Towards sustainable pond farming

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"Before we had these farm ponds we could only farm in the wet season and everybody migrated to make money to survive. Now with these ponds we can work on our own land, year round, and we produce a surplus to sell at the market. These ponds give us hope for our community and children" said Máximo Gonzales in the April 1996 issue of the ILEIA Newsletter (Maita and Verweij 1996). This article described an unique system of interconnected farm ponds in the Oloy community near Cochabamba, Bolivia. The development of the farm pond system unleashed a process of fast change in peasant farming. Peasant families improved their farming system by developing new strategies to produce vegetables, grains, fruit trees, aromatic herbs, and to raise animals. Now, farm pond farming is spreading fast and integrated agriculture is promising to become a sustainable production system suitable for small farmers on Andean slopes. Based on the experiences of CORACA, a peasant organisation that has contributed significantly to the promotion and development of family farm pond farming, the author analyses further the development and spread of the system.

History of pond farming

The population of the Quechua-speaking community of Oloy is concentrated in the lower parts of the region, on the gently undulating 'pampas' with silt-clay soils at an altitude of about 2100 metres above sea level. The climate is semi-dry, with an average annual rainfall of 450 mm between November and March. Until the farm ponds were built, rainfed maize was the main crop.

The first farm ponds date back to the eighties, when small water reservoirs that the peasants themselves had dug out (k'hochas) were enlarged with the help of heavy machinery that political parties made available to the communities. Rainwater is collected in these farm ponds, taking advantage of the runoff from the higher slopes or water from a nearby watercourse during rainy weather.

Between 1990 and 1991, on the request of community members, the PDAR programme to prevent migration to coca-growing areas built interconnected farm ponds in Oloy. This work was complemented with a rock-cement diversion dam in the Yuraj Yuraj watercourse, to fill the ponds during the rainy season. This dam and the 5 km long conveyance ditch connected and filled 20 family ponds (storage capacity about 1000 m^3) and 2 community ponds (storage capacity about 10,000 m^3).

Given the lack of other permanent water sources, farm ponds have become a source of water for domestic use, drinking water for animals, supplementary irrigation of summer crops and for small-scale irrigation of highly valuable dry season crops. The water in the family ponds is used to irrigate up to 0.25 ha of farmland on which onion, garlic, tomato, beans and other vegetables are grown. Some farmers even have enough water to grow fruit trees. It is common practice to protect the irrigated area and farm pond from cattle by building fences around them with thorny branches, barbed wire or stone or brick walls (see figure 1). The land inside the fence can range from 0.3 to 4 ha.

There is no clear category for these farm ponds in terms of irrigation or soil and water conservation. Rainfed farm ponds are usually referred to as a means of preserving water and soil and for collecting water. This is fair enough if the water runs off the slopes above the pond, but in many cases it rains further away from the production area, therefore the water is obtained from other parts of the small valley catchment. This is why some authors refer to irrigation (Pacey & Cullis; 1986, p8).

In recent years, the area under irrigation was expanded considerably and production was intensified by increasing the number and size of the ponds. In the community of Aiquile, for example, more than 1000 new ponds were constructed in the nineties. Now, a large number of government organisations, municipalities, NGOs and peasant organisations are digging, with the use of earthmoving tractors, hectares of farm ponds in many Bolivian communities. Many different designs are used for the construction of these ponds. The costs of the ponds differ from US$ 300 for a simple small pond of about 300 m^3 to US$ 2000 for a larger and more sophisticated pond, and up to US$ 4000 for a 5000 m^3 pond. The funding arrangements also differ per organisation. Funds come from the local municipality, the national government or a foreign funding agency. Farmers normally pay a contribution of 10 - 20 % of the total costs in advance.

