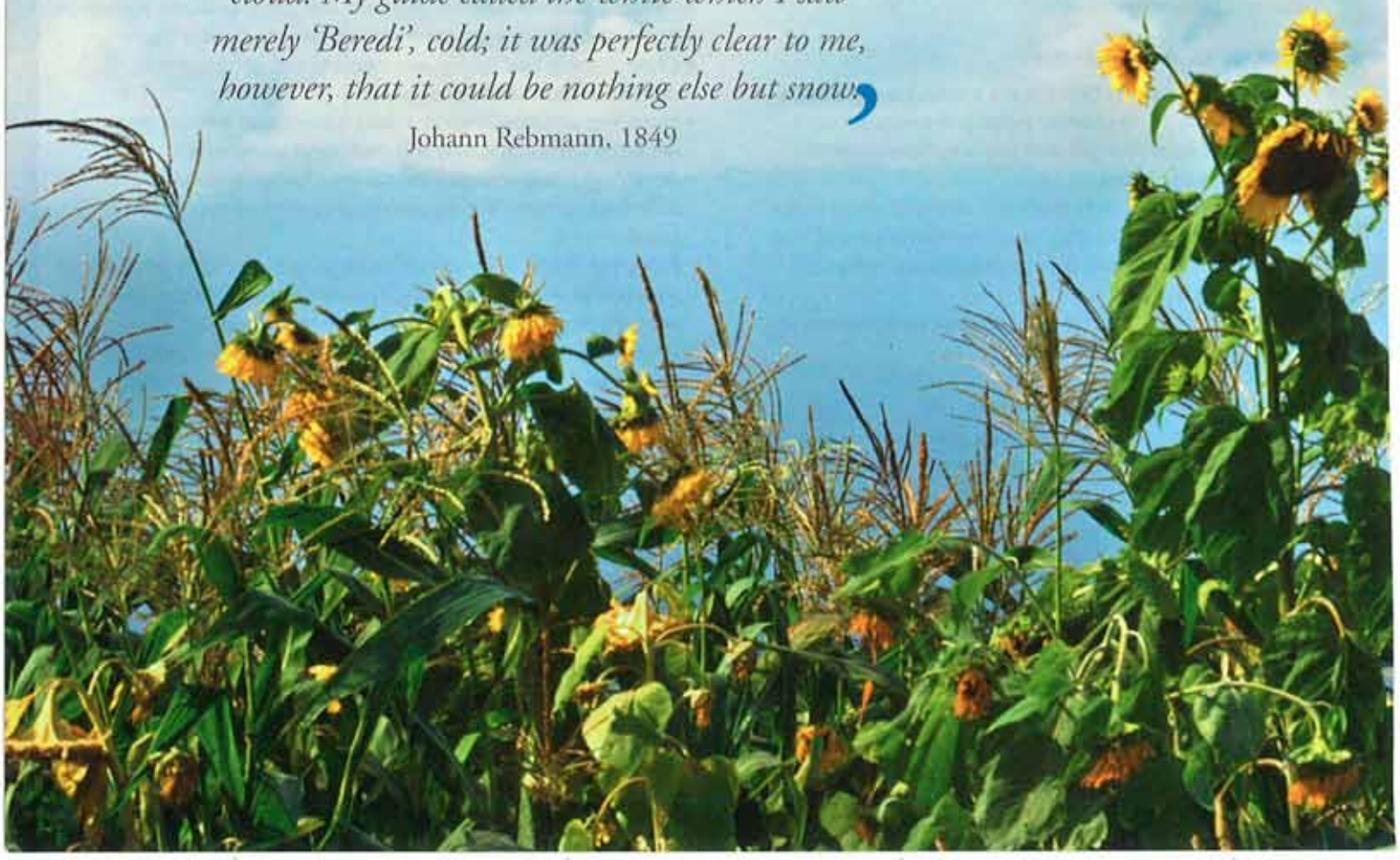
