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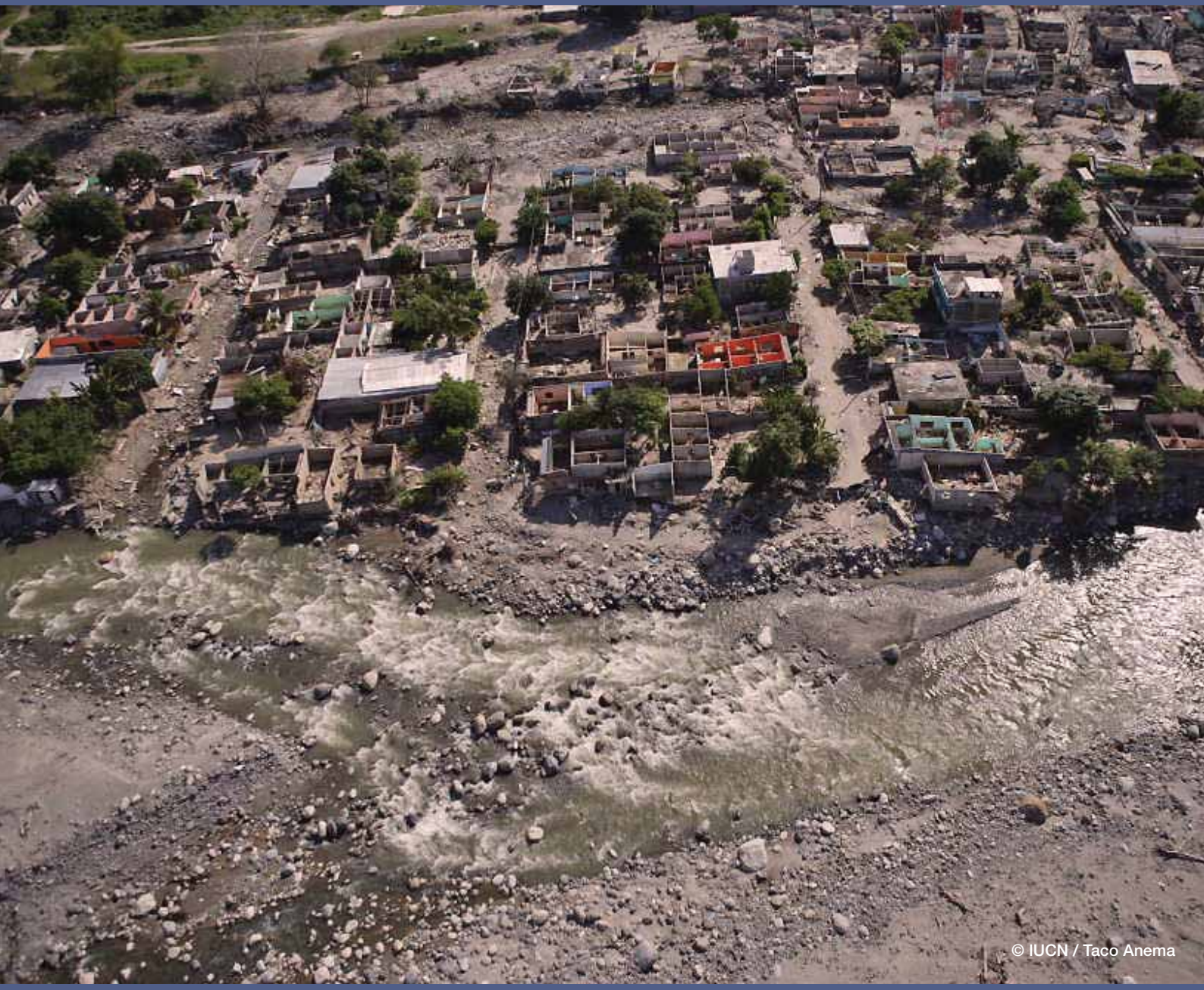

Managing watersheds for urban resilience

Policy Brief

Presented at the Global Platform for Disaster Risk Reduction

Roundtable on "Managing watersheds for urban resilience"

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United Nations International Strategy for Disaster Reduction

Key messages:

1. Well-managed, healthy watersheds provide a wide range of goods and services to both urban and rural populations and play a vital role in supporting urban life.
2. Urban areas are dependent on watersheds, yet urban expansion and land use changes have contributed to watershed degradation, increasing urban exposure and vulnerabilities to water-related hazards.
3. Risk-sensitive, sustainable watershed management balances resource needs amongst multiple users both upstream and downstream, and also reduces vulnerabilities and develops coping capacities to deal with potential disaster risks through mitigation and preventive actions.
4. Ecosystem-based approaches in watershed management, such as reforestation, river or wetland restoration, and floodplain regulation, when combined appropriately with engineered infrastructure, can provide complementary solutions to help achieve urban development goals, as well as protect people and development investments against water-related disasters and climate change.
5. Successful watershed management is based on stakeholder consultations across geographical, institutional and political boundaries and requires strong, long-term political, technical and financial commitments.

