

MICRO IRRIGATION IN NEPAL: AN EFFECTIVE TOOL TO FIGHT AGAINST POVERTY

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INTRODUCTION

Non Conventional Irrigation Technology Project (NITP) was established on 2003 A.D. to develop and promote other than conventional irrigation technology/ies and techniques. Its aim is to develop irrigation systems incorporating efficient technologies for both to the under irrigated areas as well as to areas where conventional irrigation systems is not possible due to reasons like high development cost, insufficient quantity of water, unsuitable geology, land and soil, etc hence designated as non irrigable. Rescuing poor from vicious cycle of poverty and uplifting women, disadvantaged and marginalized groups of people economically are the ultimate goals of this project. Apart from basic objective of providing irrigation to otherwise dry lands it has been successful in lessening social discrimination emanating from social and economic inequality such as poverty, illiteracy, gender, and cast system.

At present NITP is promoting micro irrigation technologies and developing efficient irrigation system for such technologies. Micro irrigation in Nepalese context is "micro both in terms of command area size as well as in application" rather not only in application at micro level as in other developed countries. Hence, very small irrigation systems using simple drip and micro sprinkler for water application are among the non conventional irrigation systems. But present understanding of micro irrigation system only as synonym to small irrigation will eventually hamper the progress of non conventional irrigation development in Nepal.

1. NEPAL

Nepal with total area 147181 sq km. and population about 28 millions is a South Asian country sandwiched between emerging world economic powers India and China. Nepal can be broadly divided into three geographical regions i.e. High Mountains, Mid Mountains and Low land plain area. Chure range is small hilly area between mid mountain (*Mahabharat*) and plain area (*Terai*). Elevation ranges from 65m to 8840 m above MSL from south to north within a short span of about 200 km. Nepal is very rich in water resources which, is yet to be harnessed. Terai, covering 18% of total area, is comparatively fertile plain area in northern tip of indo-gangetic plain. Remaining 82% is covered by mountain. Per capita income is less than 460 US\$ with above 60% of its population engaged in agriculture. Contribution of agriculture sector in GDP is more than 30%. Main agriculture products are rice, wheat, pulses, tea and sugar cane. Main staple food is rice. Agriculture productivity is well below world standard.

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Nepalese society is cast based discriminatory and patriarchal where women are subjugated both economically and physically. Poverty is rampant among lower cast but not limited to them.

1.1 Overall Irrigation Status

Total cultivatable land in Nepal is about 2640 thousand hectares, out of which only 1766 thousand hectares is categorized as irrigable. Remaining 874 thousands hectare are non irrigable as conventional irrigation schemes are unfeasible for these areas.

Inclusive of irrigation systems for 636 thousand hectares developed by farmers themselves irrigation infrastructures are already built for total 1252 thousand hectares which is 47% of total agriculture land and 71% of total irrigable land. Almost 50% of these irrigation systems built by farmers have received government assistance for upgrading and maintenance. Only 46% of irrigated land or 22% of total agricultural land has year round irrigation facility.

2.1 Non Conventional Irrigation System: Nepalese Context

2.1.1 Objective of the NITP

Objective of the NITP is to implement the micro-irrigation program for disadvantaged group, marginal land and farmers, severely water deficit areas and provide an effective micro-irrigation service delivery mechanism with high value crop production support for poverty alleviation.

2.1.2 Non conventional irrigation system

Water acquisition and its application, if both of them or any one of them, is not conventional in nature than it is non conventional irrigation system. Hence, irrigation system which includes one or more than one of the following components is non conventional irrigation system.

1. Drip
2. Sprinkler
3. Treadle Pump (Manually (by feet) operated ground water extracting machine)
4. Low cost water storage (Thai jars, soil-cement or plastic lined) tanks
5. Rain water harvesting

2.2 Project Area, Priority, Budget and Present Status

The sub projects are scattered throughout Nepal. Based on experiences gained so far it has been observed that non conventional irrigation schemes are most useful and necessary for mid hill and inner terai (area between mid mountains and Chure). But developments of non conventional irrigation sub projects are not restricted to these areas only. While treadle pumps are used in terai, schemes with drip and sprinkler technologies are being promoted mainly in mid mountain and hills.

Positive discrimination is accepted in selection criteria of NITP. Priority is given to the areas inhabited by marginalized poor community with no potential for future

development of conventional irrigation. Similarly access to market or potential for future market development in nearby areas is assessed.