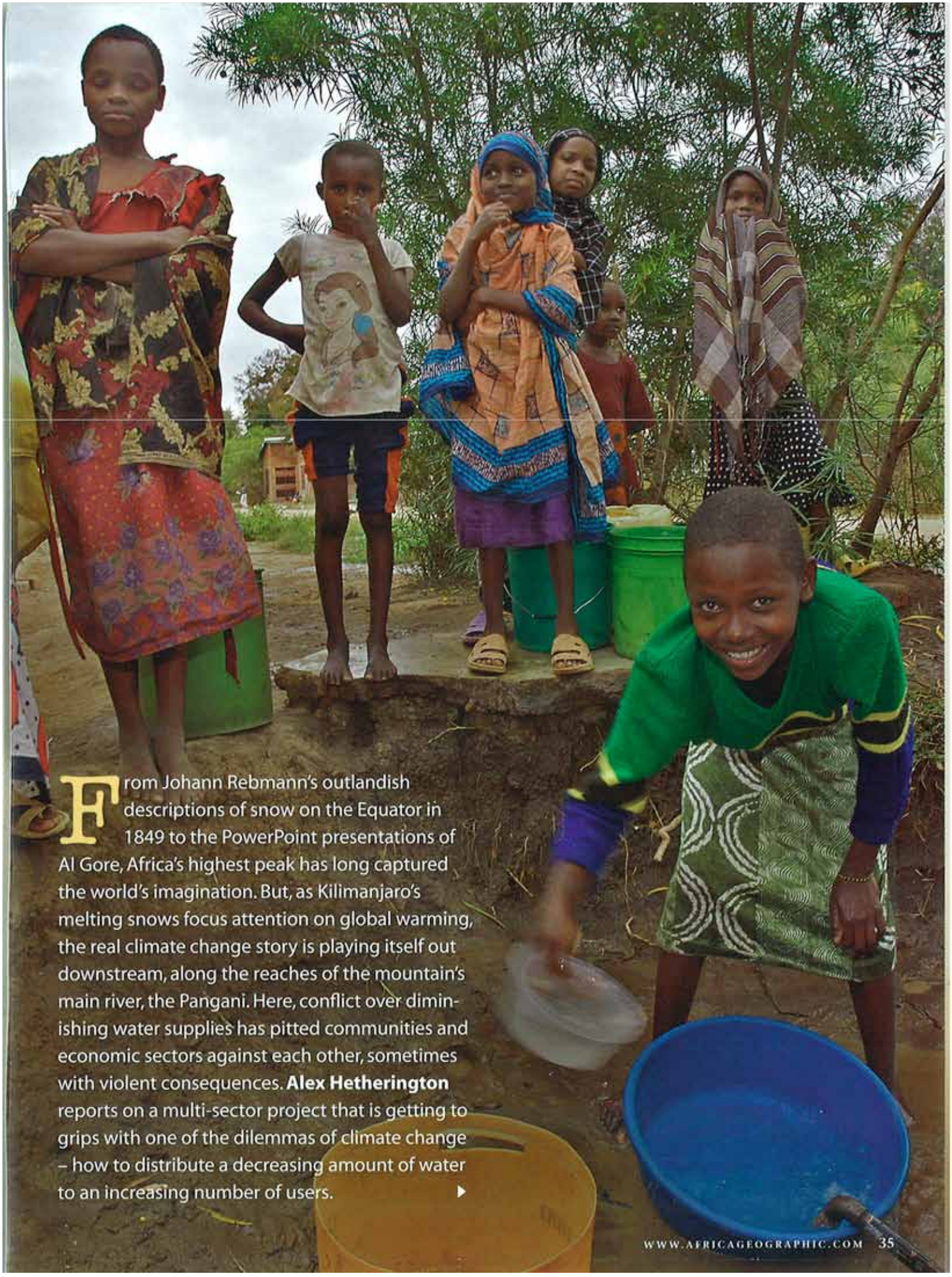
the spoils of KILIMANJARO