Policy recommendations:

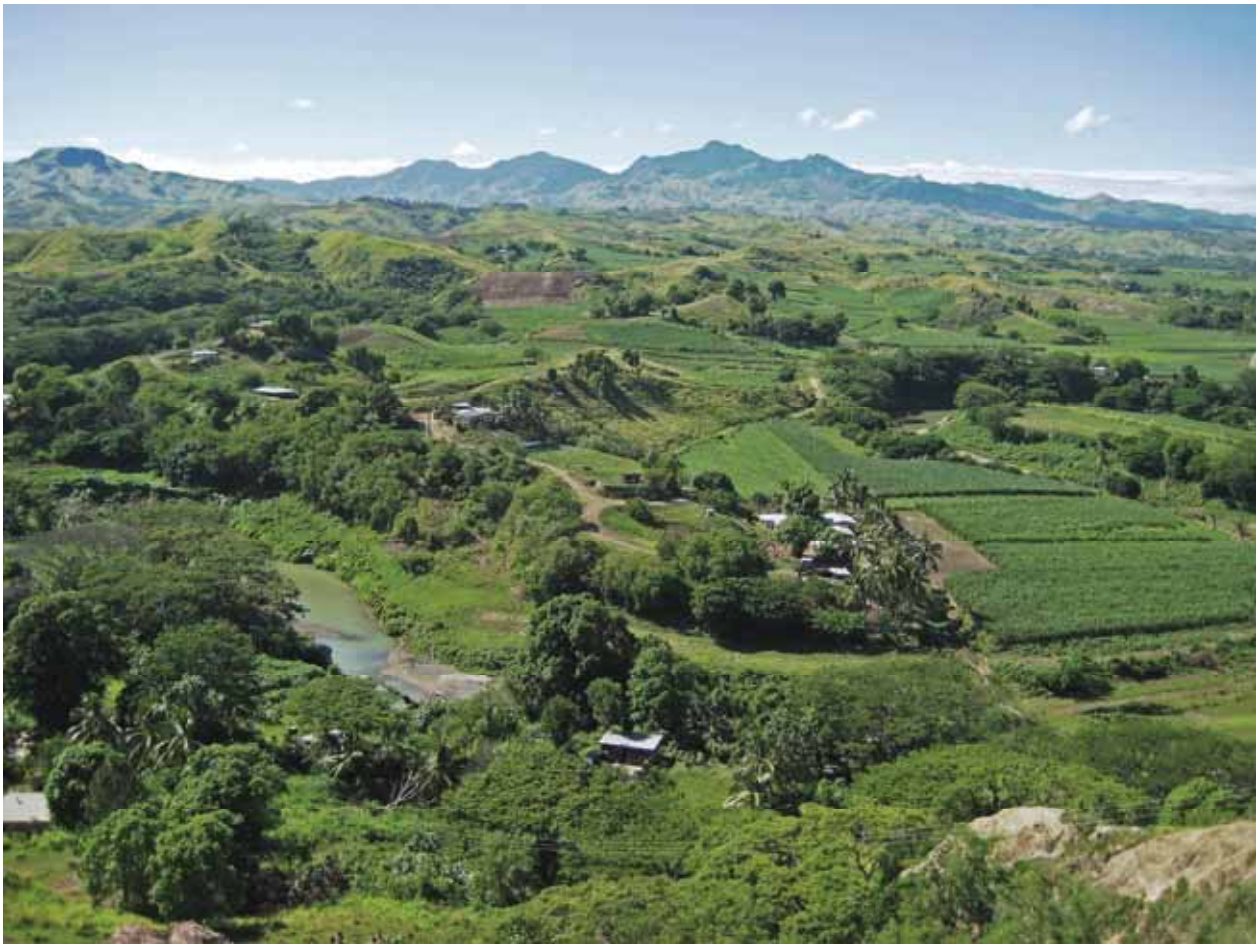
1. Ensure that policies and legal frameworks are in place to support, replicate and institutionalize the practice of risk-sensitive, sustainable watershed management, across political and institutional boundaries.
2. Integrate sustainable watershed management as part of urban development planning and urban risk management.
3. Enhance capacities to undertake risk-sensitive, sustainable watershed management planning in urban areas.
4. Promote innovative approaches to overcome capacity limitations, such as fostering public-private sector partnerships.
5. Support community and civil society involvement in watershed planning processes to build ownership and long-term support.