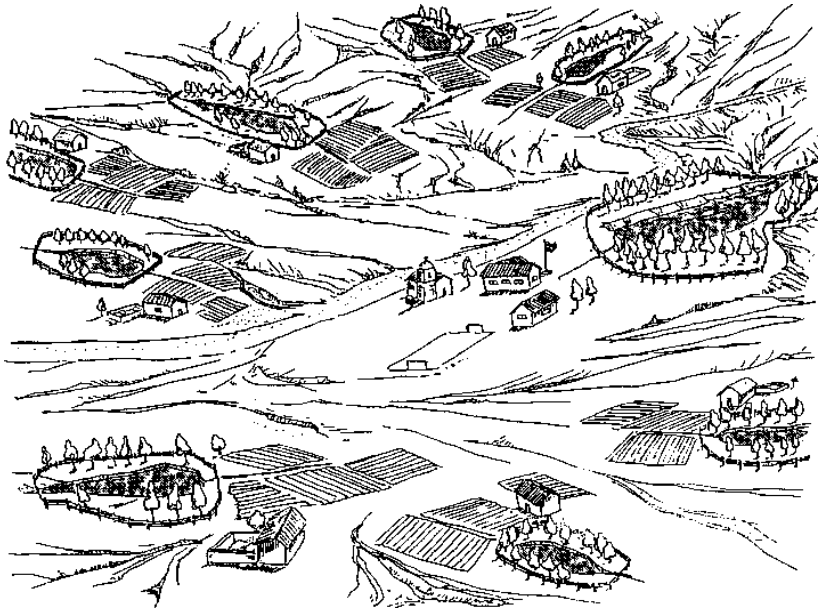

figure 1: Overview of farm ponds in the community of Tarija (Verweij, 2001)

Different strategies of farm pond farming

Once water is available, a part of the new farm pond users (about 25% of the farmers in CORACA's operational area) concentrates on growing crops like onions, tomatoes and potatoes for the market. These ***market farmers*** tend to grow one or two crops intensively and then leave the land to lie fallow after the harvest, when the water runs dry. Their production system is intensive and yields are high: more than 40 tons per ha. of tomatoes and 30 tons of onions. Without much help from outside, they sell the produce in their own town as well as in Sucre and Cochabamba. In 1999, when prices of tomatoes were high, tomato farmers earned up to US$1800 from a 2000 square metre plot, spending US$425 on fertilisers, pesticides and transport. They had never before had so much money in their hands and earned back their initial investment in one year! But prices are not always high and increasingly farmers start to feel the economic and ecological problems related to monoculture market farming.

A second but increasing group of families are producing on a less intensive and lower-cost basis and largely for home consumption. Their production conditions are often less

favourable and they do not accept the high costs and risks involved in market agriculture. Compared to traditional rainfed farmers, these farmers have increased the number of crops (vegetables, grains and fruits) they grow and the amount of surplus products they bring to the market. For these ***conservative improvers*** the farm pond is very important to secure water for human use, their animals and some food crops during the dry period. It has enhanced their quality of life, improved their diets and increased their income. Finding markets for surplus products is sometimes a problem, but with the help of CORACA (who has the contacts) these farmers always find a buyer.

Towards sustainable pond farming

In general, yields in pond farming are up to 4 times higher than the regional rainfed production levels and the contribution of pond farming to regional food security is increasing fast. It is, therefore, obvious that the sustainability of the system is crucial.

However, not every farmer knows how to take care of these systems, which means that the euphoria of earning money from tomatoes did not last long. Those who planted tomatoes year after year have noticed that their soil is getting depleted and that the presence of pests and diseases is increasing. Production costs are increasing every year as more fertilisers and pesticides are needed to maintain the same production level. Unfavourable market prices cause even more frustration. These farmers now realise that the production and sustainability of their farming system depends on much more than just water. They realise that working with some factors and neglecting others is counterproductive. It is no use having water on the plot if the soil is deteriorated or eroded. Nor is there any sense in producing high amounts of products for the market if these can neither be sold nor transformed.

Fortunately, insight into alternative, ***integrated farming*** is increasing. About 10% of the farmers with a farm pond are experimenting with this third farming strategy, which is gradually being developed. These farmers diversify their cropping system and integrate livestock as well. Their plots are turning into regular orchards, with over 25 species of vegetables, grains, fruit trees, forage, aromatic herbs and flowers. There is a growing tendency to keep small animals like guinea pigs, hens, ducks, partridges, bees and fish. These families use their small plots to a maximum by growing crops around the borders of their farm pond and fruit trees, forestry species, ornamental plants, shrubs or forage alongside the fences. Since these plots are fenced in to keep animals out, wild vegetation grows in the corners and on the borders of the farm pond (fig.2).

The families are very fond of their farm ponds and gardens. Based on their own ideas and available resources, they create irrigation systems using gutters, pipes and aqueducts. They also protect their borders with grass and stones, adorn their gardens with flowers, obtain all kinds of fruit seeds and seedlings and build terraces or bench terraces to make their small plots as productive as possible. Their infectious enthusiasm is creating an interesting and innovative type of competitiveness. However, many of these initiatives lack a technical basis, which is why the results still leave much to be desired. Adequate monitoring and backstopping by expert technicians would guarantee even better results.

