

Integrated Water Resources Management

Developing Integrated Water Resource Management in the Republic of Palau

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Abstract

Watershed management in the Republic of Palau has been constrained by the lack of effective mechanisms to integrate the diverse range of community interests in decision-making. This is largely due to overlapping and fragmented efforts from numerous government agencies with responsibilities for land and water management. A burgeoning coastal tourism sector, overloaded wastewater and treatment infrastructure, and coastal water quality problems are driving demand for more streamlined delivery of water related services in Palau.

The first step in this process has involved actions aimed at establishing effective cross-sectoral collaboration at the national level, and the creation of efficient inter-linkages and feed back loops between national and community priorities and actions. These include the review and design of the policy and legal settings to facilitate “horizontal” (inter-sectoral) and “vertical” (national-community governance) interactions and networking between stakeholders. It is envisaged that a National Apex Water Body will be established to carry out necessary institutional reforms and to reconcile both sectoral and national interests and priorities for water.

These broader policy reforms are being complemented by a national IWRM demonstration project which focuses on sustainable water management using “*ridge to reef*” principles. This Global Environment Facility (GEF) funded initiative is aimed at restoring the Ngerikiil watershed to improve surface water quality. Work being undertaken includes reintroduction of

native plant species to help stabilize soil, establishment and operation of a participatory monitoring programme using bio-indicators, pollutant and socio-economic surveys, and establishment of a payment for ecosystem services scheme. This demonstration project is designed to act as a catalyst for replication and scaling-up approaches to improve water resource management and to inform broader policy and legal reforms in Palau.

Introduction

Water resources of the Pacific's Small Island Developing States (SIDS) are stressed because of increasing populations, urbanization, development, climate change and other pressures. This is especially true for the Republic of Palau, where water demands are rising with increasing economic development. Sustainable development is necessary for safeguarding the environment while encouraging economic growth. Small Pacific Island Countries (PIC) rely heavily on freshwater resources, although due to the small landmasses of many PICs, most freshwater sources are under pressure from overuse and/or pollution leading to deteriorating water quality (Kingston, 2004). The pollution of freshwater resources also contributes to deterioration of coastal water quality, which is critical to the fisheries (both subsistence and commercial) and tourism sectors. Urbanization and population increases also weigh heavily on wastewater disposal, which impact both fresh and marine water resources.

An integrated approach to water and wastewater resource management is essential for PICs. Most land-based activities or developments impact freshwater resources in one way or another. Unsustainable development within watersheds impact on water supply systems which increase the cost of water treatment, affect human health, and supporting functions of coastal ecosystems (Palau Water Safety Plan National Steering Committee, 2009). This impact has a cascading effect that can only be dealt with if the management of such impact is addressed in an integrated manner. Additionally, water resource and wastewater management needs to be properly managed so that community needs for economic development are met without threat to long term health and sustainability of watersheds and coastal environments (Republic of Palau, 2008). An integrated approach to water resource and wastewater management will ensure that future generations of Palau have a healthy environment and economy. This paper outlines initiatives to address this need through the adoption of Integrated Water Resources Management approaches in Palau, which focus on "*ridge to reef*" and "*community to cabinet*" principles.

The Geographical Setting

The Republic of Palau consists of moderately elevated volcanic islands to flat karsts islands and atolls and therefore faces issues ranging from watershed misuse on the larger island of Babeldaob to saltwater intrusion of freshwater lenses on platform islands and atolls (Eledui and Olkeriil, 2007). With the opening up of the central part of the largest island of Babeldaob with a new road, development is expected in the watersheds of this island. Degradation of the watersheds is a concern. Increasing deforestation, pesticide use, and inadequate wastewater

management due to urbanization are perceived as potential impacts to the watersheds if management approaches are not properly coordinated and integrated.

Palau is best known for its world-class scuba diving sites. The economy, aside from foreign aid, relies heavily on tourism. Tourism associated developments as well as an increasing population to accommodate put pressure on natural water resources, outdated public wastewater infrastructure, and coastal water quality. With increasing economic development, there is more pressure for streamlining delivery of water related services in Palau. As a result of increased impacts on wastewater systems, studies have shown that water quality in certain coastal areas has deteriorated to levels that may impact human health (Rengiil, 1999).