This policy brief is intended to raise awareness of the importance of sustainable watershed management for resilient urban planning, and to provide recommendations on how city and municipal governments can effectively utilize a watershed management approach for urban risk reduction. The policy brief aims to contribute towards the International Strategy for Disaster Reduction (ISDR) Global Campaign "Making Cities Resilient"[1] and strategic outcomes of the 2011 Global Platform for Disaster Risk Reduction.

1. Disaster risk in an urbanizing world

Urban areas are expanding globally, with increasing populations and migration from rural to urban centres. Already more than 50 percent of the world's population lives in cities, with a projection of 70 percent by 2030. Much of urban growth will take place in low and middle-income nations and mostly in hazard-prone coastal areas and flood plains.[2] As people, homes, infrastructure and industry become increasingly concentrated in cities, urban risk is also expected to increase.[3] Due to location, many cities are already exposed to multiple hazards, such as earthquakes, landslides, floods, and coastal storm surges.[4] However, cities that are exposed to hazards are not necessarily disaster-prone. Many hazards only become disasters when there are existing vulnerabilities that limit or reduce the capacity of individuals and society to manage, cope with and recover from hazard impacts. For instance, urban growth may take place in informal settlements, where housing construction is often of poor quality and basic infrastructure (drainage, waste disposal, water supply) is lacking. This multiplies disaster vulnerabilities, especially for the poorest segments of the population, who tend to settle in hazardous places in and near urban areas.[5] Enhancing urban resilience against disasters means reducing exposure and vulnerabilities, including those induced by ecosystem degradation.

Local governments, as the closest authority to the population and its territory, are recognized as key players in building resilient communities – communities that are better able to resist, cope with and recover from large and small hazards. Local governments are often the first to respond in case of disasters, but they are also responsible for providing key services and addressing multiple development priorities. Through an integrated approach to watershed management and urban risk reduction, city and municipal governments can seek to achieve their development goals as well as protect people and development investments against disasters.



The Nadi River Basin, Fiji © C.Warmenbol / IUCN

Case study 1. Managing the Nadi Catchment Basin for flood risk reduction, Fiji

Spanning an area of 512 km^2 and supporting approximately 51,000 inhabitants[6], the Nadi River Basin is of vital importance to Fiji. Nadi supports the country's main tourism centre and has major urban settlements, surrounded by sugarcane farming as the main agricultural activity in the watershed.

Heavy rainfall events in January 2009 were considered to be the worst in 75 years. The Nadi River peaked at 8 meters, flooding the Nadi Town and other low lying areas, affecting local businesses, tourist resorts, farmers and community residents. Economic costs of the 2009 floods in Nadi alone were estimated to be USD 73 million.[7] Although floods are common in Fiji, flooding incidences have increased in recent decades, posing significant challenges to flood risk management in the country.[8]

Flood risk reduction in Nadi would require improved economic and social development, urban land-use planning and watershed management. Since the 1980s, mainly as a result of receiving preferential access to European markets, sugar cane growers have expanded into the hills and onto steeper slopes. Sustainable farming practices, such as contour farming and use of vetiver grass, have declined, resulting in increased erosion and siltation of water bodies. The 1987 political coups also reduced public services, resulting in deterioration of water drainage systems and increased flood events.[9]

Presently, there is fragmented institutional and governance arrangements over land-use planning in Nadi and elsewhere in the country, which impede flood risk reduction efforts. The Nadi Town Council and Nadi Rural Local Authority are responsible for land-use planning, but many developments have been allowed that have affected drainage systems. Multiple government agencies are mandated to tackle rural and agricultural development, but their policies, plans and strategies are not harmonized and often remain unenforced, further exacerbating watershed degradation and contributing to excessive flooding.

To tackle these challenges, a Nadi Basin Coordinating Committee (NBCC) has recently been established under the UNDP-GEF funded Integrated Water Resource Management (IWRM) Project, supported by SOPAC and IUCN. NBCC stakeholders include: the Fiji Meteorological Services; the National Disaster Management Office; Ministry of Agriculture and Forestry, Lands Department; and the Nadi Town Council. The project is developing a "Ridge to Reef – Community to Catchment" IWRM approach that emphasizes policy and legislative reform and capacity development for national water resource management for sustainable development and flood risk reduction.[10] The project will contribute towards improving disaster risk management (including disaster preparedness, response, recovery and rehabilitation efforts) under an IWRM framework.