By having a diverse small-scale production system financed with own and local funds, farmers can produce a larger variety of products and can make the peasant economy more secure. The fact that they can increase control and lower costs is an additional advantage. This is very evident as far as agro-chemicals are concerned; these farmers use only one third of the amount used in irrigated plantation agriculture in Santa Cruz. Integrated farming is a more balanced strategy of farming, which combines market and self-sufficiency objectives within a more ecologically sustainable, overall approach.

Further improvements needed

In fact, development of family farm pond farming has just started. Farmers with access to farm ponds listed the following demands for improvement at a workshop:

1. Community/farmer organisation (production and marketing, awareness of collective values).
2. Soil and water management (farm planning, soil and water conservation practices, irrigation canals, gully control)
3. Integrated Pest Management (training, development of local practices).
4. Marketing (seeking markets for local products and opportunities for new crops, establishing relations with companies, seeking and creation of opportunities).
5. Financial management (loans, help in calculating production costs).

An increasing demand for technical support has been noted since farm pond construction was initiated. Often, farmers start to pay attention only when they encounter real problems. For example, the demand for high quality seeds (see box 1) is coming up only now after many diseases have been spread. Still, farmers express their need for holistic monitoring from a peasant farmers' perspective. Once the problem of water shortage was solved, questions arose about a more sustainable, ecological and healthy way of production, applying integrated pest and soil fertility management methods.

Having worked on productive aspects, peasants are also looking towards processing, transforming and marketing of their products, which is something they cannot do on their own. Developing the farming community means that all these aspects have to be worked on. Anyone who intends to support this process has the moral obligation to go beyond farm ponds and technological packages. That is why today's agricultural scientists and rural instructors must have a more complete understanding of sustainable agriculture and the food production chain. They also should be versatile and take an active part in peasant struggles.

Social Capital

Experience showed that it is fundamental to raise the self-esteem of peasant farmers before they can do anything for improving

Box 1. Production of high quality seeds

The farm pond garden is a farm jewel because water is assured. Yields tend to be more than 4 times higher than in rainfed conditions. Products are more regular and of better quality. In order to capitalise on the production potential, irrigated plots deserve only the best inputs, i.e. seeds, fertilisers and manpower.

For example, what happens if inferior quality seeds are sown in the plot? First of all, production would be lower and secondly, the farm would be infected with diseases, nematodes and insects. This will reduce the productive potential of the land for a long period, as some pests and diseases, and nematodes in particular, are difficult to eliminate. The saying "seeds are half the technological package" means that one must start with an excellent seed in order to get a good harvest.

For this reason CORACA formulated a proposal to multiply high quality, basic potato seeds in irrigated plots. It is enough to sow small areas because the high yield makes rapid multiplication possible. This saves the buying of expensive seeds and guarantees good seeds for use in rainfed areas of the farm or for sale. More than 13 bags of good quality seeds can be obtained from one bag of basic seeds. The same strategy could be applied to other crops.

(Based on the presentation of Gonzalo Reynaga at a CORACA Seminar)