Total budget allocated to NITP has gradually increased from US\$ 0.54 million for the FY 2007/08 to US\$ 1.46 million for the FY 2010/011. While total estimated cost of 223 ongoing projects is US\$ 6.2 million only US\$ 1.46 million is allocated in this fiscal year. Nearly 94% of the allocated budget is used for civil works of project.

At present 223 sub projects in 74 districts² with total command area 3300 ha are under construction. It is expected that 40 of these projects will complete by the end of fiscal year 2010/11 providing irrigation to additional 501 hectare of land. About 90% of the sub projects have command area less than 20 ha.

Already completed 135 projects, with total expenditure of US\$4.2 million, in 44 districts can irrigate about 2558 ha. if utilized properly as most of the projects are intended for drip irrigation schemes and designed accordingly.

A. Simple Drip

Simple drip system is very simplified form of modern drip technology. Holes are punched in 8mm lateral pipes to act as emitters. Pressure is generated by placing tank (capacity 60 ltrs) about 1 meter above the ground.

B. Micro Sprinkler

Micro sprinkler have very small coverage of about 4 meters in diameter. They can be operated under 7 to 10 meter head. Small area of coverage is specially suited for small terraces in mountains.

Table 1: Cost of Simple Drip and Micro Sprinkler System

System	Size	Irrigation Capacity	Retail (Without/With US\$)	Price tank ³	Remarks
Simple Drip System	Very small	90 sqm	10.76-14.13		4 Drip lines
Simple Drip System	Small	125 sqm	15.45-18.98		6 Drip lines
Simple Drip System	Medium	250 sqm	27.74-31.34		8 Drip lines
Micro Sprinkler System	Small	250 sqm	11		4 risers
Mini Sprinkler System	Small	250 sqm	9.63		2 risers

Apart from NITP different I/NGOs are also involved in micro irrigation development (Table 2). Some of these organizations which were active even before government started its initiative are still active in micro irrigation development in Nepal.

2- There are 75 districts in Nepal.

3- HDP tank of size 50 ltrs

Table 2: Different Organizations Involved in Micro Irrigation Development and their contribution

S. No.	Organization	Hectare	House Holds	Hectare per HH
1	ADB/N ⁴	28987	29035	0.998
2	IDE ⁵	9815	119406	0.082
3	SISP ⁶	2280	7800	0.292
4	NITP ⁷	2558	6800	0.376
5	DEPROSC ³	1211	4139	0.293
6	SAPROS ³	335	3852	0.087
7	MDI ³	168	1001	0.168
8	CEAPRED ³	129	741	0.174
9	VDRC ³	21	229	0.092
10	HELVETAS ²	5	27	0.185
		45509	173030	0.262

Comparatively larger average landholding per household in ADB/N invested areas is clear indication of undue influence by comparatively wealthy farmers to government agency. Contrary to this in the projects developed by I/NGOs majority are small farmers as indicated by average land holding size. This is one of the reasons behind the success of their initiative.

3. Beliefs and Achievements of NITP

NITP firmly believes that development is a right not a generosity. For NITP Development is not only a matter exclusively of economic growth and increase in gross domestic product. Projects of this size do not have substantial impact in GDP. NITP firmly believes that genuine change is most often rooted in small communities of poor people and NITP can play very important role in this change. Hence, all neglected areas and communities are primary target of NITP development.

NITP believes in positive discrimination and attention to vulnerable group. Affirmative action is needed to correct, offer remorse and compensate for neglect and seclusion of disadvantaged group since historical times. Obviously positive discrimination is their right, not plead for sympathy. For NITP all those who cannot claim their rights or are voiceless are potential beneficiaries as it is not a matter of cast but it is state of being powerlessness resulting from poverty and lack of education which are proving to be more detrimental for the cause of social justice.

Social inclusion and women empowerment are other two areas of major achievements of NITP's micro irrigation schemes. Objective of social inclusion is being achieved through overall participatory process. Through this process decisive participation of all irrespective of their cast, race, religion, gender and economical status is ensured in each stages of development. Mandatory provision of 35 percent women in WUA's (Water User's Association) executive committee is helping in women's empowerment by installing confidence in them and providing opportunity for leadership. At the same time this process is successfully creating awareness among the disadvantaged group (poor, women, lower cast and ethnic group) in the community, helping them to organize, empowering them for decision-making so that

4- ADB/N: Agriculture Development Bank Nepal (semi government organization)

5- International Non Governmental Organizations

6- Local Non Governmental Organizations

7- Non Conventional Irrigation Technology Project

they can identify and prioritize their needs. It is also building up user's capacity for preparation, implementation, operation and management of subprojects in other areas as well to enhance their livelihoods.

