

Contributing to food and nutritional security in a densely populated country

# Sustainable agro-pisciculture in Malawi

*Integrated agro-pisciculture has great potential to contribute towards food and nutritional security in countries by allowing farmers to produce fish which is highly nutritious to augment carbohydrate rich staple diets and intensifying crop production and reducing agricultural production risk through better farm water and nutrient management.*

Malawi is a small but highly densely populated country in Southern Africa where small landholdings per household, high reliance on rain-fed agriculture, low land productivity and low rural incomes that make most agricultural inputs unaffordable to small-scale farmers have resulted in increased food and nutritional insecurity. Constraints on land productivity include rapid environmental degradation and limited or inadequate access to land. Fish is an important part of the nutrition of Malawians contributing about 28 percent of their animal protein intake as well as being a source of vital vitamins, micro-nutrients and minerals. However, for the past twenty years, this important source of animal protein has been declining rapidly to the extent that the per capita consumption of fish has declined by 50 percent from 14 kilograms per year to just under 7 kilograms per year. The reduction in per capita fish consumption has seriously affected the nutritional security of rural Malawians who are already facing food insecurity due to declining land productivity.

The most commonly proposed solution to food insecurity and increased rates of land degradation is to intensify land use by adopting new crop varieties and applying fertilizers and pesticides. Unfortunately, the resources with which to access these technologies are severely limited among smallholders. In Malawi, only 33 percent of farmers manage to actually sell for profit any of their produce and credit is unavailable. As a result, inorganic fertilizer supplies only an estimated 27 percent of needed nitrogen for smallholder farms. Unfortunately, the resources with which to access these technologies are severely

## Malawi Fact Sheet

- Total area: 118,000 km<sup>2</sup>
- Total population: 9.9 million
- Population density: 105 people per km<sup>2</sup>
- Number of poor people: 6.3 million (65.3%)
- Life expectancy (2000): 39 years
- Fertility: 6.3 children per woman
- Malnutrition: 49 percent of under-five children are stunted
- Food security: 11 percent of population experiences a food deficit annually
- Land ownership: 55 percent of 1.8 million smallholder farm families cultivate less than 0.5 hectares of land
- Per capita income: US\$ 120
- Major source of income for rural households: Agriculture (63.7%)

limited among smallholders. The majority of smallholder agriculture enterprises must function on the natural resource base of the farm itself. With respect to nutritional security, the situation is even more alarming with 66 percent of the population unable to meet the minimum daily energy requirement of 2 200 calories.

In the context of increased food and nutritional insecurity, frequency and severity of famine and land degradation, a shift towards more sustainable and durable farming systems yet with higher productivity and income could significantly decrease the level of food insecurity and hunger. Integrated agro-pisciculture also known as integrated agro-aquaculture has been promoted as a sustainable

Daniel Jamu  
WorldFish Center  
Zomba, Malawi  
d.jamu@cgiar.org

Sloans Chimatiro  
Department of Fisheries  
Lilongwe, Malawi  
chimatiro@sdnp.org.mw



Photo: Jamu

In integrated agro-pisciculture agricultural wastes and manure are converted into high quality fish protein.

The use of irrigation water from ponds results in higher crop yields, thus contributing towards food and nutritional security.

means of increasing fish production, intensifying crop production for the rural poor in Malawi for the past 15 years. The promotion of integrated aquaculture-agriculture has been achieved through collaborative efforts of the Malawi Government, WorldFish Center (formerly ICLARM) development partners (principally Germany and U.S.A.) and NGOs.

The basic principle of integrated agro-pisciculture is to grow fish in waterbodies that are closely integrated into, and intentionally make use of the resource flows of all the diverse activities on a farm. The basic aim is to convert agricultural wastes and manure into high quality fish protein, to use the nutrients generated in the pond as fertilizers for growing plants on the farm, to reduce the need for off-farm inputs and to maximize the use of on-farm resources through recycling and to grow vegetables around the pond by using it as a small on-farm water reservoir, and with the additional option to grow vegetables, maize and rice in the residual moisture of the ponds in times of drought.

