Left: On-farm demonstration and exchange visits: women demonstrating the system to visitors (PARDYP)
Right: Farmer interaction programme: results and experiences were shared regularly through interaction meetings where drip users and non-users discussed the technology (Madhav Dhakal)

Participatory action research on drip irrigation

Nepal: थोपा सिंचाईमा सहभागीमूलक कार्यसंगै अनुसन्धान

Conducting participatory action research with farmers and line agencies for demonstrating, disseminating and scaling up drip irrigation

Most farming in the uplands of Nepal's midhills is rainfed with many fields remaining fallow during the dry season due to lack of irrigation water. The People and Resource Dynamics Project (PARDYP) water demand and supply survey identified scarcity of irrigation water as a major issue in Nepal's midhills. To assess the potential of drip irrigation to address this problem, the University of British Columbia (UBC) in 2000/2001, in collaboration with PARDYP, tested a low cost irrigation drip set and a more costly set in the Jhikhu Khola watershed; and PARDYP and Tribhuvan University's Institute of Engineering (Nepal) tested the low cost set with farmers at another site at Kubinde village, Kavre.

PARDYP started research on drip irrigation at an agricultural research station (the Spices Crop Development Centre at Tamaghat, Kabhrepalanchok) and brought different stakeholders, principally farmers, to the station to learn. After seeing the trials some farmers, especially those living near the research station, started testing drip irrigation on their farms. From 2001 to 2004, PARDYP subsidised 50% of the cost of the drip sets to most adopting farmers.

PARDYP organised several farm visits for stakeholders to the research station and farmers' fields. The number of interested farmers increased and many started testing and demonstrating the technology on their farms. PARDYP provided technical support during installation, advice about water application, and trouble shooting training to user farmers. Soon, many farmers started using drip irrigation with little or no technical support from PARDYP. Some collected quantitative and qualitative information on the performance of their systems. Results and experiences were shared regularly after cropping seasons through interaction meetings. Users' experiences convinced many others to adopt the technology.

Interaction meetings were organised to communicate farmers' feedback to the organisation and businesses involved in making the drip sets. Farmers from the watershed were taken to the drip set manufacturers to establish a direct link between them and to allow the project to phase out its support.

This approach emphasised on-station to on-farm research and demonstration to facilitate ongoing monitoring and evaluation of the performance of locally made drip sets.

WOCAT database reference: QA NEP6
Location: Jhikhu Khola watershed, Kabhrepalanchok district, Nepal
Approach area: 111 km²
Land use: Annual cropping
Climate: Humid subtropical
Related technology: Low cost drip irrigation, QT NEP6
Compiled by: Madhav Dhakal, ICIMOD
Date: August 2006, updated September 2006

The technology was documented using the WOCAT (www.wocat.org) tool.
ICIMOD
Swiss Agency for Development and Cooperation SDC
WOCAT

Problem, objectives and constraints

Problem

- Lack of systematic on-farm research on drip irrigation
- Weak institutional collaboration for developing, disseminating and scaling up drip technology
- Inadequate water available for agriculture alongside strong seasonality and poor irrigation facilities

Objectives

- To test, demonstrate, and evaluate drip irrigation systems under local conditions with multiple stakeholders
- To share results and experiences with communities to scale up the technology

Constraints addressed

Major	Specification	Treatment
Technical	Promotion of micro irrigation was not a priority of line agencies in the study area	Technology implemented with multiple stakeholders' participation
Financial	Insufficient government incentives	A cost-effective technology and implementing approach
Institutional	Weak institutional collaboration among line agencies	Participatory action research with several institutions – universities, local research centres, and farmers
Minor	**Specification**	**Treatment**
Other	Lack of awareness on potential water-saving options	Community-based training, discussions and field visits

Participation and decision making

Target groups

Land users

Extension workers

Approach costs met by:

International donor-funded project (PARDYP)	50%
Community/local	50%
TOTAL	**100%**

Decisions on choice of the technology: Mainly national soil and water conservation (SWC) specialist in consultation with land users. The project tested drip irrigation as a promising water-efficient technology.

