Food and Agriculture Organization of the United Nations

RESILIENCE PROMISING PRACTICES

CONFLICTS AND PROTRACTED CRISES

Implementing aquaponics in the Gaza Strip

Reducing vulnerability to food and nutrition insecurity in dry, urban areas and protracted crisis situations through efficient resource use

→ **Context** Food production in the Gaza Strip is constrained by an arid environment and limited access to steady sources of water. This threatens the food security and nutrition of local communities, which is further undermined by a wider context of protracted crisis and continued restricted access to critical livelihood resources for fishing and farming. Since 2010, the Food and Agriculture Organization of the United Nations (FAO) has been helping to enhance the resilience of at-risk populations in the West Bank and Gaza Strip through donor-funded projects that focus on protecting and strengthening their food security and livelihoods. One of the methods used by FAO is aquaponics, integrated fish and plant production.

→ **Challenge** Globally, access to and availability of water and arable land is growing scarcer due to:

- increasing and longer incidents of drought periods;
- growing population and higher demand for land and water use; and
- soil degradation caused by deforestation, intensive farming, etc.

This has led to rising food and nutrition insecurity in many countries, and is exacerbating protracted crises situations such as in the Gaza Strip.

→ **Methodological approach** Aquaponics includes the following steps:

- identify locations and communities that would benefit most from aquaponic systems based on needs assessment;
- provide education and training programmes to develop farmers' technical capacity;
- introduce and support aquaponic systems to households and establish demonstration units; and
- introduce an aquaponic system, using simple and locally available materials including plastic containers, gravel, pumps and plumbing; and
- only establish aquaponics where there is consistent electricity and access to plant seed and fish seed.

Cross-cutting issues

Gender → *Women are often involved in the post-harvest side of fishing livelihoods. Aquaponic systems promote more involvement from women throughout the entire production process.*

- *Daily tasks, such as harvesting or planting, are labour-saving and can include all genders and age groups.*
- *In some social contexts where women's mobility might be limited, aquaponics presents a unique opportunity to acquire the skills and education needed to maintain such a system without having to leave the home, as these systems can be placed on patios, gardens or rooftops.*

Nutrition → *Aquaponic systems offer a source of both nutrient-rich fish as well as vegetable crops. Further, if there is a particular malnutrition in a region (e.g. Vitamin A deficiency), households can grow crops rich in that nutrient to help decrease that specific deficiency. The use of such a targeted aquaponic system can thus help increase local dietary diversity.*

What is aquaponics and how does it contribute to increasing resilient livelihoods?

Aquaponics is the combination of soilless vegetable growing (hydroponics) and fish farming (aquaculture) within a closed recirculating system that uses nutrient-rich wastewater from the fish tanks as an organic fertilizer for plant production. This removes both the need for chemical fertilizers as well the disposal of fish wastewater. This technique reduces reliance on water for both aquaculture and farming, which is particularly interesting in arid and semi-arid agrosystems. As such, this system supports the resilience of livelihoods in places with water and fertile soil scarcity and resulting food insecurity.

→ Impacts **Increased household food and nutrition security and reduced vulnerability to crises:**

- produces two agricultural products (fish and vegetables) from one input (fish food);
- supports high water-use efficiency: aquaponics uses less than 50 percent of the water needed for normal soil farming;
- does not require soil, fertilizer or chemical pesticides;
- decreases household reliance on access to arable land, and continuous and large volumes of water;
- provides supplemental income, if the production unit is large enough and if a household chooses to sell produce grown;
- promotes education about fish, bacteria, and plant production; sustainable agriculture; ecosystems; and nutrient recycling.

→ Replicability and Upscaling

Aquaponics would be most successful in places meeting the following conditions:

- **Reliable access to electricity (or affordable access to solar energy units):**

  The operation of an aquaponics system requires electricity to operate the water pumps and thus cannot work unless there is a reliable and affordable source of electricity.

- **Dry and arid areas:**

  Aquaponics is most appropriate where land is expensive, water is scarce and soil is poor. Otherwise, in areas suitable for agriculture, the introduction of aquaponics in lieu of traditional farming may be too complicated given the accompanying training and education required.

- **Urban and peri-urban environments:**

  In urban environments where no or very little land is available, aquaponics provides families with a means to grow crops and farm fish on small balconies, patios or rooftops.

- **Areas with the potential to create cooperatives among several small farms or aquaponics systems:**

  In areas where there is a potential to build a network among several households using aquaponics, it is easier to purchase fish stock, feed, and seed plants in bulk and at a cheaper price and can thereby lead to opportunities for commercialization.

Sustainability

Aquaponics promotes environmental, economic, and socially sustainable practices. Environmentally, this system prevents aquaculture waste from polluting nearby watersheds while simultaneously enabling greater water and production control. It also does not rely on chemicals for fertilizer, pest or weed control. While the creation of an aquaponic system may require a large initial investment (also depending on the size of the unit), once it has been built it only incurs low recurring costs—especially when taking into account the combined returns coming from both the fish and vegetable production. In addition, aquaponics can offer quality-of-life improvements because the food is produced locally using comparatively simple harvest methods and culturally appropriate crops can be grown.

Aquaponics: lessons learned from Gaza

FAO's aquaponics pilot in the Gaza Strip comprised two phases – testing the approach in January 2012 and then, in January 2013, installing aquaponic systems for food insecure, poor and predominantly female-headed households. The project was initially successful, enabling the participants to grow food. Women particularly benefited as the method enabled them to work within their homes. However, the pilot intervention and its timeframe were designed to assist the populations most in need and the project targeted poor, urban families with minimal farming experience. After the initial provision of inputs, many of the participating households lacked the resources to continue purchasing inputs, as well as the farming knowledge and experience to ensure satisfactory performance of their crops. At the same time, they did not have access to technical support from local, experienced producers. Overall, the experience in the Gaza Strip highlights the importance of working first with families who have the means and farming expertise to ensure that the aquaponics enterprise is profitable and sustainable within the local context. Once these households have built their capacities and have developed successful working models, future projects can include other interested families who can rely on technical support from an existing local network.

→ More information

On Aquaponics:

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- www.fao.org/3/contents/1dea3c92-1faa-47bb-a374-0cf4d9874544/i4021e00.htm
- www.fao.org/fileadmin/templates/FCIT/PDF/Fact_sheet_on_aquaponics_Final.pdf
- http://teca.fao.org/search/technology-simple?search_api_views_fulltext=Aquaponics

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