The Institutional Setting

Palau is politically divided into 16 states, 10 of which are on Babeldaob. The National Government has three branches of government: Executive, Legislative and Judicial. Under the Palau Constitution, the National Government is in charge of management of natural resources but the actual resource owners are the State Governments. Several agencies are responsible for different areas of management of water resources and the environment. The various bureaus under the Ministry of Natural Resources, Environment, and Tourism are responsible for forest inventories, agriculture, protected areas, as well as tourism.

The Ministry of Public Infrastructure, Industries, and Commerce is responsible for the public water supply and public wastewater systems as well as operating the public landfills. The Palau Environmental Quality Protection Board is a semi-autonomous agency that regulates earthmoving activities, solid waste management, public water supply systems, and discharges into water bodies. Other agencies with shared interest come from the health sector, the state governments and the private sector. No single agency is responsible for the planning and management of water use, water shortage, preparing and implementing drought contingency plans, coordination with water customers, and development of strategic plans.

Establishing a National APEX Water Body

A key barrier to the development of integrated approaches to water and wastewater management in Palau has been the lack of a national water committee and limited coordination between agencies and existing project-based committees (Republic of Palau, 2007(a)). There has also been a lack of resources and resolve to conduct enforcement. Generally enforcement of policies is lackluster, or limited by resources. Regulations need to be updated to reflect changes in lifestyle, research, and climate.

The current government framework lacks effective mechanisms to integrate the diverse range of community interests in decision-making. Existing legislative bodies work with some

collaboration but no proper management schemes towards integrated protection. The underlying principles of Integrated Water Resources Management (IWRM) will hopefully help strengthen existing and proposed water resource management for the Republic.

Previous Initiatives Promoting Cross-Sectorial Coordination

Previous attempts to coordinate sectorial activities in Palau's government agencies have experienced initial enthusiasm. Each attempt has had strengths and weaknesses.

- The National Environment Protection Council (NEPC) was created by President Remengesau. The NEPC is composed of government and nongovernment agencies and organizations and is responsible for prioritizing national environmental issues facing Palau. The strengths of the NEPC are that it has the President's support for most of their programmes. However, the focus of this group is mainly policy. It has very little community awareness and initiative.
- The Marine Resources Pacific Consortium Palau (MAREPAC Palau) is a group of government and non-government organizations that hold interest in marine resources research. Members are interested organizations and persons and generally conduct scientific and community research for the understanding and protection of the marine environment. MAREPAC has been very active at the community and agency level. However, most of its funding depends on the Regional MAREPAC group, which has been inactive recently in grant seeking, and has limited interaction with the executive level of government.
- The Palau Natural Resources Council (PNRC) PNRC is another group of government and non-government agencies that have a specific interest in the terrestrial resources of Palau. Its main focuses are forestry resources, invasive species, and watershed protection. PNRC horizontally links agencies and NGOs, and has several on-the-ground programmes with active participation from partners. However, community involvement can be increased and the Council is still seeking legal recognition from the Executive level.
- One current attempt to coordinate and collaborate is the Water Safety Plan National Steering Committee. This committee involves most of the relevant government agencies and is chaired by the Bureau of Public Works. Its main objective is to set in place a National Drinking Water Safety Plan. Though the committee has done tremendous work in minimizing overlapping efforts, its mandate and power of authority is limited.

Priority Actions for Improved Cross-Sectorial Coordination

There is still more work to be done to protect the watershed from overdevelopment and promote conservative water use. Existing policies need to be reviewed in the context of the IWRM approach to ensure that every section of the Pacific Regional Action Plan is integrated and that

there are linkages to ecosystem protection and human health/hygiene issues with watershed and coastal management and land use policies.

Many past failures in water resources management are attributable to the fact that water is viewed as free and its full value is not recognized. In order to extract the maximum benefits from the available water resources there is a need to change perceptions about water values. More community input is needed as well. Traditionally the management of natural resources was in the hands of traditional leaders. With this system, the diverse range of community interests was part of the decision-making process. In comparison, the current political structure has had limited input from the community.

