

## **Water and Environment in Tanzania: A Case of Pangani River Basin**

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### **Abstract**

The Pangani River Basin is of the size of about 43,650 km<sup>2</sup>, with about 5% of this area in Kenya, and the remainder distributed across the Arusha, Manyara, Kilimanjaro and Tanga regions of Tanzania. The Pangani River system drains the southern and eastern sides of Africa's highest peak, Mt. Kilimanjaro (5,985 m) as well as Mt. Meru (4,566 m), then passes through the arid Masai Steppe, draining the Pare and Usambara Mountains before reaching the coastal town of Pangani, marking its estuary with the Indian Ocean.

Pangani Basin is one of Tanzania's most productive areas, with nationally important agricultural outputs and hydropower production (95 MW, 17% of Tanzania's national power grid capacity) as well as globally important forest and biodiversity resources. The basin hosts an estimated 3.7 million people, 80% of whom rely directly or indirectly on irrigated agriculture for their livelihoods.

Climate change has had a significant effect on the basin and the situation is expected to worsen. Glacial ice caps of Mt. Kilimanjaro, towering over the basin, are expected to disappear by 2020 and increased temperatures are expected to result in a 6-9% annual reduction in surface flows (VPO-URT 2003; OECD 2003). Climate change and abstractions have reduced in-stream flows from hundreds to less than 40 m<sup>3</sup> per second (IUCN 2003) over the past decades.

Pangani is a water-stressed basin with many latent and emerging conflicts among water user groups. Current supplies do not even meet the allocation of the more than 1000 users holding water rights. In addition, there are more than 1800 traditional abstractions that do not hold water rights (PBWO 2005). Water is over-allocated, resulting in many conflicts among water user groups. Conflicts include conflicts of scale, conflicts of tenure and conflicts of location.

## **Introduction**

Water within a basin serves human needs such as drinking, cooking, washing and sanitation; allows arid land to become productive through irrigation; provides a habitat for plants, fish, and wildlife; supplies urban and industrial uses; generates electricity through hydropower; and supports many recreational uses. River resources around the world have been developed and managed or centuries of control volatiles supplies of water in order to meet demands for water quantity, quality and reliability in time and space (Loucks, 1981).

River basins are typically large, crossing not only private property lines, but regional and international boundaries as well. Localized development of water resources to meet community and regional needs for clean water and food and has often come without regard to other users or uses. Thus, comprehensive plans to develop and manage basin resources have been the exception rather than the rule. Private agendas, contradictory objectives, and histories of no cooperation increase the difficulty of achieving efficient resource management. High information costs due to the many users of river basin have impeded the process of negotiation and exchange that could lead to a socially optimal allocation. Consequently, conflicts over the developmental and allocation of water persist.

The dominant use-conflicts over river basin resource allocation are the water quantity and water quality in space and time. Uses may be classified as either consumptive or non consumptive. Consumptive use is defined to be the amount of water withdrawn from the system in such a way that it is no longer available for other uses or users. In this respect, river basin water has common pool characteristics in that one use precludes other uses. Examples are agricultural irrigation and urban water use. Consumptive uses may compete by sector (e.g. municipal, agricultural, and industrial commercial), within sectors (allocation to one farm versus another farm), or regionally (upstream regions versus downstream regions). Non consumptive uses do not result in a significant reduction in net stream flow, and depending on the type, may allow for multiple non conflicting uses at the same time and location.

## **Dialogues**

Dialogue processes require time and resources and they increase the transaction costs of water management. At the same time, they can strengthen Water Users Associations, foster relationships between the government and communities, and promote the formation of Water Users Associations where they did not yet exist. Dialogue processes have a better chance of success, if they are initiated prior to a crisis situation. The process should include: an analysis of the conflict, relationship and trust building, negotiating solutions and action plans and joint implementation of the action plans. The more inclusive the process is the more sustainable and equitable the outcome will be.

## **Conflicts**

Conflicts have emerged between water users of different sizes and power in the basin. Large scale plantations, often backed by foreign investment and using hundreds of litres of water per second through efficient drip irrigation systems, differ starkly from small-scale users of traditional furrow systems with efficiency as low as 14%. Similarly, the three urban centres in the basin require more water as they expand, pitting city municipalities against the village governments of farming communities.

## **Land Tenure**

Tenure is the right to manage a resource. Many small-scale users in the Pangani Basin are reluctant to apply and pay for water rights, arguing that water is a 'gift from God'. These communities reject government efforts to manage water resources, even to the point of vandalizing water control gates and structures.

## **Conflicts of Location**

Tanzania Electric Supply Company (TANESCO) pays a royalty to the Ministry of Water & Livestock Development for 95 MW, assuming a 45m<sup>3</sup>/s flow of reduced rainfall and upstream abstractions, flow to the hydropower installation is often as little as 15m<sup>3</sup>/s, limiting production to as low as 32 MW and creating national-level conflicts as power supply to the national grid is compromised. In addition, reduced flows have led to saltwater intrusions almost 20km upstream, compromising agricultural activities in the lower basin and creating conflicts.

