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Poverty Alleviation and Resource Conservation Through Integrated Watershed Management in a Fragile Foot-Hill Ecosystem

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INTRODUCTION

With only 22% of the world's land suitable for agricultural production, the yearly loss of 5-7 million ha by various forms of land degradation mostly, in the hunger belt comprising tropical and sub-tropical countries, would seriously jeopardize the prospects of feeding rising population on planet earth (Buring, 1989, Lal and Stewart 1992). The commitment to feed increasing population with diminishing availability of land and water would largely require successful restoration and conservation of these resources (Brown 1984). Poverty alleviation with a strong commitment for conservation of natural resources would be the first challenge of the 21st century. Abject poverty, high population and degradation of the production base are some of the problems defying solution in most developing countries including India. Piecemeal efforts in the pre and post-independence era have largely failed to halt the march of degradation, which incidentally is most severe in the fragile mountainous and hilly ecosystems of the country (Hannaway 1988).

Himalayan foot-hills (Shivaliks) sandwiched between the alluvial plains and the rocky mountains cover an area of about eight million hectares in 5 northern states of India and form one of the eight most degraded ecosystems of the country (GOI 1998). Erratic distribution of rainfall, small land holdings, lack of irrigation facilities, heavy biotic pressure on natural forests, inadequate vegetative cover, heavy soil erosion, land slides, declining soil fertility and frequent crop failures resulting in scarcity of food, fodder and fuel are the characteristic features if this region (Grewal 1995). The area once dotted with perennial springs and gentle streams were converted into a tract of ferocious torrents overflowing with muddy water and debris from fragile barren hills to river basins. The floodwaters erode banks, deposit senile sand on fertile land and inundate large areas in plains disrupting communication and causing colossal loss of human life, livestock and property. Large-scale migration of male population in search of work, drudgery of women due to scarcity of drinking water, food, and fodder and a general lack of education especially among girls are the common socio-economic problems of this region. It was observed that boys continued with their studies but girls drop out from schools to help their mothers in fuel and fodder collection. The benefits of green (cereal production) or white (dairy development) revolution did not reach the foothill farmers because of lack of irrigation facilities, scarcity of arable land and undulating terrain. This resulted in increasing unemployment, migration to plains, mal-nutrition, poor health and enlarged economic disparities and regional imbalances within the states. Major share of the financial resources of the country were allocated to irrigation, education, health care, communication and industrial development, which largely benefited the rich and elite. Reversal of poverty linked resource degradation continues to be a challenge for all those engaged in poverty alleviation and bringing about equity. It appears that the Government alone cannot resolve such a gigantic problem of a complex nature without active involvement of local communities (Chambers *et al* 1989, Chopra *et al* 1990).

Two decades of operational research and development in watershed management have given a ray of hope through some success stories (Grewal *et al* 1995). However, large-scale application of the results of the above research and development efforts could not be achieved mainly due to lack of integration between various line agencies operating in the watersheds. However, there is a growing realization in the country that eco-development of rained areas is difficult without adopting a community-led integrated watershed development approach. This approach was therefore adopted in the World Bank-supported Integrated Watershed Development Project (IWDP), both in the Shivalik hills (4 states) and the plains (3 states). This paper describes the salient features and important results of IWDP (Hills) with particular reference to resource conservation and poverty alleviation.

Integrated Watershed Development Project

The project was launched in 1990 for seven years with an estimated cost of US $ 125.6 million (75 million credit from the bank) to treat 2,30,000 ha contiguous area of four northern states i.e. Haryana, Himachal Pradesh, Jammu and Kashmir and Punjab called Shivaliks (Map 1). The single window system of providing goods and services was ensured by complete integration of soil and water conservation, forestry, rainfed agriculture, horticulture and live stock components through a unified implementing agency. Project interventions included reforestation of degraded forest and pasture lands, soil and water conservation, agricultural and horticultural crops demonstrations, breed improvement, and health care of livestock, water resources development for human and livestock use, and supplemental irrigation for rain-fed crops. Adoption of watershed approach through community participation and comprehensive demand-driven planning was built into project design. The state agricultural universities were involved for adaptive research and capacity