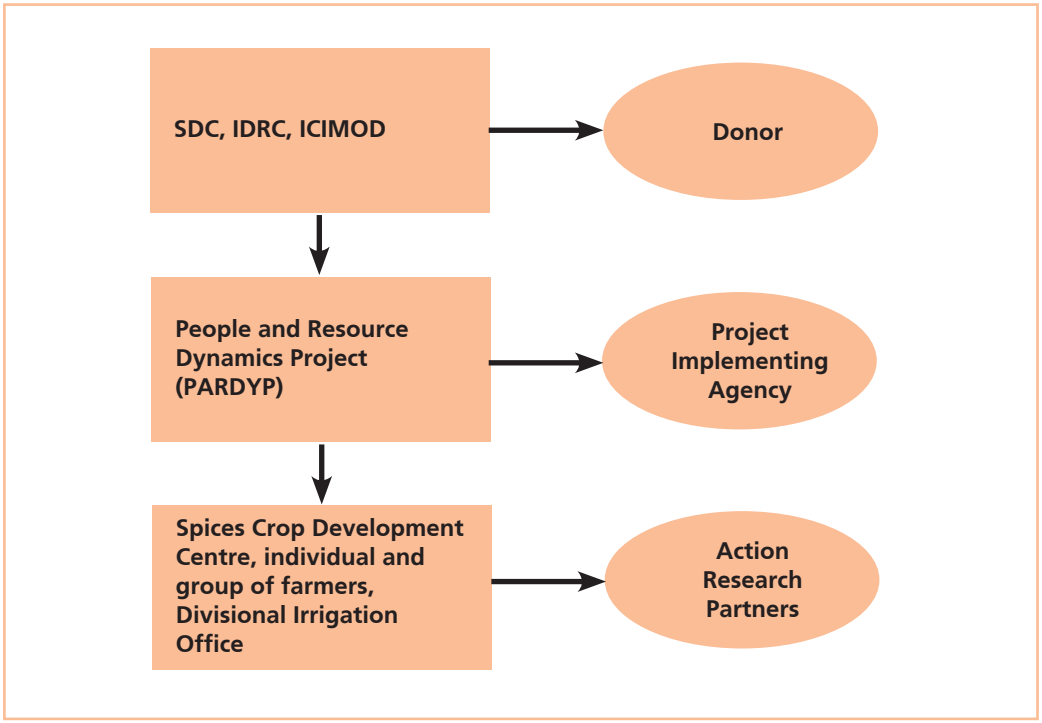
Decisions on method of implementing the technology: Mainly SWC specialist in consultation with land users. It was tested first in the research station to build confidence of the project staff and surrounding villagers, and was then taken to interested farmers' fields.

Approach designed by: National specialist and land users. The approach was implemented jointly by national specialists and land users.

Community involvement

Phase	Involvement	Activities
Initiation	Interactive	A water demand and supply survey identified problem of lack of water in the dry season for irrigating crops. The concept of drip irrigation was shared at public meetings and a demonstration plot established at a local agricultural research centre. Several farmer visits organised to the research centre.
Planning	Interactive	At the public meetings, farmers showed interest in drip irrigation. The project supported them by transporting drip sets to the nearest roadhead and subsidising the purchase costs.
Implementation	self-mobilisation	Farmers implemented the technology and the project provided technical support.
Monitoring/ evaluation	Interactive	Farmers monitored the technology with project support. Evaluation was usually done at meetings and exchange visits.
Research	self-mobilisation	The technology was tested at the local research centre during the first few years followed by on-farm research with farmers. Farmers collected and analysed quantitative and qualitative information themselves.