Additional information:
Lal, P. N. 2010. "Vulnerability to natural disasters: An economic analysis of the Fiji 2009 floods on the Fijian sugar belt". *Pacific Economic Bulletin 25(1): pp. 62-77.*
http://www.sopac.org/index.php/water-governance/iwrm-programme/gef-iwrm-project

2. Linking watersheds and urban resilience

A watershed encompasses the land area that water flows across or through on its way to a shared stream, river, lake, estuary or ocean. Also referred to as catchment basins, watersheds capture and store water from the atmosphere, but also release water slowly or rapidly through various water bodies. Watersheds often cross administrative or even national boundaries, and can traverse areas of wide geographic, ecological, social and economic diversity.[11] Important ecosystems within a watershed may include upland and lowland forests, rivers, streams, lakes, wetlands and mangroves. The unique combination of climate, geology, hydrology, soils and vegetation as well as anthropogenic (human-induced) activities shape and influence the watershed landscape, especially the condition of land and water resources.[12]

Watersheds provide a wide range of goods and services to both urban and rural populations and play an important role in supporting urban life and development (Box 1). Increasing or preserving tree coverage in upland zones helps maintain water quality and quantity in urban areas located downstream. Today at least one third of the world's biggest cities, such as, Singapore, Jakarta, Rio de Janeiro, New York, Bogotá, Madrid and Cape Town draw a significant portion of their drinking water from forested catchment areas.[13] Well-managed, healthy watersheds maintain water run-off, reduce erosion, filter sediments and polluting materials, stabilize slopes and stream banks and in many cases reduce the occurrence of shallow landslides and floods. Watersheds are also a source of economic goods that are vital to livelihoods and economies, and provide spaces for recreation and cultural heritage.

Box 1. Watershed ecosystem services

Watershed physical and biological processes and resources provide a wide range of goods and services to human populations, including[14]:

Provisioning services Services focused on directly supplying food and non-food products: • Freshwater supply • Crop and fruit production • Livestock production • Fish production • Timber and building materials supply • Medicines • Hydroelectric power • Transport and navigation	*Regulating services* Services related to regulating flows or reducing hazards: • Regulation of hydrological flows (buffer run-off, soil water infiltration, groundwater recharge, maintenance of base flows) • Natural hazard mitigation (e.g. flood prevention, peak flow reduction, landslide reduction) • Soil protection and control of erosion and sedimentation • Control of surface and groundwater quality • Climate regulation • Carbon regulation
Supporting services Services that support habitats and ecosystem functioning: • Wildlife habitat • Flow regime required to maintain downstream habitat and uses	*Cultural, religious and amenity services* Services related to recreation and human inspiration: • Aquatic recreation • Landscape aesthetics • Cultural heritage and identity • Religious, artistic and spiritual inspiration

Case study 2. Protecting and restoring the Miyun Watershed for livelihoods and city resilience in China[15]

Over the last 30 to 40 years, substantial efforts were made to reforest the Miyun landscape in China. The Miyun reservoir supplies up to 80 percent of the water used in Bejing, China's capital city, which has been experiencing worsening water scarcity. This problem is directly attributed to the disappearance of much of the original broadleaf forest in the Miyun Watershed.

In response, the Government instituted strict controls on land and forest use from the mid-1980s, including a total ban on logging, and invested substantially in reforestation and planting large areas of conifers and other species. Today, these strictly protected, young, even-aged stands of trees are in poor condition and contribute little to soil, water and biodiversity conservation, mainly because they have not been actively managed. Also as a result of the logging ban and strict regulation of forest access, local communities outside of Beijing have become progressively disadvantaged in economic terms over the last decades. There are few alternative income sources in the area, as cash incomes have traditionally been associated with forest products.

Since 1995, the Beijing Municipality has compensated Chengteh and Zhangjiakou Cities in the Hebei Province for the protection of the Miyun watershed. Currently the annual payment is USD 2.5 million, of which USD 1 million goes to Zhangjiakou. Funds are used only for specific purposes, including adoption of soil and water conservation measures and subsidies to farmers who convert paddy fields to dry farmland, forest land or grass land.

However, it was clear that the strict logging ban needed to be replaced with a new forest management strategy. In 2007, IUCN initiated a project that recognised the multiple needs and functions of the watershed and brought together the many different stakeholders and sectors with an interest in the watershed. A new set of forest management tools were introduced, representing a shift from a strict, protection-oriented approach towards more sustainable resource use through active management by forest-based communities.