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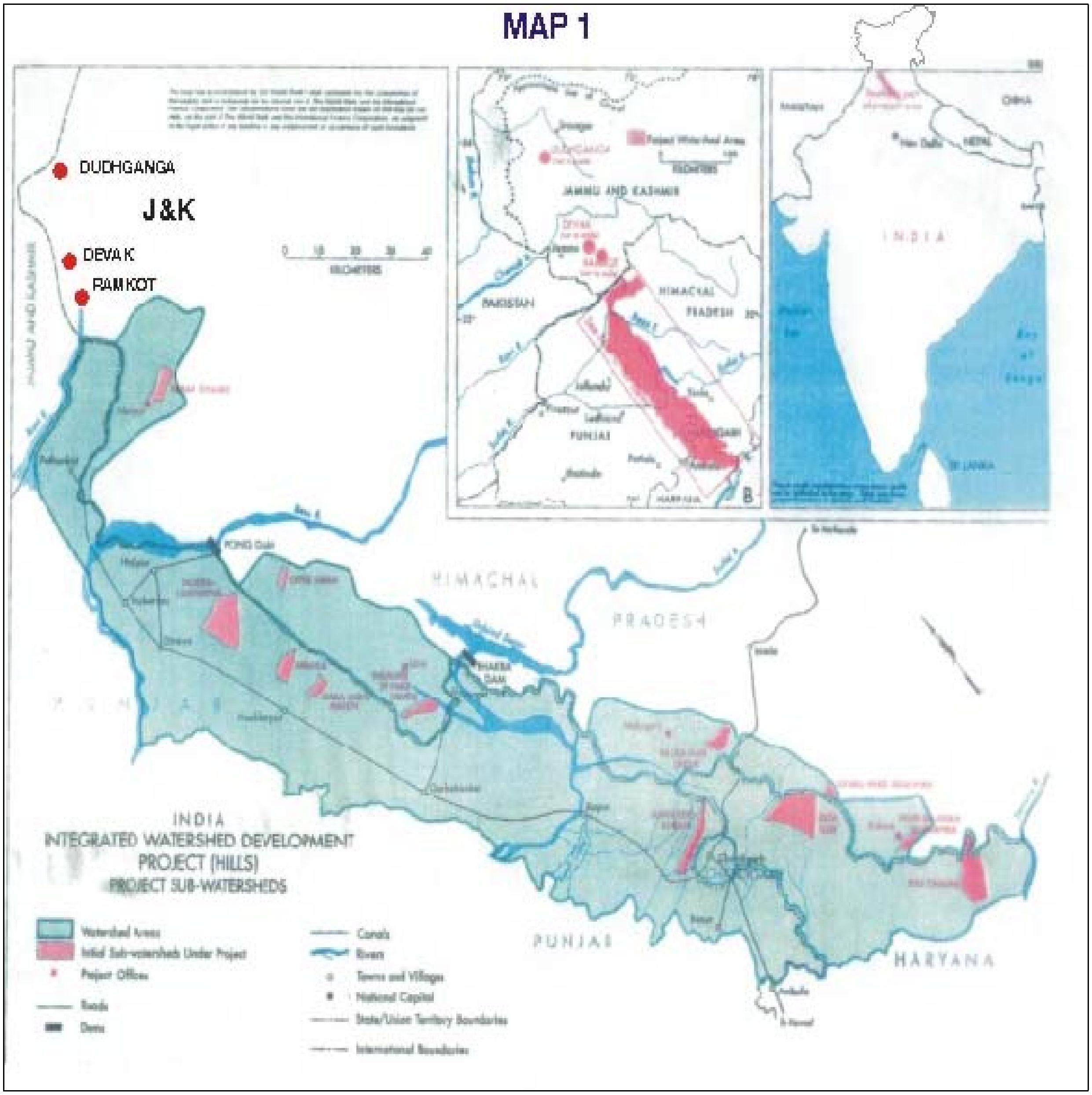

Table 1. Achievement of IWDP (Hills) up to ,1998 in 4 States of North India.

Activities	Unit	State-wise Achievement				Total
		Haryana	**Himachal Pradesh**	**Jammu & Kashmir**	**Punjab**	
Arable land production	ha	11,870	22,602	20,160	13,922	68,554
Non-arable land protection	ha	15,243	16,408	18,081	43,964	93,696
Terrace repair	ha	-	5,620	-	-	5,620
Rainfed horticulture	ha	1,214	1,775	4.315	545	7,849
Total	**ha**	**28,327**	**46,405**	**42,516**	**58,431**	**175,719**
Water harvesting structures & village ponds	no	300	610	959	178	2,047
Water storage	000 m^3	189	1,602	369	1,296	3,456
Total Expenditure (Rs)	**million**	**501.69**	**447.12**	**517. 41**	**775.59**	**2,241.81**

Source: Government of India, Ministry of Agriculture, 1998
Rs. 42= One US$

Table 2. Run –off and soil loss from four treated sub-watersheds in IWDP (Hills), Punjab.

