

# GWP Experience in Small Islands Water Resources Management

Reference: CS-30

## **GWP Consultants has more than 20 years' experience in investigating, assessing, exploiting, protecting and managing groundwater, rainwater, surface water and alternative water resources in small island developing states (SIDS) and other small island environments.**

GWP Consultants has worked across the Pacific, Caribbean, Atlantic and Indian Oceans in more than 20 SIDS on integrated and non-integrated water resources assessment, development, management and protection, ranging from the atoll islands of the Maldives, Kiribati and Tuvalu, to the karstic terrains of Niue, Tonga and Antigua, from the volcanic slopes of Samoa, Comoros, Cape Verde and St Lucia, to the diverse environs of Vanuatu, Fiji, Seychelles and New Caledonia. Wherever possible we use integrated approaches to water management, focussing on conjunctive use of rainwater and/or surface water with groundwater depending on source availability and quality.

Mindful of the limited national human and financial capacities in many SIDS, GWP works closely with national departments, NGOs and regional inter-governmental organisations to strengthen local knowledge and management skillbases, tailoring approaches to maximise sustainability, whilst recognising the specific threat of climate change to these countries.

### **Recent Projects:**

#### **Groundwater Lens Vulnerability Assessments on Niue Island**

Niue Island is an extensively karstified raised limestone atoll, with no surface water, and all villages supplied by boreholes, with unknown groundwater lens volume and drought vulnerability. GWP designed and supervised the construction and testing of 3 No. multi-level piezometer nest boreholes, enabling the freshwater lens thickness to be monitored using manual and automated systems. Production borehole pumping tests, surface geophysics, and a national well inventory contributed, with the new monitoring system, to establishing lens and borehole sustainable yields, drought and pollution vulnerability (from land use and post cyclone damage) assessments were delivered. Production borehole pumping tests, surface geophysics, and a national well inventory contributed, with a new monitoring system, to establishing lens and borehole sustainable yields.



#### **National Water Resources Assessment and Management for Samoa**

Provision of a 5 year technical support programme, including national inventories of water resources, and institutional and legislative capacity needs assessments. The project designed and delivered surface water and groundwater monitoring systems, including flood warning and watershed management monitoring networks, identification of basin sustainable yields and saline intrusion vulnerability assessments, introduction of water allocation licensing, watershed rehabilitation initiatives and up-skilling of local staff.



#### **Tsunami Impact and Recovery Assessments for the Maldives**

The Asian tsunami of December 2004 caused widespread devastation on the low-lying atoll islands of the Maldives, resulting in infrastructure destruction and widespread salinization of the groundwater resources. Rapid assessments of groundwater quality across the country were undertaken using pre-existing monitoring nests and augmented using surface geophysics and well surveys, to establish the groundwater salinization extent from tsunami inundation, as well as the speed of re-freshening of the freshwater lenses. These findings were used to re-design development agency recovery strategies.



### Urban and Rural Rainwater Harvesting Improvements in Kiribati

Rainwater harvesting assessments were undertaken on houses, communal buildings (churches & maneabas), and strategic infrastructure assets (hospitals and warehouses) to identify improvements required to increase drought resilience of target communities. Community consultations developed island wide water master plans. Detailed water supply designs, tender document preparation, procurement support and construction supervision were provided for water catchment refurbishment, transmission mains, pumping stations (where required) and storage and header tanks. Operation and maintenance and hygiene promotion guidance were also delivered.



### Groundwater Assessment and Exploitation in Kiribati

Island drought resilience can be significantly improved through exploitation of groundwater resources. 22 islands were assessed using well inventories, surface geophysics and piezometer nest drilling to identify fresh groundwater resources and establish sustainable yields. An infiltration gallery was designed and installed at a demonstration community to skim freshwater, utilising solar pumps and header tanks. Operation and maintenance and resource protection guidance were also delivered. Existing but abandoned urban groundwater infiltration galleries were rehabilitated, pump and head works infrastructure replaced, power supplies reinstated, transmission mains replaced and repaired as appropriate and security measures enhanced to protect the abstraction system.



### Caribbean Guidelines on Surface Water Re-Use and Groundwater Recharge

Rainwater and especially storm water run-off entering the sea are seen as both a lost freshwater resource and a flood and erosion hazard. This project explored different rainwater and storm water capture and disposal technologies to enhance groundwater recharge. Guidelines were developed across a range of scales from individual households, to communal buildings, to major developments and sub-catchments and watersheds, using hard engineering and soft eco-system infrastructures, for a variety of water types including rainwater, storm water run-off, river waters, greywater and blackwater.



### Storm Water Control and Management on Zirqa Island, United Arab Emirates

Intense storm events in small steep catchments create rapid flood flows capable of intense destruction to infrastructure and communities. Ungauged wadi catchments were characterised on an offshore island and then assessed for appropriate return period rainfall events to determine times-to-peak and peak flood flows discharging through and around a proposed multi-million dollar oil installation facility. Existing storm water designs were checked and re-designed to provide an effective spate flood management drainage system.



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