dealing with complex issues such as water ownership. There is a risk that urgent issues such as flooding and access to water supplies will 'take over' overarching policy processes, resulting in a disjointed and fragmented approach to the resource and its management, and a lack of attention to the interconnected nature of land and water.

The Solomon Islands has faced periods of political instability, which has made it difficult to focus government attention on a single issue such as water. Water resources management has been fragmented due to a lack of national policy and community awareness. Through the PfWG, key government representatives got the chance to exchange experiences with Samoa, which has already come far in the process of improving water governance. Solomon Islands drafted a National Water Resources Policy and a National Water Resources Legislation, formed a temporary water group and drafted terms of reference for a National Steering Committee to support the IWRM process. The government has provided a budget allocation for the IWRM process and are currently focusing on consultation and review of the National Water Resources Act. Solomon Islands are faced with challenges such as resolving water ownership issues (especially in the view of increased mining activities) and raising awareness of water resources management (specifically links to land-use practices) taking into account low literacy rates in communities.



Solomons



Kiribati

The main challenges to IWRM identified for Kiribati include politicised resource management approaches, lack of government awareness and political will, and the dispersed nature of the land and population; all leading to delay in adoption of draft national water plans, policies and legislation. This was partly addressed by supporting the reformation of the Kiribati Water Supply and Sanitation Coordinating Committee under the Office of the President to avoid intersectoral competition. It was also recognised that capacity needs to be built in a wide range of areas supporting IWRM; from policy making to technical expertise and community participation in decision-making. The challenge of geography could be met by grouping the islands in governance arrangements. The progress toward IWRM will be influenced by the means and success in coordinating the various Ministries, agencies, and departments involved. The IWRM process needs to account for, and be adapted to, the cultural circumstance of Kiribati.