Watershed	Area (ha)	Run off as% of rainfall 1994	1995	1996	1997	1998	Soil loss (t ha-^{1} yr-^{1}) 1994	1995	1996	1997	1998
Gurha	50	-	33.2 (1521)	7.5 (938)	4.3 (832)	5.8 (1029)	-	155.1	51.9	24.0	19.7
Makowal	45	40.3	36.0 (2177)	0.1 (1481)	0.2 (1488)	0.5 (2221)	-	24.4	1.6	1.4	3.0
Kapahat	22	43.0	54.8 (2049)	3.1 (1105)	0.3 (1163)	0.8 (1517)	163.5	45.3	26.1	5.8	11.8
Manjhi	45	50.4	56.2 (2035)	4.2 (1332)	0.2 (1025)	0.4 (1577)	419.0	48.2	23.8	1.3	4.7

Figures in parentheses show seasonal rainfall in mm.

capacity building of the project staff. The main strength of the project was an in-built flexibility and experience-dictated use of the same during project implementation. A regular and effective mechanism of interaction between the project staff, World Bank and the Ministry of Agriculture introduced several positive changes, especially after the mid-term review, to improve the sustainability of project activities. Theses changes included enhanced allocation to water resources development, encouraging use of local grasses, shrubs and trees to meet the local needs, use of local materials and indigenous technologies, constituting community-based organizations to shoulder the responsibility of implementing, cost sharing by beneficiaries, post-project operation and maintenance.

In a period of eight years, out of 230,000 ha area proposed for treatment, an area of 175,000 ha was treated at a total cost of Rs. 2,242 million (Rs 42=1 US$) benefiting 82,000 families having a population of 600,000 (Table 1). More than 2,000 water harvesting structures and village ponds were constructed to store 3,456,000 cubic meters of water for human use, livestock drinking and supplement irrigation. The project activities have mostly benefited the less privileged population consisting of women, landless labor and small and marginal farmers. Water harvesting structures had the immediate and visible impact and received priority from the communities and created willingness for cost sharing in an increasing manner. About 35 % of the funds were used for this activity during the last three years of the project.

RESOURCE CONSERVATION

Impact evaluation and monitoring carried out during seven years of project's operation have generated useful information on the impact of project interventions. Some of these are highlighted in the succeeding paragraphs.

Reduction in runoff and soil loss

Run off and soil loss measurements were recorded from four typical sub-watersheds in each state by installing gauging stations to record the effect of treatment on watershed hydrology. In the state of Punjab, the run-off from the four sub-watersheds (see map 2) before treatment varied from 40.3 percent to 50.4 percent of rainfall before imposing the treatments during the base year 1994 (Table 2). Consequent upon the imposition of the treatments, namely of trees and grasses, construction of loose stone check dams, drop structures, and community-imposed control on grazing; a quick reduction in runoff was noticed. Thus in 1998, the runoff varied from a mere 0.4 to 5.8 percent. Similarly, the digging of staggered contour trenches (750 rm/ha), planting soil loss declined from 163.5 – 419.0 t. ha.$^{-1}$ yr.$^{-1}$ during base year to 3.0 – 19.7 t. ha.$^{-1}$ yr.$^{-1}$ in 1998. Different watersheds responded differently to treatment measures as evidenced by highly variable runoff and soil loss values because of the variable size, nature and property of soil, slope conditions, vegetative cover development and extent of the landslide infestation. The stabilization of landslide areas took a longer time and hence runoff and soil loss declined at a much slower rate. Similar trend in reduction of run off and soil loss was reported from treated watersheds of other participating states (GOI 1998).

