Low Cost Micro-Irrigation II

Excerpts from an Information Event on Dissemination Concepts and Experiences

by Elisabeth Katz, LBL

On the 31st of May an information event was arranged by the section Employment and Income of SDC, with the purpose of sharing the experience with low cost micro-irrigation technology and its dissemination through a market creation approach with others, and make it available to development organisations, which are interested in introducing poverty-oriented micro-irrigation in their programmes. This article provides an overview of the ideas and experiences presented in this event which took place in the premises of the Swiss College of Agriculture in Zollikofen.

Access to irrigation water is a limiting factor to the productivity and profitability of many small farms in developing countries, in particular in the many areas where water is becoming increasingly scarce. Most water saving irrigation systems are not affordable for the poor, because the equipment is capital-intensive. Common drip irrigation systems are designed to serve larger areas, and cannot be broken down to fit the small plots which the large majority of poor farmers cultivate. In recent years low-cost drip irrigation equipment has become available. Kits of varying capacity for plot sizes from 40 m^2 up to 2 ha have been developed, tested, and are now used, in Nepal, India and a few other countries. These kits reduce the cost to irrigate an acre of land to 250 US$ on average compared to 1000 US$ in conventional drip irrigation systems. They require only little initial investment (with a bucket kit of 8 US$ a plot of 40 m^2 area can be irrigated), and they can be easily increased in reach later on.

Low cost micro-irrigation technology can help poor people to earn 100 or more dollars of additional cash income per year. And it can help to grow crops with up to 60% less water than with conventional irrigation.

The interest of Eritrean farmers in micro-irrigation ist high.

Dissemination of micro-irrigation systems through a market creation approach[1]

The market creation approach to development

Treadle pumps are a good business ...

for marginal farmers...

... and also for micro-enterprises which manufacture them ...

... and for dealers who market them ...

... and for craftsmen who install them.

The market creation approach to development is based on the exploitation of a market gap by designing an affordable product which increases the income of poor people substantially. To make the product available on a large scale, a profitable supply chain in the private sector must be established.

Conventional pumps for irrigation were much too expensive for poor people. The treadle pump made dry season irrigation affordable also for them (e.g. in Bangladesh, India and in various African countries). Not only poor farmers benefit from this development, but also the players in the supply chain.

Micro-irrigation and market creation

Low cost micro-irrigation has the potential of generating much additional income for poor people in areas where water is scarce. Large-scale dissemination of this technology requires the creation of vibrant markets for the low-cost micro-irrigation equipment, where every element of the value adding supply chain must be profitable.

According to the available experience, the approach to build up dissemination of low-cost micro-irrigation through market creation must include the following elements:

- Assessing feasibility
- Adaptation of technology to local conditions
- Supply chain development
- Rural mass marketing
- Agricultural integration
- Impact measurement and feedback.

[1] These concepts were presented by Dr. Urs Heierli, Section Employment and Income, SDC Berne, Switzerland.

Demonstration of low-cost micro-irrigation equipment[2]

A drip system made in India

The participants witnessing the equipment in operation ...

... and a look at details.

An observation made:

The kit is designed for well levelled or terraced land. On the slopy demonstration plot, water flow was uneven. Thus an adaptation to local conditions was necessary. Plastic clips to squeeze the pipes and regulate water flow along the pipe were the solution to the problem.

A drum kit made in Nepal

The drum ...

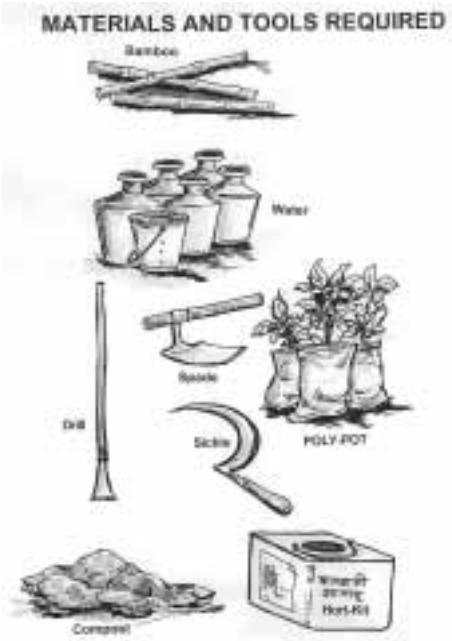
... and a drip line with drippers.

A low-cost sprinkler system from India

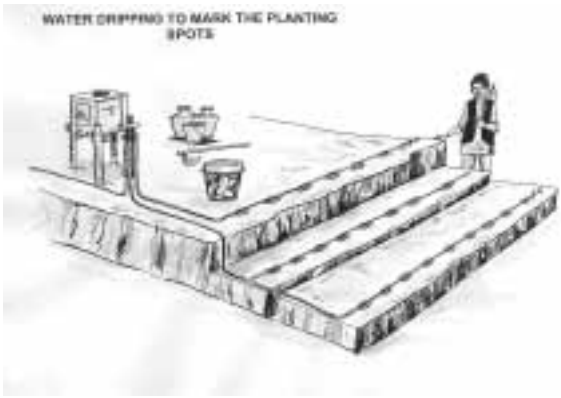
[2] The demonstration was organised by Christoph Studer of the Swiss College of Agriculture, Zollikofen, Switzerland, and Bob Nanes, IDE Nepal.