Differences in participation of men and women: Only 20% of total participants were women



PARDYP project donors and implementing partners
SDC: Swiss Agency for Development and Co-operation
IDRC: International Development Research Centre
ICIMOD: International Centre for Integrated Mountain Development

Extension and promotion

Training: Training programmes were organised on how to install and maintain the drip systems. Likewise farmers were trained on record keeping for water application, production, and cost-benefit analysis. The different target groups became more knowledgeable about the technical aspects of drip irrigation, and the economic benefits of using drip irrigation to grow vegetable crops.
Extension: Farmer-to-farmer dissemination and the traditional extension approach took place at interactive meetings, on-station and on-farm demonstration visits, and workshops. The projects' own extension structure and other agents facilitated this work with support from the government's existing extension system within the Spices Crop Development Centre. The various target groups became more aware about water conservation and efficient irrigation methods. The number of farmers adopting the technology significantly increased as a result of this approach.
Research: Action research was carried out to compare the water requirements, the cost-benefit, and the advantages and disadvantages of traditional and drip irrigation. The project's focus on research helped to improve knowledge on water saving and cost-benefit analysis.
Importance of land use rights: Individual land ownership helped to implement this approach and to disseminate and scale up the technology as there were no conflicts among land users.

Incentives

Labour: None
Inputs: 50% subsidy on drip kits provided by the project during initial stages to a few farmers.
Support of local institutions: On-site training during drip installation provided to a local NGO (Ranipani Gram Sewa Kendra) with vegetable seedling support.
Long-term impact of incentives: The incentives at the beginning helped raise awareness amongst land users and to spread the technology. In the long-term farmers who received incentives are getting good economic benefit from the technology.

Monitoring and evaluation

Monitored aspects	Methods and indicators
Biophysical	ad hoc observations on land use change, crop rotation, soil surveys
Technical	regular measurements of water requirements
Socio-cultural	ad hoc observations through socioeconomic surveys
Economic/production	regular measurements of cost-benefit and production
Area treated	regular measurements of area under drip irrigation
No. of land users involved	regular recording of number of drip users

Impacts of the approach

Changes as a result of monitoring and evaluation: Few changes were made: the subsidy system was withdrawn and work with groups rather than single households was started. In addition, interaction programmes were organised at different locations in the watershed.

Improved soil and water management: Land users started cropping land that was previously left fallow in the dry season and increased the area under cash crops – especially vegetables. Drip irrigation used only 60% of water compared to bucket irrigation.

Adoption of the approach by other projects/land users: A few institutions and district level line agencies like Ranipani Gram Sewa Kendra, a local NGO, and the Divisional Irrigation Office Kabhrepalanchok started organising interactive meetings to discuss drip irrigation.

Sustainability: Most of the land users continue to use drip irrigation and are maintaining the sets. A few farmers, including women, abandoned drip after using it for some time. The women who abandoned it said they did so because of "lack of technical knowledge", "not enough labour" and "too far to get water"

Concluding statements

Strengths and →how to sustain/improve	**Weaknesses** and →how to overcome
This approach emphasises the participation of multiple stakeholders in researching, disseminating, and scaling up the use of the technology → Identify and involve new interested stakeholders	Many local land users remain unaware about the potential of drip irrigation technology → Make more funds available to further promote the technology
On-station and on-farm research was important to get results from different locations and under different conditions → Continue research to acquire in-depth knowledge on performance of drip irrigation under different conditions	Women drip farmers' constraints were not sufficiently addressed → Women's priorities and constraints must be better understood and addressed by programmes and projects on drip irrigation
Regular interaction meetings provided land users with a platform to share ideas and for non-adopters to learn about drip from users → Continue such meetings and involve more potential adopters	
Farmer-to-farmer visits were helpful to build confidence of farmers by seeing on-site results → As above	
On-site training on drip installation and maintenance helped build confidence in using drip sets → As above	

Key reference(s): ICIMOD (2007) *Good Practices in Watershed Management, Lessons Learned in the Mid Hills of Nepal.* Kathmandu: ICIMOD; Shrestha-Malla, S. (2004). Adoption of Drip Technology and its Impact on Gender: a Case Study from Jhikhu Khola Watershed, Nepal. PARDYP/ICIMOD (unpublished)

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