Reduction in biotic pressure on forest watersheds

The extent of biotic pressure was evaluated in three contiguous sub-watersheds of Punjab namely Bullowal, Mohanmajra/Kolar and Takarla having respectively good, medium and poor forest cover because of good social pressure over grazing by an effective Village Development Committee (VDC), moderate social pressure by a not so effective VDC and no social pressure because of the absence of any VDC (control). The number of livestock going to the

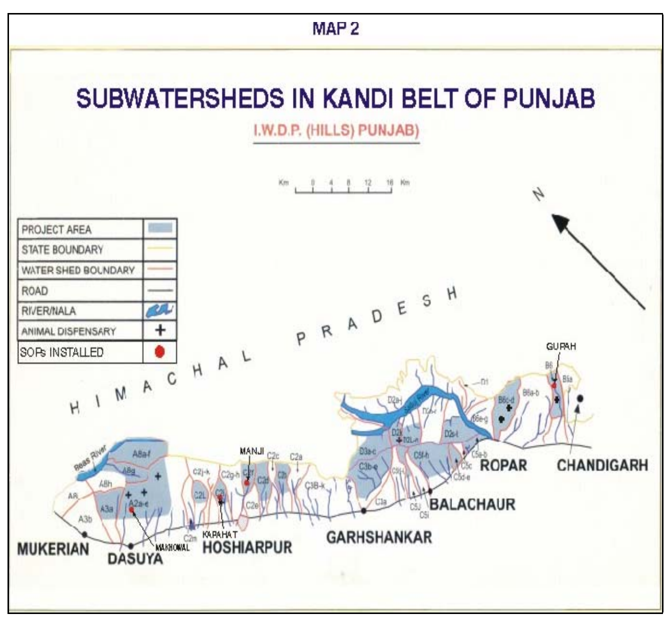

Table 3: Livestock and human pressure in three sub-watersheds having variable vegetation cover condition as a result of effectiveness of village development committee.

Type of pressure		Condition of Forest cover*		
	Unit	Good	Moderate	Poor
A. LIVESTOCK PRESSURE				
I. Daily animal grazing				
Cows	no	1	6	11
Goats	no	4	160	410
Buffaloes	no	5	13	22
Total	no	10	179	443
II. Animal excreta counts in 225m^3 plots				
Cows/ Buffaloes	no	1	4	13
Goats	no	2	19	57
B. HUMAN PRESSURE				
Persons going to forest area daily	no	22	119	195
Daily fuel wood extracted	kg	220	1754	3757
Daily fodder (grass-tree leaf) extracted		439	2509	620

*Good –very effective community protection, Moderate- moderate community protection, poor- no community protection.

Table 4: Vegetation cover development indices of a treated and protected watershed and an untreated control watershed with biotic pressure (recorded after 7 years of treatment).

		Treated watershed				Untreated watershed			
Particular	Unit	Top slope	Mid slope	Bottom slope	Mean	Top slope	Middle slope	Bottom Slope	Mean
Growing tree stock	No.ha-^{1}	488	710	1520	**906**	222	533	577	**444**
Bush density	No.ha-^{1}	9146	9457	1332	**6645**	448	222	577	**416**
Grass clumps	No.m^{-2}	104	32	25	**54**	12	4	8	**8**
Natural regeneration	No.ha-^{1}	344	266	488	**366**	40	47	59	**49**
Canopy cover	%	79.1	86.7	28.2	**64.7**	16.8	18.2	14.8	**16.6**
Green grass yield	t.ha-^{1}	6.3	2.7	8.3	**5.8**	0.5	0.5	1.3	**0.8**
Leaf litter (Air dry)									
Branches & twigs	t.ha-^{1}	4.1	5.0	2.4	**3.8**	0.6	0.7	1.1	**0.8**
Leaves	t.ha-^{1}	2.5	2.6	2.1	**2.4**	0.2	0.3	1.1	**0.6**

Source: Singh, B. 1998

forest area daily for grazing was 10,179 and 443 in case of effective, moderately effective and non-existing VDC respectively (Table 3). The animal excreta counts further supported this evidence. The number of persons visiting forest area daily for fuel and fodder extraction in these watersheds was 22,119 and 195 respectively. The rate of fuel and fodder extraction was quite low in the well-protected watershed but extraction increased with the decrease in social pressure exerted by the VDC. In case of the control watershed, the availability of green grass decreased because of excessive grazing, and the problem of fuel wood extraction was rather accentuated. Evidently, an effective VDC was instrumental in protecting the natural forest watersheds against excessive exploitation.