It has been identified that the establishment of a national APEX water body is a necessary precursor for the accomplishment of IWRM in Palau. It is anticipated that this body will be responsible for developing policies and strategies, and for co-ordination and national planning regarding water resources. As there is no comprehensive policy, this new body can incorporate IWRM principles into a national water policy. It will also play a lead role in reconciling water-related developments in the Republic with the overall management of available water resources and related infrastructure. This will lead to the much needed integration of water resources policy with national economic policy, as well as with other sectoral policies and strategic plans.

Economic and social policies must take into account the impacts on water resources and public infrastructure, and all developments must be evaluated for possible impacts on freshwater supply, environmental flows, and receiving coastal water quality (ADB, 2009). Consequently, the water resources management system established by the national APEX water body must include cross-sectoral information exchange and co-ordination procedures, as well as techniques for the evaluation of individual projects with respect to their implications for the water resources in particular and society in general.

Initial tasks of the national Apex water body involve a consultative process aimed at reaching cross-sectorial agreement on its role in coordinating government agencies with respect to water and sanitation management. This will lead to the development of a broad-based water and sanitation strategic plan which is consistent with sectorial policies of government agencies, private sector business plans, and community views, particularly those of women's groups. Planned actions to achieve this include a review of existing water policies and identification of needs with respect to national water policy reform. Priorities will be identified and the Apex body will provide advice on government water management issues. The body is being promoted as a forum for interaction and information dissemination between agencies, government and the community, where increased understanding and awareness on causes and effects of mismanagement of water resources can be shared.

An important role of the APEX water body will be the promotion of project concepts and objectives at the national level, thereby ensuring integration of IWRM into national policy and planning frameworks. Concerted effort must be made if project activities are to have an impact beyond the immediate community and stakeholder level. Generating understanding and support from the wider public is necessary if there is to be sustainable change at the national level. Building communications capacity and the development of an overarching national communications strategy for, and with the input of, the APEX body is therefore also a priority.

European Union and Global Environment Facility Support for IWRM in Palau

The Pacific Island Applied Geoscience Commission (SOPAC), recognizing the slow movement of the implementation of the Pacific Regional Action Plan (RAP) for Sustainable Water Management, secured funding from the ACP-EU Water Facility for a three-year program from 2008 to 2010 to provide support to create an enabling environment for Integrated Water Resource Management. This project being implemented across 14 PICs is providing support for policy and legislative reform for improved water-use efficiency and sanitation in Palau. Similarly, a Memorandum of Agreement was signed between Palau's Environmental Quality Protection Board and SOPAC for the operation of a National IWRM Demonstration Project as part of the Global Environment Facility (GEF) funded project entitled "*Implementing Sustainable Water Resources and Wastewater Management in Pacific Island Countries*" currently being executed by SOPAC.

Ngerkill Watershed Restoration for the Improvement of Water Quality

The broader policy reforms outlined above are being complemented by a GEF funded IWRM Demonstration Project in Palau which is focused on the restoration of the Ngerikiil Watershed in the State of Airai on Babeldaob Island. This watershed contains the water source for Airai and Koror, which serves 78% of the population of Palau. The demonstration project is developing sustainable water management practices using "*ridge to reef*" principles, and is designed to act as a catalyst for replication and scaling-up approaches to improve water resource management and to inform broader policy and legal reforms in Palau.