### Integrated agro-pisciculture and food security

Integrated aquaculture/agriculture (IAA) technologies have been promoted by the Malawi Government, WorldFish Center and its partners in Malawi for the past 15 years as a sustainable and durable farming system that could significantly increase food and nutritional insecurity and poverty through:

- 1 Fish production (more nutritious food rich in protein, minerals and vitamins available to complement the high carbohydrate maize staple).
- 2 Intensification of agricultural production through better farm water and nutrient management.
- 3 Increased incomes from fish and crop

### Household level impacts of integrated agro-pisciculture or IAA

- IAA farmers have three times (USD 310) more income than non-IAA farmers (USD 160).
- Higher monthly per capita consumption of fresh fish (IAA=0.96 kg; non-IAA=0.36 kg) and fresh meat (IAA=0.63 kg; non-IAA=0.37 kg).
- IAA households consume 163% more fresh fish and spend 23% more in per capita protein expenditure than non-IAA households.



Photo: Janna

production leading to increased access to food by households.

- 4 Sustainable utilization of on-farm resources and increased resilience due to farm diversification and water management.

### Impacts of integrated agro-pisciculture on food security and poverty

The WorldFish Center has evaluated the direct (increases in technical efficiency, household incomes, food and nutritional security) and indirect (sustainability, spillover of technologies, social changes) impacts of the development and dissemination of integrated aquaculture-agriculture technologies in Malawi. In general the results indicate that integrated agro-pisciculture does contribute towards increased household food and nutritional security, reduce levels of poverty and increase the environmental sustainability of farmlands. These impacts have been achieved both at the farm and household level.

At the farm level, integrated agro-pisciculture farms have high levels of technical efficiency i.e. they are producing more food efficiently than farms where integrated agro-pisciculture is absent. For example, fish production in ponds not integrated with agriculture is around 800 kilograms per hectare per year while in integrated agro-pisciculture, fish production is over 1800 kilograms per hectare per year. For maize, production in integrated agro-pisciculture systems ranges from 4 to 6 tons per hectare and this is three times higher than that obtained on farms without integrated agro-pisciculture. The production of maize using irrigation water from ponds produces enough maize to feed a household of five for an extra five months. Such benefits of integrated agro-pisciculture are crucial in a country where 1 million people face a food deficit every year.

At the household level these levels of technical efficiency in food production translates into higher per capita income, higher consumption of fresh fish and better nutrition of under-five children in households practicing integrated agro-pisciculture. The higher incomes in households that practice integrated agro-pisciculture increases the household consumption of other protein foods such as beans and meat and further improving the household nutritional status.

### From household food security to national food security

These impacts have not gone unnoticed by the development community in Malawi to the extent that an increasing number of NGOs are incorporating integrated agro-pisciculture into their food security projects. Evaluation of returns to investment in IAA research and development show positive returns on investment and net social benefits. This suggests that future investments in IAA development by donors and development agencies will result in positive changes in the livelihoods of the poor. The involvement of NGOs and organizations of farmers into clubs and associations has contributed to the accelerated adoption of integrated agro-pisciculture and increased the number of women involved in integrated agro-pisciculture. Therefore, the involvement of NGOs and farmer organizations in the further development of IAA holds the key for translating the household food security and income gains achieved so far into increased national food security.

### The challenge

Integrated agro-pisciculture has been shown to increase levels of household income and food and nutritional security in the high aquaculture potential areas of Malawi and hence has the potential to contribute towards the Millennium Development Goals of reducing food insecurity and poverty. Investing in the development of IAA also makes economic sense to donors because of the positive returns on research and development funds spent on IAA. The challenge for WorldFish Center and its development partners is to scale-up these successes so that a large number of beneficiaries can benefit from IAA. This will entail investments in replication of successes to a large number of sites and countries with suitable environmental conditions for integrated agro-pisciculture. Assessments in Malawi show that these investments are worthwhile.