Rehabilitation of degraded watersheds

The rehabilitation of treated watersheds was evaluated by an independent outside agency in Jainti Devi Ki Rao (2591 ha), and Sugha Rao (7581 ha) watersheds of the Punjab in terms of vegetative cover development as indicated by indices like growing tree stock, bush density, grass clumps, natural regeneration, canopy cover, grass yield and litter accumulation on the forest floor over a period of 7 years in these two treated watersheds and compared with an untreated control. The values of all the indices were much higher in the treated watershed as compared to the control (Table 4). It was interesting to note that a) bushes responded very quickly to treatment, b) bush dominance was more in top and mid slopes because of steeper slopes, less soil depth, and low soil moisture whereas trees dominated on lower /bottom slopes where soil physical conditions were better, c) bushes tended to lower the regeneration of trees but provided good canopy cover and helped in more litter accumulation on the forest floor. The development of multi-layered vegetative cover comprising trees, bushes, grasses and leaf litter intercepted more rainfall, reduced velocity of overland flow, improved the chances of infiltration and hence helped in reducing runoff and soil loss from the treated watersheds.

Improvement in base flow of treated watershed

Consequent upon reduction in runoff from treated watersheds and moderation of flood peaks; the catchments storage improved substantially and the run-off was slowly released in the form of base flow. A typical run off hydrograph of Makkowal sub watershed for 76 mm rainfall

Table 5: Improvement in base flow (perennially) characteristics of watersheds before and after treatment.[1]

Description of base flow characteristics	Unit	Pre-project status (1990)	Current status(1997)
Number of perennial torrents	no	27	38
Length of base flow in torrents	km	58	195
Duration of base flow in torrents	Month		
0-3		11	3
4-6		4	4
7-9		3	3
9-12		9	28
Discharge of surface base flow	Cu secs		
Poor	< 0.25	14	0
Moderate	0.25-0.75	10	17
High	0.75-1.50	3	14
Very high	> 1.50	3	7

[1]Only surface base flow was recorded on a given date in the watersheds before and after the treatment

Table 6: Land and infrastructure saved from threats of torrents after watershed treatment.

	Area (ha)		Infrastructure saved		
Name of watershed	**Saved**	**Reclaimed**	**Villages (no)**	**Schools (no)**	**Roads (km)**
Dasuya Langerpur	1315	18	13	4	3.0
Nara Dada manjhi	266	20	6	2	1.5
Arniala	90	60	5	2	0.5
Jainti Devi Ji Ki Rao	80	8	2	1	1.0
Sughrao	95	2	6	2	0.3
Balachaur	6	2	2	1	3.0
Mohanmajra Nighi	56	2	0	0	0.3
Total	**1908**	**112**	**34**	**12**	**9.6**

storm received on 2.8.1995 and that of 87 mm storm received on 3.8.99 clearly show moderation of flood peak and prolonged period of base flow (fig 3). This change from seasonality to perennially in the base flow characteristics of torrents was evident from the increased number, length, duration, and discharge of base flow after project interventions (Table 5). The benefits of perennial flows over flash are manifold e.g. more recharge of ground water as reflected in the rise of water table in the wells, prolonged soil moisture availability to trees and grasses, protection of land against stream bank erosion, and increased possibilities of harvesting perennial flows for supplemental irrigation. The average rise in ground water table observed regularly in selected 28 wells located in the project area out of a total of some 300 wells varied from 0.7 to 7.7 meters over a period of 7 years. The improvement in moisture regime was indicated by the appearance of moisture loving (mesospheric) vegetation such as algae, mosses, *Typha, Vitex and Eugenia.*

Protection of land and rural infrastructure

Due to the reduction in flow peaks, an area of 1,908 ha located along the drainage ways of seven watersheds under study was saved from the torrent menace. In addition, an area of 112 ha was reclaimed from torrent beds and brought under cultivation (Table 6). The rural infrastructure, which remained in constant threat of ferocious torrents, was saved due to project interventions. At least 34 villages, 12 schools and 9.6 km of vulnerable patches of rural roads were taken out from the threat of floods. Poor farmers started cultivating land with more confidence and agricultural inputs were added without fear of devastating floods. The price of agricultural land located along drainage lines has risen by three to four times because of protection against erosion.