A horticulture income kit developed in Nepal[3]

In Nepal low-cost micro-irrigation equipment is made available on a wider scale in the form of a horticulture income kit, which allows an easy start with micro-irrigation to vegetable gardeners. Vegetable gardens are very often managed by women. The kit includes all the necessary components of the drip irrigation equipment, as well as all the material required to start growing drip irrigated vegetables. Further there are pictorial instructions on how to use the drip irrigation equipment and the agricultural materials. The kit is packed neatly in a box or bucket which then serves as a water container feeding the drip lines. The horticulture income kit has been designed and developed by IDE (International Development Enterprises) Nepal. The pictures below are extracts from the pictorial instructions to illustrate the design and use of the kit (note that these are not all the pictures).



PORPOSED BOX FOR HORTICULTURAL KIT



Introducing low-cost micro-irrigation in a new country – first experiences from Eritrea[4]

Background

In Eritrea a pre-feasibility study on the potential of affordable micro-irrigation systems was undertaken by a team from CDE (Centre for Environment and Development) of the University of Berne, the College for Agriculture and Aquatic Science of the University of Asmara, and IDE (International Development Enterprises) India. The main purposes of the study were to assess the interest in different micro-irrigations systems in various areas of Eritrea, to establish contacts with local partners for further programme steps, and

[3] The horticulture income kit was presented by Bob Nanes of IDE Nepal.

[4] This study was presented by Brigitta Stillhardt and Pablo Loosli, Centre for Environment and Development, University of Bern.

to begin to assess the economic, social and ecological implications of this new technology under local conditions.

For the purpose of the study different types of micro-irrigation kits were given to farmers for testing. The testers were instructed and assisted in the use of the equipment. The following kits, imported from India, were included in the test:

- Kitchen garden kit for 40 m^2
- Vegetable kit for 100 m^2
- Horticulture kit for perennial fruit crops on 130 m^2
- Micro-sprinkler kit for 160m^2.

The interest in the micro-irrigation turned out to be high, with farmers as well as up to ministry level. Thus it was not difficult to find motivated partners for a further larger-scale testing programme.

Eritrean women test a vegetable kit.

Key insights gained so far

- In areas where sufficient irrigation water for flood irrigation is available, the interest was not substantial.
- One must assess carefully whether to address women or men. Particularly for the smaller kits, women are often likely to be the appropriate addressees.
- The land holding system often does not encourage investment in longer term horticulture. (reallocation of land every 7-9 years). Thus the horticulture kit received rather little interest.
- There should be a filter cloth (to filter water containing a lot of particles) included in the kits, and some spare parts to ensure quick repair.
- The micro-sprinkler needs tap water with sufficient pressure or the possibility to place the water source at 10 m height to function properly. Further it cannot be used in windy weather.
- Animals have to be strictly kept away from the irrigated plots, because they not only destroy the plants but also the equipment. The necesssary fencing adds to the cost.
- The overall taxation on material import adds 10% to the equipment cost.

Important questions still open

- No reliable economic assessment was yet possible, because of rapidly changing prices in the markets.
- The potential socio-economic and ecological effects of an introduction of micro-irrigation are not yet understood.

  In areas where water is very scarce it needs to be assessed whether conflicts between use of water for drinking and other household purposes and irrigation may arise.

  Because of the more efficient water use with micro-irrigation, return flow to groundwater is reduced. If micro-irrigation use is widespread in an area, there is an increased risk of aquifer overexploitation.

  How will the additional income be used? If it is invested in animals, then growing herds may increase pressure on grasslands.

  Will there be enough organic fertilisers? Or will farmers adopt unecologically high levels of chemical fertilisers?

  How can the danger of soil salinisation be dealt with?

Next steps

Together with the identified partners a larger-scale testing phase will be carried out in the coming winter months, which should on the one hand raise the interest of many more people and provide further answers to open questions.

The freshwater and cotton programme of WWF Switzerland[5]

Cotton is grown, processed and traded worldwide. The cotton sub-sector is known for inefficient use of water, high levels of pesticide use, contributions to degradation of wetlands, rivers and lakes, and threats for biodiversity.

The freshwater and cotton programme of WWF wants to raise awareness about these problems and demonstrate viable alternatives. Towards this end it supports organic cotton production.

In the Maikaal project in Eastern India farmers grow organic cotton which is then exported to Switzerland and marketed by COOP (one of the two largest retail chains in Switzerland). Currently 1100 farmers in 90 villages cultivate 8000 acres of organic cotton, resulting in the production of 2500 tons of certified organic cotton. The yields are between 350 and 800 kg per acre. The incentives to the farmers are a premium on the price, access to extension services and guaranteed acceptance of their produce.

In Maikaal drip irrigation was introduced in order to increase water use efficiency. The response is encouraging. The pay-back period for investments is short, because with drip irrigation yields increase substantially. Paired row planting patterns reduce the cost of drip irrigation and farmers begin to buy components and assemble the systems themselves, reducing the cost further to 9000 Rs. per acre.

