



Achieving Sustainable Watersheds

Research4Life's OARE platform helps researchers in Kenya address local environmental challenges

For generations, the Ogiek tribe in Kenya's Rift Valley has inhabited the Mau Forest in the Njoro River watershed, relying on the river flowing through the valley and surrounding forest for food and shelter. In recent years however, the tribe's traditional way of life was forced to change as a result of a growing human population and over-farming in the valley. The tribe was no longer able to live in the forest and was forced to subsist on a river that had become stagnant and hazardedly polluted.

The rest of the watershed's local community and wildlife was also affected by pressures on the environment and the river – a key source of water for the 300,000 residents and the surrounding wildlife. The river's water bacterial coliform count rose sharply above the WHO recommended limit of 24 and was recorded at levels of up to 100,000 in some areas, leading to sickness among residents.

Njoro Watershed Facts

- 300,000 people
- 302 km² of Lake Nakuru watershed
- The Njoro River is 60 km in length
- It contributes 39% of the runoff into Lake Nakuru

In addition, disruption to the natural hydrological processes put pressure on the region's biodiversity. In Lake Nakuru, which shrank dramatically in size due to a reduction in the quantity of water flowing from the river, the resident pink flamingos' population decreased from 1.2 million in 2004 to just 70,000 by 2007.

Dr. Poli Semenye witnessed the devastation in the Njoro River watershed first-hand and began to take action. He engaged the local research community to study the region and determine ways to best address the threats to the watershed and their impact on human life and wildlife. A challenge however, arose in researchers' lack of access to up-to-date research and data, crucial to helping them find solutions.



The Ogiek tribe on their ancestral homeland



Pink flamingos in Lake Nakuru





Research4Life

Support came through Research4Life, a program designed to overcome the digital divide in access to leading research and help address the UN's Millennium Development Goals.

Research4Life stems from a speech made in 2000 by former UN Secretary General Kofi Annan who reiterated the importance of using Information and Communication Technology (ICT) and public-private partnerships in supporting development. Research4Life provides scientists, doctors, researchers, and policy makers in developing countries with access to peer-reviewed scientific journals, books and databases.

Through the UN's three main partners, the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the United Nations Environmental Programme (UNEP), Research4Life facilitates access to the latest advances and thinking in the sciences via an online platform. As the sole technology partner, Microsoft has supported the technical infrastructure for access and authentication, information delivery, and the platform's search and security features.

OARE, the environmental channel supported by UNEP, includes targeted research in environmental toxicology and pollution, zoology, botany, ecology, environmental law and policy, climatology and energy. OARE also facilitates the application of this research in the development and adoption of environmentally sound policies, strategies, practices and technologies.

Key facts about Research4Life

- Provided to 108 developing countries
- Access to 7,500 journals
- 340 different publishers including Elsevier, Springer Verlag and Wiley-Blackwell
- Supported by Microsoft, UNEP, WHO and FAO

In Kenya, Dr. Poli Semenyé worked with researchers from nearby Egerton University and utilized OARE to construct innovative solutions tailored for the Njoro River watershed. Together, they launched SUMAWA, a multi-disciplinary research effort focusing on reducing pollution in the Njoro watershed and educating the region's residents. Through partnerships with Kenyan universities, US universities and local authorities, SUMAWA researchers began to address the worsening environmental situation and to create a sustainable response.

"Through online access to OARE I've been able to see what has been happening to other watersheds of the same magnitude," explains Daniel Kyalo, a PhD student from Egerton University and participant in SUMAWA. "Through the resources I found out that it is possible to inform policymakers



The OARE research library at Egerton University

on the best policies that they can implement to have sustainable livestock production systems. It's important for me to be informed to what is happening globally and put the global environment into local context."

Based on information found through OARE, SUMAWA has addressed the watershed's challenges through a number of initiatives – each aimed at addressing different environmental issues facing the Njoro watershed.

"Online access to research on the environment alongside access to the sister partnerships on health and agriculture, really has overcome in one quantum leap a major disadvantage of many students in developing countries. They do not have the resources in universities and in teaching institutions to subscribe to what are often quite expensive scientific journals."