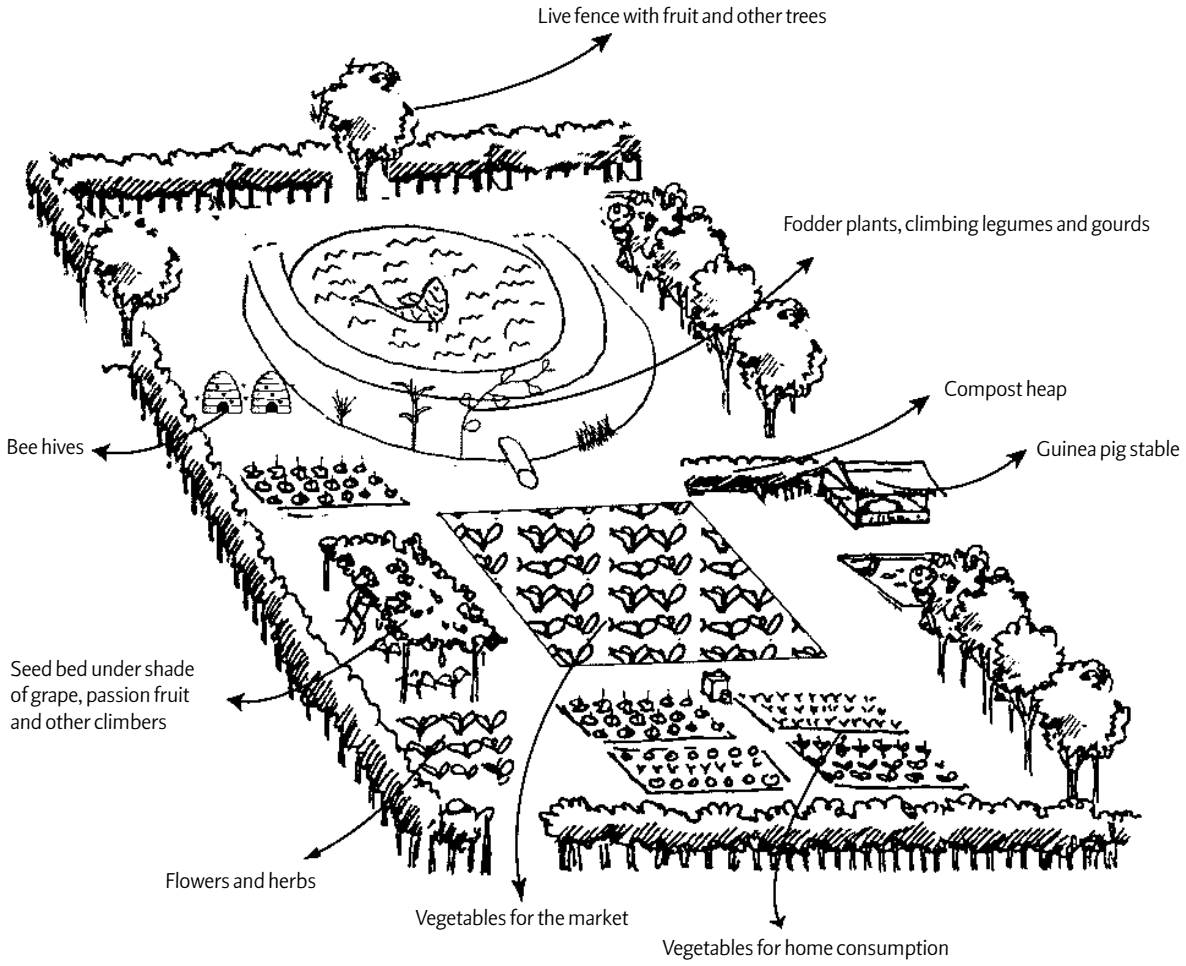

figure 2: Diversified pond farm (Verweij 2001)

their situation. They must be made aware of their valuable know-how, skills and potential and realise that they are capable of making changes. Peasants can evaluate examples and alternatives and apply them, provided that they have the information, inputs and instruments, and, above all, self-confidence.

Social capital was identified as an essential precondition for working together in a change process. Social capital, in terms of self-esteem, credibility of the support agents involved, mutual respect and confidence between peasant families and the support organisation, and shared background and responsibility, is needed to obtain tangible results.

Social capital creates the belief that things can actually improve. If there is ample social capital, peasant farmers will have the courage to demand training and advice on issues that are important to them, copy successful examples and demand the right conditions to carry out joint experiments with technicians.

Growing institutional concerns

Paradoxically, many small support organisations are withdrawing from regions with adverse development conditions, either because they have lost their funding completely or are fighting to survive and avoid more cut-backs. Meanwhile, the highest international development co-operation authorities have discovered the key to development: good governance and institutional development at macro level. But their strategy stops at that level with no connection to the peasant farmers and their support organisations at micro level, which means that peasant demands will not be heard nor met. Times are hard for support organisations at micro level because they are not considered sustainable, democratic nor representative, and therefore do not justify financial support, whilst peasant organisations have to finance themselves to become sustainable.

It is indeed necessary to work at macro-level to develop regional development plans, favourable economic policies for agricultural development, strong national institutions and international trade relations, but without support to local NGOs and peasant organisations there will be no credible and concerted development efforts at micro or at macro level. In many cases the construction of farm ponds has helped to build up social capital between peasant families and support organisations. Advantage must be taken of this social capital to synchronise development initiatives at macro and micro level to make further practical development of sustainable family farm pond farming feasible. ■

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