TEXT BY ALEX HETHERINGTON
PHOTOGRAPHS BY GEORGINA GOODWIN

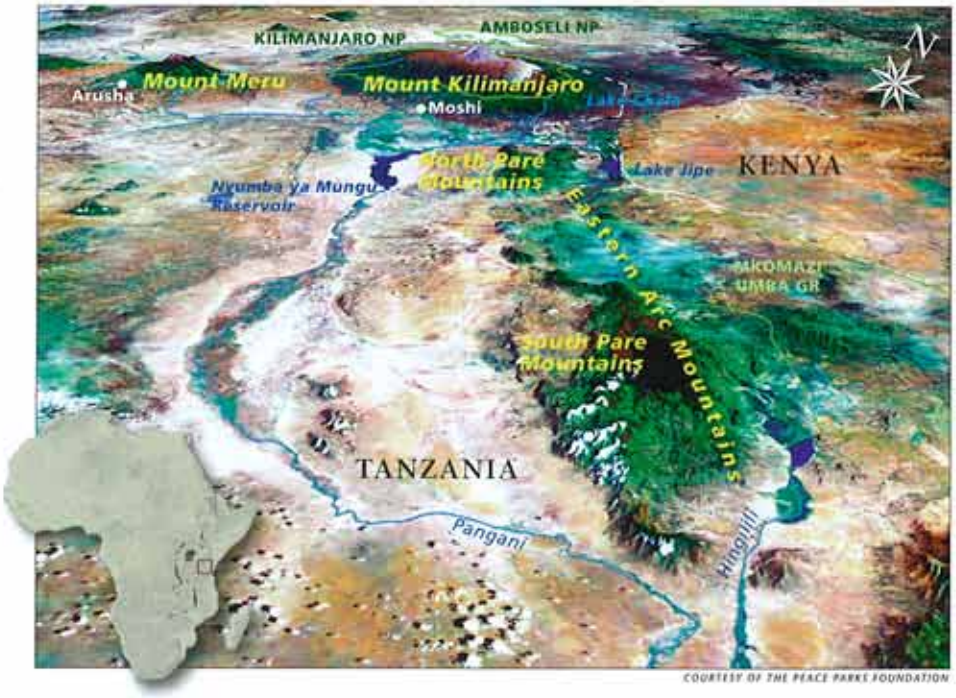
'This morning we discerned the Mountains of Jagga more distinctly than ever; and about 10 o'clock I fancied I saw a dazzlingly white cloud. My guide called the white which I saw merely 'Beredi', cold; it was perfectly clear to me, however, that it could be nothing else but snow.'

Johann Rebmann, 1849





From Johann Rebmann's outlandish descriptions of snow on the Equator in 1849 to the PowerPoint presentations of Al Gore, Africa's highest peak has long captured the world's imagination. But, as Kilimanjaro's melting snows focus attention on global warming, the real climate change story is playing itself out downstream, along the reaches of the mountain's main river, the Pangani. Here, conflict over diminishing water supplies has pitted communities and economic sectors against each other, sometimes with violent consequences. **Alex Hetherington** reports on a multi-sector project that is getting to grips with one of the dilemmas of climate change – how to distribute a decreasing amount of water to an increasing number of users. ▶



COURTESY OF THE PEACE PARKS FOUNDATION

Home to some 3.7 million people, the 43 000-square-kilometre Pangani River basin stretches from Kilimanjaro's highest slopes eastwards to the tropical estuary near Pangani town, 300 kilometres north of Tanzania's one-time capital, Dar es Salaam. The river passes through the country's prime sugar plantations as well as considerable swamp resources, the Jipa and Chala lakes and the Nyumba ya Mungu reservoir, all of which support fisheries.

It also skirts the rich forest ecosystems of the Eastern Arc Mountains, one of the world's top 25 biodiversity hotspots. Here, it is believed that 30 per cent of the estimated 2 000 plant species, including the African violet *Saintpaulia*, are endemic, while up to 80 per cent of the region's spider and millipede species may have ranges that


Kilimanjaro, 17 February 1993


Kilimanjaro, 21 February 2000

NASA/GODDARD SPACE FLIGHT CENTER SCIENTIFIC VISUALIZATION STUDIO AND USGS

SNOW PATROL

Researchers believe that the ice fields on Africa's highest mountain have shrunk by almost 80 per cent in the past century. Some scientists are saying that the snow cap, formed 11 000 years ago, could be gone completely within two decades.

are limited to a single mountain. With glacier melt and two annual wet seasons to replenish its waters, the Pangani and the people it has served have thrived. That is, until recent times.

In 2000, violence broke out in villages along the Pangani's Hingilili tributary in the South Pare Mountains, 200 kilometres east of Moshi. The river's lyrical name belies the seriousness of the event. Although no deaths resulted, district police were called in to calm the situation and restore order, while administrative authorities embarked on a lengthy process of dialogue and conflict resolution. Centuries of trust between neighbouring communities had been broken and reports indicated numerous similar conflicts in other parts of the Pangani basin. At the heart of the problem, quite simply, was access to water.

For centuries, the waters of the Pangani and its tributaries were controlled by customary law, enforced at the discretion of local chiefs. It was an efficient system where traditional knowledge, passed down through generations, recognised the fact that the highlands of the basin receive markedly more rainfall than its lowlands and acknowledged the need to secure water for downstream users and the overall health of the ecosystem.