ECONOMIC DEVELOPMENT

The above said ecological benefits have resulted in the economic development of resource poor rural communities as indicated below:

Increased availability of fuel, fodder and commercial grass

It was observed that women made a substantial contribution towards rural economy in the Shivaliks, A study by Singh *et al* 1996 in the biggest watershed of the project namely Dasuya Langerpur has shown that:

– As many 86% of the women were engaged in tending of livestock;
– 70% were engaged in fuel wood collection, 58% in fodder collection and 48% in crop production;
– 34% were employed in rope (ban) making and 21% in bhabbar grass harvesting.

The overall contribution of women to the total family income was estimated at 36%. Therefore, any increase in the yield of fodder grass or availability of fuel wood would naturally reduce the drudgery of farmwomen. Impact evaluation of the project by an outside agency in Sugha Rao and Jainti Devi Ki Rao watersheds has shown that there was substantial reduction in the drudgery of women (Fig, 4). The increase in the yield of green fodder grasses over the base year varied from 2.8 to 3.5 t. ha. $^{-1}$ yr. $^{-1}$ with the mean of 3.2 in 8 forest watersheds (as already mentioned) spread over an area of 22,703 ha which generated an additional annual benefit of Rs. 21.88 million at a modest price of Rs. 3,000 per tonne in 1999 prices. Similarly, the increased availability of fuel wood from trees and bushes varied from 1.7 to 2.2 with an average of 1.9 t. $ha.^{-1}$ $yr.^{-1}$ in those watersheds thereby producing an additional fuel wood of 43,136 tonnes worth Rs. 25.88 million at the market price of Rs. 600 per tonne. The increase in Bhabbar grass (*Eulaliopsis binata*) yield varied from 0.8 to 1.3 with a mean of 1.1 t. $ha.^{-1}$ yr^{-1}. The value of the additional 15,892 tonne of air-dry bhabbar grass at Rs. 2,000 per tonne was Rs. 31.78 million. The total value of the increased biomass produced from 8 treated watersheds (21.80+25.88+31.78) was Rs 79.54 million per annum against the total project investment of Rs. 220 million. The benefits from timber would, however, be an addition. Fodder grasses were mostly brought from the treated watersheds by cut and carry system but more of fuel wood was extracted by lopping trees and bushes from the untreated watersheds.

Employment generation

Bhabar grass is not only a very effective soil binder, but also provides raw material for paper industry and used for rope making by the rural poor. For paper making, the grass is extracted every year in November and December, transported from forests on camels to yards where it is sun-dried and then sent to the paper mills. Grass cutting, transporting and sun-drying provide lean period employment to a large number of local people in the close vicinity of their villages. This job of converting grass into rope provides employment to women, landless and weaker sections of society. Any increase in the availability of Bhaber grass is, therefore, a sure means of additional employment to the poorer strata of the society (Singh 1997). The tremendous opportunities created by the project for employment generation is evident from the increase in rope making machines. For example, in four villages of Nara-Dada-Manjhi watershed, the number of manually operated rope making machines increased from 106 to 196 between 1990-91 and 1996-97. The number of power operated machines increased from 40 to 408 over the same period (Singh 1997). Most of these machines are operated by people from the lowest stratum of society thus giving a boost to the poverty alleviation drive.

The project has generated seven million man-days of direct employment to rural poor in the state of Punjab alone. The major share of employment (six million man days) was generated in the forestry component, followed by one million man-days by soil and water conservation component.

Increase in crop and milk production

Over the entire project area of the Punjab state, the yield of maize increased from 0.80 to 1.34 t. $ha.^{-1}$ $yr.^{-1}$ and that of wheat from 0.90 to 1.83 t. $ha.^{-1}$ $yr.^{-1}$. The use of fertilizer N increased from 18.1 to 32.8 and P from 4.2 to 14.8 kg. $ha.^{-1}$ yr^{-1} during the project period. The overall milk yield improved from 3.0 to 7.5 liters/day and sale of milk in selected watersheds recorded an increase of 1.6 to 5.0 times. The landless farmers received maximum advantage from the animal husbandry component. For example in 5 typical villager of Hoshiarpur District of Punjab, the number of local breed of cows has decreased from 236 in 1990 to 73 in 1998 with a simultaneous increase in cross-bred cows from 45 to 199 in the same period. Such an increase was observed in other project villages as well. The number of sheep and goats (grazing animals) decreased from 212 to 50. The area under fodder crops increased from 64 to 85 ha. The availability of milk per day improved from 1267 to 2110 liters in 5 villages and from 2.94 to 4.90 liters per day. Consumption of milk also rose by about 34 percent.