User's committee is providing platform to disadvantaged group to mingle with others, which is invaluable instrumental in raising their level of self confidence. In addition to this the democratic process adopted in electing executive members of WUA is another important feature helping in social inclusion.

Leadership ability and sense of economic independence are very important in women's empowerment as these two factors have direct impact on individual identity, dignity, self respect and social standing. Leadership ability comes from knowledge and capability to demonstrate and implement such knowledge. NITP is instrumental in increasing women's confidence level by giving them leadership opportunity through WUA, improving their leadership quality by involving them in various micro irrigation and agriculture related trainings, participation in user's committee activities, interaction programs and introducing sense of freedom in them by including them in "away from home" farmers tour program. Economic independence is achieved through control over resources i.e. by selling agro products and controlling the returns. In small micro enterprises such as small micro irrigation supported agricultural activities women benefit in particular, because their say over the output of homestead based activities tends to be stronger than for other sites of agricultural production.

4. Scope for non conventional irrigation schemes

The potential agricultural land area for non conventional irrigation development in Nepal is around 1000 thousand hectare which is summation of non irrigable and under irrigated land. Further, it is possible to increase irrigation capacity of present irrigation infrastructures drastically with adoption of efficient drips and sprinklers for water application.

Nepal being a mountainous country with fragile geology poses tremendous challenge from stability point of view. Landslides, slope failure, rock fall or any other form of soil mass movement is common along the canal alignment both due to natural cause and due to human intervention. As pipe is used for water conveyance in Non conventional systems it requires very little excavation works hence induces less disturbance to natural geomorphology. This makes such schemes more appropriate in Nepalese context.

Areas under cultivation in hill and mountain region are either terraced or sloppy land. Soil erosion rate is high from such areas which is further aggravated by conventional surface irrigation. Irrigation technologies which use small quantity of water such as drip and sprinkler are helpful to mitigate soil erosion from such land.

Seepage and deep percolation loss is high because of high porosity and shallow depth of soil in mountainous region. Drip and sprinkler are most appropriate application technologies to minimize the loss of water as well as nutrients.

The economical status of majority of people and average land holding per family has further made micro irrigation more relevant.

5. Problems in Micro Irrigation Development in Nepal

The problems associated with micro irrigation development are of varied nature as technologies are new for Nepalese farmers. Capacity of the drip and sprinkler sets, its coverage, prior knowledge about these technologies, farmer's capacity to invest in these technologies etc are major hurdles in micro irrigation development. Farmers are unaware of effectiveness of these technologies. Moreover farmers who are

accustomed with flooding methods of irrigation have doubts about these systems meeting crop water requirement.

Drip sets developed in Nepal are of very small capacity as largest set can cover 1000 sq.m. Only Hence big farmers who have capacity to lead small farmers in vegetable farming and marketing are not attracted towards it. These poor small farmers would have followed big farmers had they used these technologies.

Changing present cropping pattern which is being practiced since centuries is another major problem. Paddy cultivation has attained status of religion or culture. Hence switching over to high value crops like vegetables is not taking place at desired pace? NITP is also facing serious problem of lack of budget. Budget allocated is minimal compared to the coverage of NITP and large number of projects under construction. Due to unavailability of sufficient budget; even for such small projects; it is taking more than anticipated time (1 to 2 years) to complete. This is totally against most strong argument in its favor that is "*being small it can be completed in very short period and benefit can be ripped immediately*".

Unwanted interventions by political leaders in project selection and compelling executing agencies to implement unfeasible projects is also harming the progress of NITP.

6. Conclusion

Topography of the country, poverty level, land fragmentation etc makes it imperative to promote micro irrigation in Nepal.

The achievements of NITP in Socio-Economic sectors are indeed remarkable. Economic independence, leadership quality, self-identity and confidence, which are key ingredients in achieving women's empowerment, are major moral boosting achievements. Similarly, NITP is playing very important and effective role in lessening social discrimination, exclusion and seclusion of deprived and destitute populace. Development induced by NITP kind of projects are in real sense "development with human face" where most deprived, marginalized and excluded sect of people are benefited and experience positive changes brought by it. These achievements in Socio-Economic sectors are indeed remarkable.

More training and motivational programs are needed to convince more farmers to adopt these technologies and switch over to high value crop farming. Either by government or through I/NGOs with government support this initiative must continue.

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