Achim Steiner, Executive Director, UNEP



SUMAWA project coordinator Dr. Poli Semenyé

Bio-Sand Filters

With the help of OARE, Egerton and University of California, Davis, researchers developed sand filters using local materials to provide the community with access to clean water. By having a filter in their home, local residents are able to get water from the river and turn it into safe water for drinking and washing at no cost beyond the initial purchase of the filter.

Pilots of the project showed that households which have used the filters have seen clear reductions in water-borne diseases. "Bio-sand filters have really assisted the community of Njoro. They are accessible to our people and have helped reduce the people who are coming to the hospital by at least 50%. They have cut down diarrhea diseases by at least 20%," explains Fredrick Bwire from the Njoro Divisional Public Health Office.

The program is currently being scaled out across the watershed with the goal of providing a more affordable source of free water for every household. Residents are also being trained to make the filter themselves, creating both employment opportunities and a local sustainable business.



Bio-sand filters help decrease water-borne diseases

Bio-Sand Filters:

- Remove particles and reduce the number of microorganisms living in water
- Can filter up to 30L at a time over 6 hours as the water trickles out of the filter
- First filters installed in 2006
- Cost around \$23 to purchase
- The project gave 30 pilot homes the filters and another group of 30 homes were selected as a control to examine the effect of the filter. The households with the filter visited the clinic 50% less than those without the filter.

Livestock Troughs

When livestock and humans share river watering and access point, contamination of water and disease can easily result from unsanitary deposits. Furthermore, large numbers of livestock on the riverbanks can increase the rate at which silt accumulates in the riverbed as the animals inadvertently push soil from the bank.

To reach a medium-term solution against livestock contamination of the river in the Njoro watershed, SUMAWA proposed and built watering troughs specifically designed for cattle, to separate them from the wells used by the human population.

The troughs not only reduce pollution in the river, but owners have reported that the cattle prefer the higher temperatures of the trough water and can avoid accidents en route to the river. An extension to the river was also added for fetching household water – an invention which has reduced the time it takes to collect water and the risk of accidents while drawing water at the river.

"We are now disseminating our research to the farmers and residents of the Njoro River watershed. We want to help them to understand the exact links between livestock production and the environment so they can best take care of the environment. Additionally, we have developed policy briefs which will help policy makers in developing relevant programs that will help farmers produce livestock products in a sustainable way," explains Daniel Kyalo from Egerton University.



Water collection from trough near the Njoro River

"SUMAWA is very relevant because it has a direct impact on the farmer, a direct impact on the individual person who lives in that watershed. If he's going to be self-sufficient, we have to demonstrate to him – as we have through this project – that by taking care of the environment in a sustainable way, he will also benefit."

James K. Tuitoek, PhD,
Vice-Chancellor, Egerton University



Training and Educating

Training is an integral component of the SUMAWA project. SUMAWA researchers have emphasized the importance of community involvement in the restoration of the Njoro Watershed through several programs. At a university level, 26 students have completed degrees ranging from undergraduate degrees to PhDs in conjunction with OARE and SUMAWA.

Additionally, SUMAWA has spearheaded non-degree training for stakeholders, primary school children, and community and team members to raise awareness of the importance of environmental preservation.

In local schools for example, the SUMAWA project implemented a tree nursery and tree planting program to teach the importance of sustainability to younger generations. Eight schools are working with the Njoro

Water Resource Users Association to plant over 10,000 seedlings across the valley, and students are receiving environmental education in the classroom as part of this intervention. The participating schools are competing amongst themselves to determine which will have the highest rate of seedling survival.

SUMAWA has been an exemplary project in the Njoro watershed, helping the local population understand the current pressures on the environment and the need for joint responsibility and action. Through OARE, Egerton University's researchers have been able to apply leading environmental research to specific localized challenges, leading the way towards a healthier river, population and wildlife.

“We need to train the people a lot more. We need a lot more education with them to shift emphasis to the issues of the river.”

Dr. Poli Semenyé, SUMAWA project coordinator



Tree planting at Ndarugu Primary School in Njoro