Key conclusions are that organic cotton is an economically viable options. Limited water resources are a major driving force for adapting local farming systems. Drip irrigation contributes to reversing trends to water resource depletion and promotes conversion to more sustainable farming practices.

Poverty impact and market development of micro-irrigation systems in India and Nepal[6]

IDE (International Development Enterprises) has introduced micro-irrigation systems in various places in India and Nepal. Now a study was conducted to assess livelihood and other impact of these systems in five regions. This excerpt focuses on the following three regions (in the other two regions micro-irrigation has been introduced only very recently):

The whole family is involved in growing vegetables with micro-irrigation.

- Nepali hills, where the focus of the intervention is on poverty reduction
- Maikaal region in Madya Pradesh, India, with focus on market development and organic cotton growers
- Kola region in Karnataka, India, with focus on market development and mulberry cultivation.

Observations made in the Nepali hills

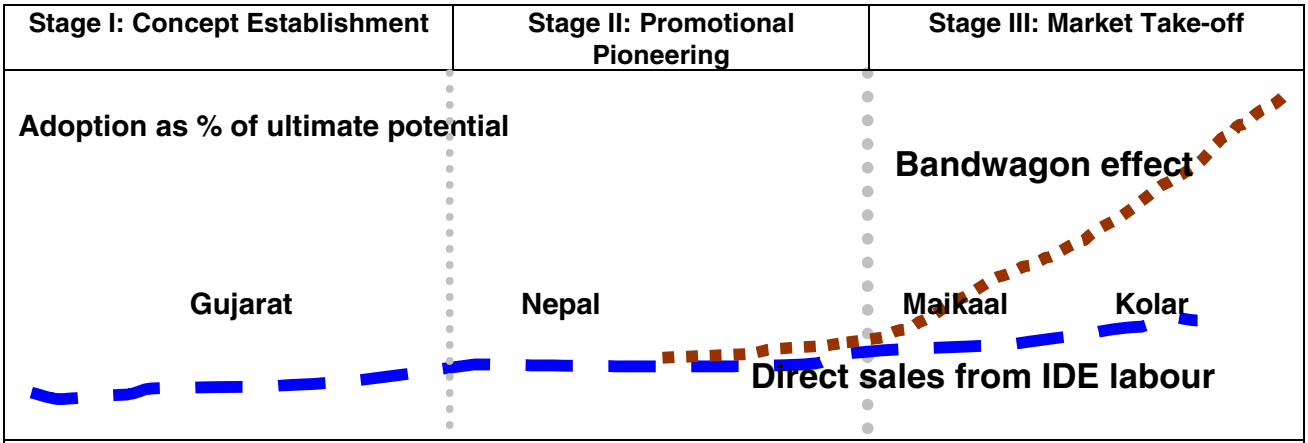
- IDE Nepal focuses on the creation of micro-irrigation communities and ensures intensive technical support to adopters.
- Adopters are largely women who buy the ready-made kits and grow vegetables in kitchen gardens. They achieve additional cash income and household vegetable consumption.
- Due to the focus on whole communities there is a risk of local gluts in the markets.
- Another risk are water use conflicts, because mostly the community drinking water supply is used for irrigation.
- The IDE approach is fool-proof (i.e. adopters are sure to be able to use the kits successfully), but very resource intensive. No market development beyond IDE's own channel could be observed.

[5] This presentation was offered by Nicole Santer of WWF Switzerland, Zurich, and Nicole North of the consultancy firm INFRAS Zurich.

[6] The study was conducted and the results presented by Dr. Tushaar Shah, IWMI India, and Jack Keller, Irrigation Consultant, USA.

Observations in Maikaal and Kola

- In both the areas adopters are middle-level farmers.
- The motivation to go for micro-irrigation is water scarcity.
- Impacts are better product quality, higher yields, less labour and input use, and 15-30% higher profits.
- In these areas farmers buy custom-built systems, ready made kits are not used.
- In both the areas micro-irrigation has been introduced several years ago. The technology is well established now and the market has developed.
- New brands are available with the suppliers, local manufacture emerges, lower cost equipment is the focus of these new introductions; all this indicates that there is sound competition in the market.



IDE as well as its offerings have no presence in the social setting	IDE emerges as a pioneer of a new technology	IDE ends up as one of the many players on the market, but in some ways is more equal than the rest.
Focus on getting the technology to work for 'target' farmers ● Understanding the target customer and her needs ● Understanding the potential of the technology ● Product development, trials, adaptation ● Customer feedback and adaptation	*Focus on market development for IDE product line* ● Promotion of the KB product range among target segments ● Developing manufacturers, distributors, dealers ● Establish and defend quality and pricing benchmarks for KB range ● Encourage, stimulate, support competing chains	*Focus on strategic management of the market* ● Focus on the MI products market as a whole to influence its *structure, conduct & performance* ● Identify opportunities for 'standard setting' and market expansion. ● Keep working with the 'target' segment. ● 'Boundary maintenance' for the market as a whole

Stages in market development derived from the study