



KnoWat: Knowing water better

Towards a more equitable and sustainable access to natural resources to achieve food security

Local solutions to address water scarcity in the Yanze subcatchment

Rwanda is a land-locked country of 26 338 km², which borders Uganda, the United Republic of Tanzania, Burundi, and the Democratic Republic of the Congo. It is divided into four provinces and the capital city of Kigali, with 30 districts and a total population of nearly 13 million.

A temperate tropical climate and two main rainy seasons (February–May; September–December) determine the planting and harvesting cycles. Rainfall varies geographically, with the eastern and southeastern parts of the country receiving less precipitation (700–1 100 mm annually) than the west and northwest (1 300–1 600 mm annually).

The country is rich in water, and agriculture is the backbone of the country's economy, employing around 70 percent of the population. Known as the 'land of a thousand hills', Rwanda is characterized by a dense system of lakes, rivers, marshlands, groundwater and soil water, which are frequently replenished by abundant rainfall.

Climate variability challenges the country, ranging from changes in rainfall patterns to more extreme weather events. In addition, there is increasing pressure on natural resources (such as water and land) due to population growth, intensification of agriculture, rapid urbanization and industrialization; this has led to competition between water users and a reduction in water quality.

These challenges need to be addressed by Rwanda's water governance institutions to ensure an equitable, sustainable and climate-proof system of water allocation.

The KnoWat project set out to promote water conservation and strengthen local water governance and management processes in the Yanze subcatchment in Rulindo district.



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Supporting water governance and management to address water scarcity

Within the main Nyabarongo Lower catchment, the Yanze subcatchment occupies an area of 9 685 hectares, equal to around ten rugby fields. The subcatchment is home to a variety of water users. Irrigated vegetable and fruit production can be found in the valleys and farmers produce maize and potatoes on the hillsides.

Other water users include coffee washing stations, water treatment plants, mineral extraction sites, small-scale irrigation and the Water and Sanitation Company (WASAC), which extracts water to supply Rwanda's capital, Kigali. In recent years, water has grown scarce in the area, leading the WASAC and local farmers to make agreements governing the sharing of water resources.

The KnoWat project worked with Yanze Horticulture Production Cooperative (YAHOPROC), a cooperative of vegetable growers, to support sustainable water resources management options, including a combination of improved solar-powered irrigation of their vegetable farms for improved production, as well as fish farming and pig production to boost the farmers' income.



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Over the past three years, the project has successfully promoted several innovations in Yanze:

☀ Clean energy to benefit people and nature. Vegetable farmers found it difficult to distribute adequate irrigation water using watering cans and treadle pumps, limiting their production. In response, the project distributed three solar-powered irrigation pumps to the YAHOPROC cooperative, and trained farmers to operate and maintain them. The solar-power pumps allow farmers to grow crops throughout the year. Because the pumps are simple to operate and maintain, they can be used by all farmers, regardless of age.

An evaluation of the use of the solar pumps for irrigation showed that they have increased the agricultural production of 250 small farmers in Yanze as well as enhancing water productivity without increasing the carbon footprint. Production increased as a result of better water availability, boosting incomes by about RF 500 000 (USD 50) per year. Using solar powered irrigation pumps also requires less labour, leaving farmers with more time to invest in other income-generating activities, such as livestock production.

🐟 Integration of fish farming and pig rearing. In addition to the introduction of solar-powered irrigation, the KnoWat project piloted two strategies to diversify income. Farmers stocked three irrigation ponds with Tilapia fingerlings, and the project supported the YAHOPROC cooperative in pig rearing. As a result, the cooperative has so far harvested 376.5 kilograms of Tilapia fish worth USD 750. Starting with the 30 pigs supplied by the project, members of the cooperative have raised around 300 pigs. The farmers have raised their incomes by selling both fish and pigs. The project supported these activities by providing training on improving market access. As a further benefit, the manure from fish and pig production serves as organic fertilizer, reducing the need to buy inorganic fertilizer, which cuts the cost of vegetable production. Furthermore, fish and meat diversify the diets and improve the nutrition of local families.

💧 Building institutions to improve water governance. The KnoWat project worked with the YAHOPROC cooperative and local leaders to build their capacity to establish a water users' association in the Yanze subcatchmen. Through the association, farmers will be able to obtain a water permit, providing long-term sure access to water resources to sustain their production systems.

Sustainable solutions

With more than 250 farmer members, the YAHOPROC cooperative has developed strategies to upscale the integrated production approach undertaken through the KnoWat project. Farmers in Yanze are highly motivated by the additional income generated by the approach.

The cooperative is now using its own resources to invest in increasing fish production. The solar pumps will be used both to irrigate crops in the field and to drain and renew water in the fishponds.

The Rulindo District authority has established strategies to adopt solar-powered irrigation throughout the district. In August 2021, 50 participants (34 men and 16 women) from all levels of district leadership participated in training on how to demonstrate solar-powered irrigation, to promote the use of solar pumps in Yanze and other parts of the district.

Furthermore, FAO is in conversations with development partners, such as the Rwanda Agriculture Board and the World Bank, to mainstream the successful integrated production approach in other rural development programmes.