This communal and ecological awareness was scuttled in 1972 with the introduction of centralised political and social control that divided the Hingilili River into upland and lowland administrative areas and, in so doing, effectively eliminated all previous integrated, community-controlled water management. In a single political act, the region was cleanly bisected and the annual flow of the Hingilili began to choke.

It was, in many ways, a classic tragedy of the commons. With disregard for their lowland neighbours, upland agriculturalists extracted increasing volumes of water and built additional channels and furrows to irrigate their growing fields. The quantity and quality of the water that reached downstream users, predominantly pastoralists, began to deteriorate. By the 1990s, changes in rainfall patterns had also become increasingly noticeable and the livelihoods of lowland communities were severely threatened. Downstream furrows and intakes fell into disrepair and heated exchanges finally boiled over into outright violent clashes.

Are these troubles an early indicator of the impacts of climate change – a precursor to the much-touted global water wars?

The satellite images are stark. Kilimanjaro's iconic ice cap has retreated 75 per cent since 1912, taking with it the glaciers that help to feed the Weru-Weru and Kikafu rivers, important branches in the headwaters of the Pangani. While it is not clear whether the increase in average global temperatures (up by 0.35 °C since 1979) has contributed directly to the glacier melt, it has certainly impacted on the mountain's rainfall patterns.

Since 1948, there has been a small but significant decrease in humidity on the mountain, which not only affects glacial stability (most ice accumulation occurs during the wet season), but also the replenishment of ▶

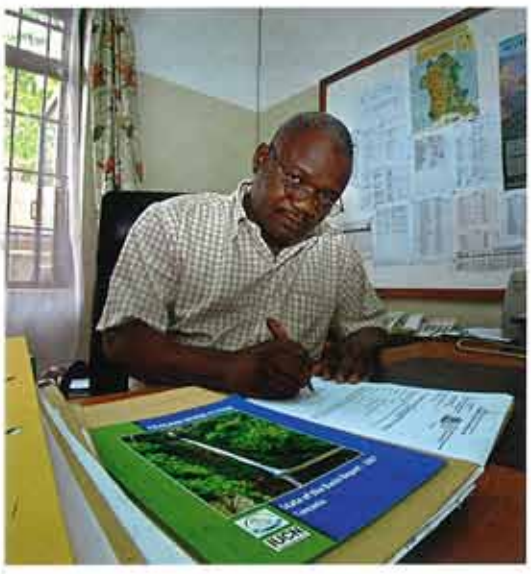
OPPOSITE A farmer waters her lettuces from one of the water channels developed to divert water from the Hingilili River into surrounding farmlands. In 2000, increasing take-off by upland agriculturalists led to violent clashes with disgruntled lowland water users.

PREVIOUS SPREAD, LEFT The past 25 years have seen dramatic changes in the Pangani River basin. New commercial activities, such as sunflower cultivation, have driven urbanisation and placed added pressure on water resources.

PREVIOUS SPREAD, RIGHT Young women from the village of Gonja in the foothills of the South Pare Mountains collect water piped from the Hingilili River. Following the unrest in 2000, initiatives such as the Pangani River Basin Management Project are working to ensure that everyone gets a fair share of the water they need.

ABOVE Mairamu Juma sifts and dehusks sundried rice in the lowlands of the South Pare Mountains. She relies on the Hingilili River to irrigate her crop.

BELOW Hamza Sadiki, man-on-the-ground for the Tanzanian Ministry of Water, believes that the problems and challenges being experienced in the Pangani River basin are early indicators of the impacts of climate change.



the mountain's many rivers. For the Pangani, which receives more than half of its water from these slopes, the net result has been a reduction in flow.

At the river's end, the situation is no better. The Pangani estuary, formerly a rich concentration of marine and aquatic biodiversity, is salting over as the Indian Ocean's incoming tides dominate the river's weakening, freshwater flow. Pollution is up and levels of dissolved oxygen, a vital factor in the health of fish and plant populations, are down.

Historically the people of the basin may have had the adaptive capacity to withstand these changes, but rapid social and economic shifts of the past 25 years are placing exceptional pressure on the region. Population growth is visible and the surrounding forests are under threat, as traditional subsistence farming lifestyles expand into previously virgin areas. Between 1952 and 1982, the natural forests of Kilimanjaro – a key component of its catchment capacity – were reduced by 41 square kilometres.