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The Pangani Basin Water Office (PBWO) and its Board are tasked with managing and allocating water resources in the basin and ultimately balancing stakeholder demands in light of reducing supply. For two years, PBWO has been working in partnership with the local NGO Pamoja and IUCN to address water-related conflicts.

### **Solutions to Conflicts**

Some of the necessary steps to resolve these conflicts include: awareness rising about water sector reforms, IWRM, and the likely effects of climate change; and supporting the water allocation process with technical data including the environmental, economic and social costs and benefits of different allocation scenarios. These steps are underway in the Pangani Basin in a project that is part of the IUCN Water & Nature Initiative. In the meantime project partners have been working on a Dialogues Process to address some of the conflicts in the basin. This process included a detailed situation analysis of conflicts at five different sites in the basin, including conflicts of scale, tenure and location. A stakeholder workshop, including representatives from communities, local and national government and technical experts, was held to discuss the situation analyses and propose a way forward for resolving these conflicts. Subsequently, dialogue platforms were established at each site to bring together actors to discuss the contentious issues and work towards consensus in resolving them. In one case this included negotiating an agreement for land-use planning that allows pastoralists access to water supplies.

Another case involved recognizing the efficacy and to some extent reinstating traditional systems where water was managed by hydrological boundaries and not administrative boundaries, making it easier to negotiate agreements between upstream and down stream users. In one case, a conflict between the Arusha Urban Water Supply and small-scale downstream users, the dialogue process has stalled because of political and national interests. The dialogue process in itself has gone far in bridging the gap between the Pangani Basin Water Office and the communities who did not understand the PBWO's role in managing and allocating the resource and thus were refusing to apply for water rights. The dialogues process, in all cases,

strengthened water user associations (WUAs). Some of the lessons learned in this phase of the dialogues process include:

#### Authority

Traditional governance systems had ways of dealing with water conflicts and these traditional arrangements should be recognized and accommodated by authorities as much as possible within water sector reforms. In such cases, the role of the basin office is as a technical advisor on policy, legislation and best practices rather than an enforcement agency.

#### Devolving Decision-Making to Lower Levels

People need to have a stake (ownership) in resources as an incentive to use the resource sustainably. Therefore issues of equity, land tenure, ownership, rights and distribution of benefits must be addressed.

#### Role of Dialogue in Strengthening Water Resources Management

Dialogue forums strengthen Water Users Associations (WUAs) and may stimulate the formalization of WUAs and/or the formation of similar associations. Demonstrations are powerful, especially the demonstration, or threat, of a well-organized neighbour with legal rights to water.

#### Dialogue Processes

Dialogue processes have a better chance of success if they are initiated prior to a crisis situation. Steps in the process includes, understanding the conflict, building relationships and trust, agreeing on solutions (signing memorandums of understanding with action plans) and joint implementation of action plans.

#### Willingness to Negotiate Equitable Solutions

The co-existence of legal and illegal water users (Those with and without water permits) hinders the willingness to negotiate equitable solutions. The more inclusive the process is the more sustainable and equitable the outcome will likely be. Increased inclusion, however, does have higher transaction costs.

### Capacity and Strength of Local Institutions

Water is a cross-cutting issue and as such, many sectors have a role to play. These include ministries of water, of agriculture, of planning, of regional and local governance, among others. Sometimes these various sectors overlap in their mandates that causes confusion. Institutional arrangements for water management must be clarified, harmonized and publicized at all levels (national, regional, district, local).

### Site Specific Approach

The local, site specific variables including history (colonization, chiefdoms, centralization, decentralization), current politics and market forces, population demographics, and effects of climate change all come into play over water negotiations and must be understood in the dialogues process.

### **Conclusion**

In the case of the Pangani Basin, with more than 500 water users associations (WUAs) and many of these having conflicts over water, it is time-consuming and expensive to establish and foster dialogue processes at all sites. For especially important conflicts (those involving significant numbers of people or resources, or violence) specific forums should be established.

Other conflicts, we hope, can be treated within the context of sub-catchments forums. The Tanzanian National Water Policy (2002) and Water Sector Development Strategy (in draft) make provisions for such forums. There is a plan of establishing the first sub-catchments forum in Tanzania in the Kikuletwa Subcatchment, one of the most contentious areas in the Pangani Basin. In preparing to establish the forum, they will conduct a situation analysis for the sub-catchments, convene a stakeholders meeting to get feedback on the situation analysis and input into the design process for the forum, conduct training and awareness-raising to establish a common understanding of water policy, legislation, and IWRM principles and prepare WUAs for participation in the forum.

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