TEXT BOX

Promoting commercial aquaponics farming among smallholder households/farms for water-use efficiency, food security and livelihood improvements

Country: Uganda
City/region where project is based: Kampala, Kamuli, Adjumani, Hoima, Wakiso and Kamwenge Districts
Population (of area where the project is based): 5,551,052 nationals and 429,337 refugees (Uganda is hosting more than 1.5million refugees)
Key organisations /stakeholders involved in the project: USAID, Sweden (SIDA); Netherlands and South African Governments; District Local Governments; Care & Assistance for Forced Migrants (CAFOMI) and Navigators of Development Association (NAVODA); Kampala Capital City Authority (KCCA) and Water Governance Institute (WGI)
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Water challenge

The dwindling fish stocks in natural water bodies due to overfishing to meet market demands is making fish very scarce in Uganda. Also, horticultural crop produce, essential to balance human diets, is currently in short supply in the country, making such products unaffordable. Furthermore, the impression to local residents and businesses that water is abundant is resulting in its wastage.

Project approach

Integrated fish and crop farming (Aquaponics) closes the water recycling/ reuse loop between farming enterprises, resulting in increased efficiency. Water is first introduced (manually or automatically) into the fish-tank from where it is drawn-out as fish-waste-water and irrigated onto a crop in grow-beds or gardens. The grow-beds are comprised of a sand-gravel-aggregate layered medium on which the crop is grown and through which the fish-waste-water is filtered and returned (manually or automatically) to the fish tank. This process removes the ammonia (fish faeces), thus cleaning the water and making it re-useable multiple times. Alternatively, the fish-waste-water is reused once as irrigation in gardens. While the systems are currently operated manually, there is potential to automate them using water pumps, pH monitors/ sensors and oxygenators based on grid/ generator electricity or solar energy, depending on farmers' preference, affordability and access to the energy options. The limited coverage of grid electricity and the expensive generator/ solar energy options makes manual systems more common. Three Aquaponics design options that are being commercialized for urban, per-urban and rural households/farms settings – these include a one cubic meter unit (option 1); a 9.2 cubic meter unit (option 2); and 75 cubic meter unit (option 3) with 200; 1200 and 7500 maximum fish stock and 10 -15 horticultural plants per square metre capacity, respectively. This plant stocking is 3-5 times higher compared to traditional agriculture, which is aimed at increasing the surface area for ammonia extraction from the fish-waste-water.

Results

The results include:

- 100 local small-scale farmers have adopted the innovation.
- 11.2tons of produce (8.5tons fish & 2.7tons of a variety of horticultural crops) from 1.3ha of land over a 2½ year period, demonstrating increased productivity per unit area. Part of the produce was consumed domestically and the surplus sold.

- Total monetary value of produce was US$16,600 fish and US$3,450 crops.
- Volume of water recycled that was also saved for other food value-chain processes was 7,300,000litres.
- The 3 Aquaponics design options cited above have been set-up in urban (27), per-urban (26) and rural (47) households/farms settings. Option 3 has only been set-up in peri-urban and rural settings, totalling to 6 units.
- 40 additional adoptees need to be realised to hit the 2019 adoption target.

SWM: Potential and barriers

We are interested in improving our project through adding SWM applications, particularly real-time data. This would reduce the amount of work farmers must do to ensure good water quality and its supply/ circulation in the systems, since sensors can control water supply and flows. Real-time data would also improve crop yields and water-use efficiency, food security and livelihood improvements. It will require introducing solar energy, since existing energy options are not reliable. The potential barriers of adding real-time data technology include:

- Limited availability and resources to cover the cost of required technology for automation;
- Difficulty in establishing linkages with suitable technology sources;
- Lack of financial support for demonstration and training of farmers in smart agriculture and water-use efficiency;
- Difficulty in securing a dependable and affordable source of good quality fish feeds and fish fingerlings.