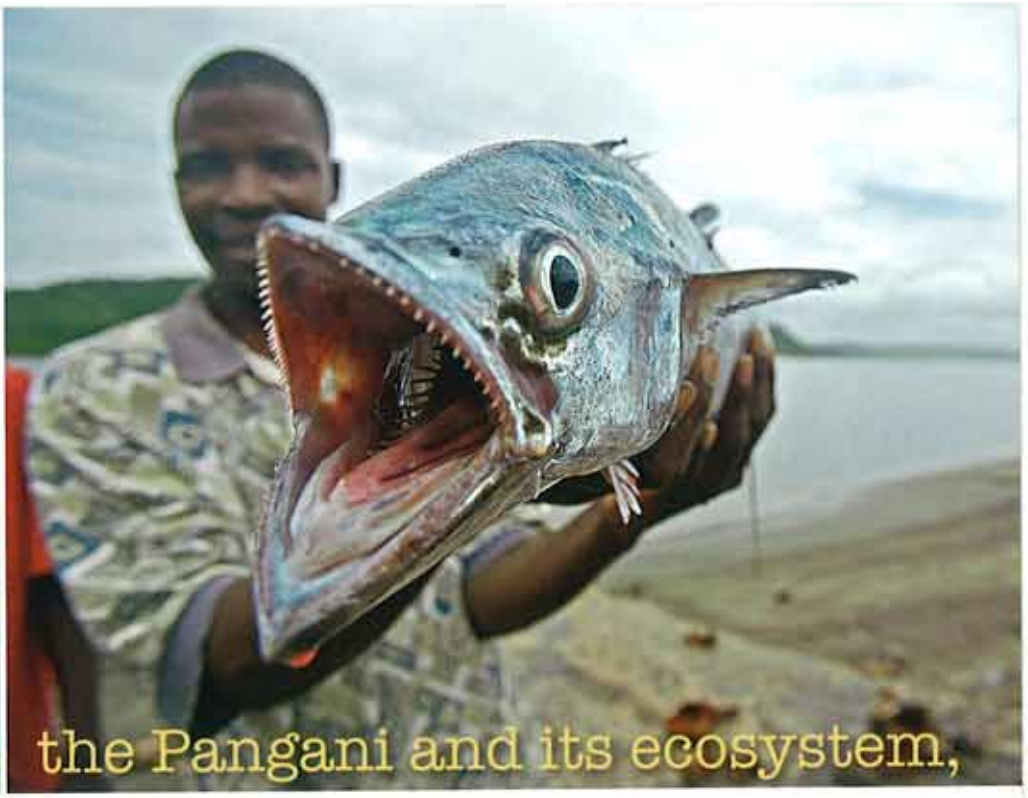
New high-end commercial agricultural activities in sisal, flowers, vegetables and tea for the European export market are causing demographic movements into the main towns of Arusha, Moshi and Boma Ng'ombe, with unprecedented pressure being exerted on their infrastructure and services. In 1995, total water demand in the Tanzanian portion of the basin was 155 000 cubic metres (that's the equivalent of 62 Olympic-sized swimming pools) per day; by 2015, this is expected to top 284 700 cubic metres per day.

Electricity demand, too, has increased, and the Pangani has been dammed in three places for hydropower purposes, with the aim of delivering 17 per cent of Tanzania's electricity needs. The dams were built specifically to restrict the country's dependency on fossil fuels and to ensure its own energy security, yet, as Tanzania's economy grows and consumes more natural resources, the opposite is happening.

All of these sectors demand high volumes of dependable water. Commercial farmers are intensive irrigators and account for the greatest use of water in the basin; rural villagers rely on it for drinking, food security and fishing; and hydropower needs a strong, consistent flow. But the Pangani and its ecosystem, already compromised by a series of climate-change body blows, is buckling under the pressure.

'Quite simply, the water is limited and the demands are high,' says Kelly West, head of the IUCN's East Africa Water Programme, alluding to the situation along the Hingilili.

West and her colleagues from the IUCN are working with the Tanzanian Ministry of Water, the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP), the EU's ACP Water Facility,



the Pangani and its ecosystem, already compromised by a series of climate-change body blows, is buckling under the pressure

local NGOs and community structures. The aim is a basin-wide assessment of the river's environmental flows (the amount of water required to maintain a healthy ecosystem) as well as the environmental, social and economic needs of all stakeholders. The information is being collated under the auspices of the Pangani River Basin Management Project (PRBMP) in Moshi and is used to inform decisions on the allocation of water and future cost-benefit analyses.