Ngerkill Watershed in Airai State

The Ngerikiil Watershed area covers 28.5 square kilometers (11 square miles or 7,040 acres) of Airai State, Babeldaob Island. The sub-watersheds of Ngerikiil include the Ngerikiil, Ikoranges, Kmekumel, Edeng, Oikull, and Airai. The watershed has been an area of importance to Palau as a major water source (water intake built in 1985) and therefore, of interest for a watershed protection project for many years. A watershed resource assessment was completed by the USDA Natural Resources Conservation Services. In order of their level of threat to the main watershed objectives the critical resource concerns were identified as:

- Soil Erosion and Sedimentation

- Nutrient, Fertilizer and Pesticide Pollution
- Solid Waste Disposal
- Invasive Species
- Wildlife Habitat Loss

The main source of pollution however is sedimentation. The causes are poor erosion control, loss of riparian buffers, and poor land-use practices. (Cole *et al.*, 1987; Otobed *et al.*, 1994; and Victor *et al.*, 2004). Sedimentation is also an issue for the coastal areas, where the sediment covered reefs have little live coral cover. Heavy rainfalls in the watersheds cause immediate and high sediment loading of the rivers. This affects coral reefs and seagrass beds on the coast, and also impacts on the treatment of public water supply systems (Babcock *et al.*, 1991; Fabricius, 2005; Rogers, 1990; and Victor, 2007).

The clearing of primary forests for development and agricultural purposes contributes to increased sediment loads of rivers and near shore coastal waters. Research by the Palau International Coral Reef Center (PICRC) reports higher sedimentation rates on coral reefs near watersheds with deforestation than near watershed with relatively pristine forests. Soil erosion is affecting water quality, decreasing depth of the rivers, and covering seagrass beds and coral reef patches. This is impacting the flora and fauna of the rivers and adjacent coastal areas (Babcock *et al.*, 1991; Rogers, 1990; and Victor, 2007).

The GEF IWRM Demonstration Project in Palau is attempting to stabilize riverbanks and revegetate the riparian buffer zone to decrease sedimentation into the Ngerikiil River and study the effectiveness of such buffer zones given the high amount of rain that Palau receives annually. Sediment studies are being undertaken in conjunction with water quality monitoring to determine the success of re-vegetated buffer zones.

Community Involvement in Ngerkill Watershed Management

In addition, public awareness campaigns for watershed awareness and protection are being developed and implemented to support this initiative. To ensure IWRM benefits are sustainable it is critical to ensure an understanding on how communities perceive issues of water in a social, environmental and economic context, as they often perceive water issues very differently from people outside the community. Understanding this will help identify areas where awareness needs to be raised and help assist a shift in attitude needed for IWRM to take place.

The Palau Conservation Society (PCS) has been a very active partner in these watershed campaigns, and brings a strong network of local community leaders and groups to Palau's efforts

to develop IWRM. The PCS is working directly with communities living and working within the watershed, and is charged with the development of innovative modeling tools as an alternative method of awareness raising. Outreach campaigns will assist with the sustainability of the IWRM project by relaying ongoing activities and initiatives to the local communities and stakeholders.

Several of the Demonstration Project activities, such as the revegetation of the buffer zones, are using volunteers and community groups to ensure a sense of ownership and stewardship. By involving the local communities, not only does the water source for Koror and Airai have protection, but also the people directly impacting these sources are more understanding towards watershed issues. A participatory bio-indicator framework is also being developed for the project with the assistance of the Palau Natural Museum and community volunteers to provide a basis for setting baselines for water quality and measuring the effectiveness of key interventions.

Conclusion

Recognizing the over-riding importance of the water resource to the demands of Koror, Airai, and adjacent environments, the State government of Airai, with support from the National government, is seeking to find ways to ensure long-term sustainability of the interventions developed by this project. The project is demonstrating sustainable maintenance and management of a critical water source through re-introduction of native plant species to help stabilize the soil, use of bioindicators as low-cost monitoring tools, and proper mitigation of road drainage, with outcomes to be replicated within the Republic and the region. This work will also be linked to broader policy and legislative reforms for IWRM and water use efficiency to be undertaken with the guidance of the Apex water body. The results of the project will also be used by this body to inform such reforms and longer term strategic planning for water resources in Palau.

It is anticipated that this two track approach being developed by the Republic of Palau will contribute to the achievement of long-term local and global environmental benefits. This will occur through the promotion of best management practices for land and water use planning and management. The promotion of proper watershed practices will reduce land degradation while preserving ecosystem stability, functions, and services such as soil and watershed protection, water purification and nutrient retention. Globally benefits include carbon uptake and storage, and the preservation of species diversity.

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