Participatory planning has resulted in the formal recognition of different forest management and use regimes, harmonising the technical information held by Government foresters with local knowledge and priorities. Local communities are responsible for applying silvicultural treatments that improve forest structure, quality and function. A permit for harvesting timber has been secured – the first to be issued in more than 20 years. A new system of harvesting fuel wood has been set in place, while significant progress was made in reducing local fuel wood demands. Finally, support has been provided to establish community-based cooperatives for marketing forest goods and services, with the aim of increasing and diversifying local income.

3. Urban risk and watershed degradation

Urban expansion, unplanned development and inappropriate land use - all linked to poor governance - have contributed to significant degradation of watersheds through deforestation, wetland reclamation, river channel alterations, urban pollution, and impervious surfaces (e.g. roads and paving, rooftops, etc.). This can diminish the natural regulating and buffering functions of watersheds against water-related hazards such as floods, landslides and drought, as well as reduced watershed capacities to provide vital products and services on which urban areas and local livelihoods depend. Human activities upstream and in peri-urban areas, can increase siltation and blockages of drainage systems, reduce ground infiltration and exacerbate run-off. Downstream communities are often forced to offset the loss of ecosystem services

from watersheds, generally through costly engineering such as flood control projects and water and sewage treatment plants.[16] Increasingly, combined approaches that utilize both engineered and environmental infrastructure are being recognized as complementary solutions to provide protection, reduce risk and maintain functioning ecosystems and the goods and services they provide.

Climate change can exacerbate existing risks to watersheds and urban populations, with more unpredictable and extreme weather events. For instance, heat waves increase energy demand for cooling. During drought periods, energy generating stations have limited capacities to discharge cooling water, and areas reliant on hydropower may face interrupted supplies. During floods, water supply networks and wastewater treatment systems are often at risk from both physical damage and contamination.[17] Planning for the future means improving present capacities to cope with future shocks, but also requires changing consumer demands and lifestyles and balancing multiple sectoral needs for watershed services.

Case study 3. The Marikina Watershed Integrated Resource Development Alliance: Building partnerships for disaster risk reduction in urban centres of Metro Manila, Philippines

The Marikina watershed located in the wider metropolitan area of Manila, the city capital, spans 28,000 hectares of what used to be rainforests and cuts across three main townships (Antipolo, San Mateo and Rodriguez). Only roughly 20 percent of the rainforest remains.

In late 2009, the Philippines was battered by tropical storm Ondoy and typhoon Pepeng, leaving nearly a thousand dead and thousands homeless, with total damage and losses estimated at USD 4.38 billion. The intensity of flash floods that devastated the Metro Manila region was attributed to the degradation of the Marikina Watershed.

Local government leaders - led by Marikina City Mayor and the Mayors of Pasig City, Antipolo City, Cainta City, Quezon City, Rodriguez and San Mateo – also known as the "Alliance of Seven", in September 2010 signed a Memorandum of Agreement and committed to work together to rehabilitate and sustainably develop the Marikina Watershed under the framework of disaster risk reduction and enhancing urban resilience. Proposed actions include rehabilitation and reforestation of the Marikina Watershed, including a review of existing policies, resettlement plan for high-risk communities and possible in-city relocation and livelihood assistance, as well as the development of harmonized mechanisms within a sustainable and climate-sensitive plan for the Marikina Watershed.

Emphasis is also placed on building partnerships not only between the seven city governments but also with other key stakeholders across the seven municipalities, including civil society and the private sector. The Alliance of Seven is working with citizens groups and local NGOs, and will also build on previous reforestation efforts by the United Coconut Planters Bank, a private bank, which started in the 1990s to rehabilitate the Marikina Watershed.

Additional information:
http://www.mb.com.ph/articles/309591/workshop-disaster-reduction
http://envicluster.wordpress.com/2010/10/19/business-mirror-alliance-of-6-works-to-bring-marikina-watershed-to-life/
http://www.businessmirror.com.ph/component/content/article/53-agri-commodities/2630-alliance-of-6-works-to-bring-marikina-watershed-to-life

4. Good practices in sustainable watershed management for urban resilience

Urban policymakers and planners need to incorporate risk-sensitive, sustainable watershed management as part of development and land-use planning, in order to build urban resilience against water-related hazards and the effects of climate change. In the past, watershed management approaches heavily utilized engineered technology such as dykes or river channelling and were typically much more centralized at the national level. Recent experiences in effective watershed management have moved towards an ecosystem-based approach, which may still be complemented by engineered solutions as appropriate. Sustainable watershed management balances water needs amongst multiple users while it protects the long-term ability of ecosystems to capture, store and release water. Incorporating risk-sensitivity in watershed management regulates resource use (i.e. land and water) in order to prevent or reduce the impacts of water-related hazards and to develop coping capacities to recover from these hazards.