'You can't consider environmental flows without considering the economic and social aspects of water-allocation scenarios. It fits with the triple pillars of sustainable development, requiring trade-offs to be made between different water users, including the environment,' says West.

For Washington Mutayoba, director for water resources in Tanzania's Ministry of Water and member of the international advisory board to the IUCN's Water and Nature Initiative (WANI), which promotes integrated water-resource management at a river basin level, the conflicts were an 'early indication' of the impact of climate change.

The Ministry's man-on-the-ground, River Basin Officer Hamza Sadiki, is more straightforward in his causal linkages. 'There is climate change, and the people are crying out to us. What can government do? We tell them they have to change their lifestyles,' he says. The PRBMP, on the other hand, is quick to point out that climate is one of many key changes taking place in the Pangani basin. It is demanding more information on the effects of climate change, with a new report imminent.

Realisation of the conflicting water interests has reached the highest echelons of power in Tanzania. The national government, recognising that water-resource allocation is best managed close to the ground and is the most effective way to avoid conflict, has been devolving authority to a local level. In 2002, a new national water policy was introduced, encouraging local-level water-user associations (WUAs) to be formalised, with limited powers of decision making. This was further reinforced by the introduction of Tanzania's draft Integrated Water Sector Management Strategy in 2004. The new policy also calls for decision makers to prioritise the use of a river according to basic human needs, followed by environmental requirements and all other uses thereafter.

At the basin level, Sadiki and his fellow national government officers analyse and determine allocations according to the competing economic sectors and are greatly informed by projects such as the PRBMP and its various partners. Such dialogue is being ▶

ABOVE At the Pangani River mouth, fishermen sell their oceanic catches. In recent years, the freshwater flow of the river has weakened, resulting in an increasingly saline estuary.

ABOVE, LEFT A key tributary of the Pangani, the Hingilili River is a valuable resource for both upland and lowland farmers.

Two locals from the South Pare Mountains on their way to fetch water. The region's increasing human population is putting added pressure on water resources, already compromised by falling rainfall figures.

driven right down to the local level and the benefits are beginning to be felt along the Hingilili.

'With the kind of [climatic and social] realities that we face today, we have to work together,' explains Yusuph M. Yusuph, chairman of the Hingilili Basin Association or HIBA, an umbrella committee of local water-user groups on the Hingilili. HIBA was established in the wake of the Hingilili clashes specifically to resolve issues between upland and lowland users of water. The individual users are diverse, ranging from the inhabitants of the Hingilili's rural villages and subsistence small-scale farmers to cooperatives. Yet their lives, through their interdependence on the same water source, are intertwined.

Yusuph, himself a rice, maize and ginger grower in the lowland, remains envious of upland farmers with their first take of the Hingilili's water during the dry season. Nevertheless he has a vision of the future and has put his own self-interest aside for the betterment of the catchment area. With reference to some of the dilapidated irrigation infrastructure that resulted from the time of conflict, Yusuph is philosophical. 'If we had an organised association in those days, we would have ensured they were all built properly to prevent siltation and breakdown. There was little discussion then,' he explains.

The newfound cooperation on the Hingilili is fundamental to ongoing peace. Community liaison officer Nasim Losai works with local dialogue and governance NGO Pamoja (meaning 'togetherness' in Swahili), a partner organisation to the PRBMP. She has been involved in the community negotiations for many years and is well aware that the success of water-user dialogue is often precarious and dependent on emotional reactions to changing social and environmental conditions.

'The one thing about community dialogue,' says Nasim with a slow smile, 'is that it takes time. Much patience is needed to achieve the desired result.'

And therein lies the rub for the Pangani and its changing climate – time. For generations, the waters filling this river were constant and abundant. Within living memory, this has changed dramatically. Now, the real question lies in how fast and effectively the people of the basin can adapt to ensure that they all receive satisfactory and equitable amounts of water. ■

Alex Hetherington was commissioned in 2007 by the IUCN Water and Nature Initiative (WANI) to document stories on integrated river basin management in southern and East Africa. With due acknowledgement from the IUCN WANI, he has filed this story for *Africa Geographic* from Tanzania's Pangani River basin.