“To measure the development of a cooperative, you must assess the lives of its members. They are now able to pay health insurance, can manage bank savings and pay school fees for their children.”

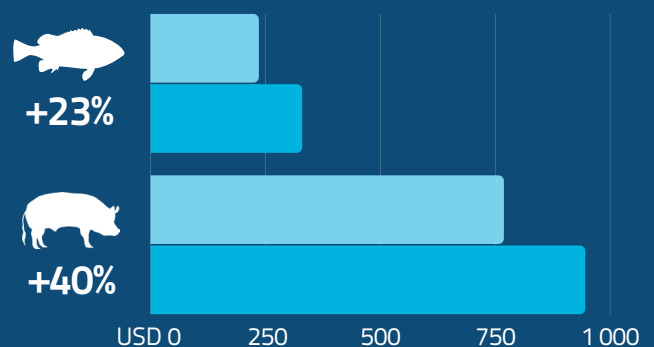
Pierre Mbarushima, YAHOPROC President



Annual income increment on average for families from pig production and for cooperative from fish production from 2020 to 2022

245 beneficiary families, received 5 000 fish fingerlings. Cooperative's annual income increased by 23% due to sales.

80 beneficiary families received 30 pigs. Their annual income increased by 40% on average due to sales.



“We no longer sit idly during **sunny season** worrying about how we can **irrigate our crops.**”

Jean d’Arc Mubaranyanga, vegetable farmer

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KnoWat's impact in the Yanze catchment: voices from the field

"The KnoWat Project came as a solution for Yanze farmers of vegetables and fruits. We are proud of the activities we have been able to implement with FAO in Rwanda."

Gilbert Umunyurwa, Irrigation Engineer, APEFA

"Thanks to KnoWat project, I am now benefiting from both aquaculture and agriculture production, all from this water. I am currently feeding 2 000 fish in one fishpond and if I take good care of it, after seven months I will harvest 500 kgs of fish. Before the project supported us with water dams, we used to have conflicts due to water scarcity, however this problem is now resolved."

Marcel Munyawera, fish farmer in Yanze subcatchment

"We no longer sit idly during sunny season worrying about how we can irrigate our crops. There is no such problem now as we have water and a solar-powered machine, which automatically pumps it for us. The mechanical pumps we had before were very tiring and labour-intensive, especially for us women.

We could not eat vegetables before, but now our nutrition has improved. Every meal we take now (has) fruits and vegetables. We no longer have malnutrition issues. Children don't suffer from Kwashiorkor (protein malnutrition) anymore.

Before adopting this new irrigation technology, I had low crop yield and didn't have a bank account. However, I have now opened a bank account and can save money. I will have a better life in future when I am old and unable to work."

Jean d'Arc Mubaranyanga, vegetable farmer



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Further information

Use the QR code to learn more about all the activities implemented in Rwanda.

www.fao.org/in-action/knowat



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Towards fairer and more sustainable access to natural resources for greater food security

Rwanda, Senegal and Sri Lanka (2019–2022)

All around the world, countries are struggling to adapt their agricultural and food systems to conditions of climate change and to extreme weather events such as long periods of drought or heavy rains. Water scarcity is expected to increase as is competition for water resources among users. Smallholder farmers are particularly vulnerable to changes in water access and availability: a sudden lack of water due to drought can mean lost income and food, threatening their lives and those of their families. For these reasons, major efforts are needed to address the links between water scarcity, food security and livelihoods in our changing climate.

The KnoWat project takes an integrated approach to water resources management that includes water accounting, water productivity, water governance and water tenure assessments. **Water accounting** is the systematic study of current status and future trends in water supply and demand in a given spatial domain. **Water productivity in agriculture** signifies the ratio between yield and the water consumed by a crop. To support water accounting and productivity assessments, the KnoWat project built the capacities of key partners to apply FAO's Water Productivity Open-access Portal (WaPOR). This tool assesses water consumption in agriculture and the water productivity of agricultural production using remote sensing.

Water governance assessment looks at the broad framework of institutions, finance and the political economy. To better understand water governance processes, the project developed and tested a **new methodology to assess water tenure**, the formal and informal arrangements used to access water. The assessment of water tenure aims to understand the different relationships between people and water resources.

Enriching our knowledge around water through accounting, productivity, governance and tenure assessments helps policy and decision-makers to plan and implement **better policies**, with the ultimate goal of ensuring equitable water allocation for **better livelihoods, food security and healthy ecosystems**, even under conditions of growing water scarcity.



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and Agriculture

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For further information, contact:

Benjamin Kiersch
Project Coordinator
Land and Water Division
Land-Water@fao.org

Joseph Bizima
National Coordinator Rwanda
FAO Representation
in Rwanda
FAO-RW@fao.org

Lamine Samaké
National Coordinator Senegal
FAO Representation
in Senegal
FAO-SN@fao.org

Thushara Ranasinghe
National Coordinator Sri Lanka
FAO Representation
in Sri Lanka
FAO-LK@fao.org

<https://www.fao.org/in-action/knowat>



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