SUSTAINABILITY AND COMMUNITY PARTICIPATION

The main emphasis of the project was on sustainable development of the fragile ecosystem. With this end in view, the stakeholders were involved in planning and execution of project activities so that technologies, which are technically sound and acceptable to the farmers, are selected. The village development committees, which represented the stakeholders, assisted the project staff in participatory planning. In Jainti, Devi Ki Rao watershed developed under the project during 1991-93, the stakeholders are now managing the community-owned forest for sustainable production. There has been a phenomenal increase in the income of beneficiaries from the sale of timber and grass from the forest. Prior to the start of the project in 1990-91, village Seonk of the watershed earned Rs. 32,000 annually from the sale of Bhabbar grass from this forest. The income rose steadily due to project interventions and reached Rs. 190,000 in 1995-96. Similarly in village Majri, the income went up from Rs. 56,000 in 1990-91 to Rs. 261,000 in 1995-96. Village Seonk also earned Rs. 961,000 from the sale of trees from community land in 1995-96. The village Panhayat (elected body) also sold trees worth Rs. 171,000 from the Panchayat land. The sale proceeds from the forestland of panchayat are credited to the social fund and spent on meeting the common needs of the villagers. At the same time, the landless are free to cut fodder grass from the forest for their use. The forest, which before the project interventions was indiscriminately grazed by large cattle herds and lopped for fuel, now yield a regular income from Bhabbar grass. Farmers now realize that investment in conservation practices are profitable and have resolved to protect and manage their forest sustainable through their collective efforts.

In Dasuya Langerpur watershed, several villages were assisted by the project in forming a water user’s cooperative society. All the villagers are eligible to become members of the society. Surface water from the streams, which flow through the hills, has been tapped above the village and has been taken through gravity flow to a large pond near the cultivated fields down below. This is a simple technique, which requires neither power nor expensive equipment. This water is then used by livestock, for meeting domestic needs of the community, and for irrigation of crops.

In village Makkowal, the village society charges its members at the rate of Rs. 12.00 per hour for using water to irrigate crops. Non-members pay Rs. 14.00 per hour. Incidentally, the village already has piped drinking water supply under the State Government’s public health scheme, which is inadequate. Apart from water distribution, the society is responsible for the protection and maintenance of the water conveyance and storage structures and for the procurement of good quality seeds of agricultural crops. After meeting all expenses, a net income of about Rs. 8,000.00 accrues to the society annually. The above technique of harvesting stream flow has become very popular in the Shivaliks and bears the name of this village namely, Makkowal Type Tank. Realizing the importance of water in rural economy, villagers have organized themselves to conserve their forest which yields water and maintain their water conveyance system through their own resources. Data on production gains by beneficiaries and non-beneficiaries in untreated areas indicated that there was autonomous spread of the improvements via farmer to farmer.

In due appreciation of the above efforts, phase II of IWDP has been proposed for another five years with much bigger physical and financial allocations. The IWDP II is proposed to cover an area of 522,000 ha in 75 sub-watersheds of 5 states with financial outlay of US $ 193 million for 5 years to cover one million people including 10,000 landless families and 5,000 livestock herders. The proposed cost per hectare has been increased from 192 in phase I to US $ 369 in phase II, with larger input per family. The new project covers adjoining areas of existing watersheds and would in addition to the activities proposed above, support up gradating of rural link roads, augmentation of potable water supply by tapping perennial flow and improvement of rural marketing infrastructure. The focus of the project would be on sustainability of activities with community-based organizations owning responsibility for implementing project activities, cost sharing and commitment for post-project operation and maintenance; institutional development of community-based organizations which would precede project implementation; establishment of complementarities between various implementing agencies in the same area; varying rates of cost sharing by beneficiaries depending upon land ownership' tenure and use; and apportioning a part of benefits from government/ forest lands for communities.

LESSON OF EXPERIENCE

The important lessons of experience that have emerged from the above project and have a wider application are that:

- Treatment of degraded watersheds should concentrate on a limited number of identified watershed in a holistic manner rather than spreading the resources thinly;
- The services of line departments responsible for watershed development in the state should be integrated under a single implementing agency;
- Community-based organizations should be formed and actively involved in planning, implementation, operation and maintenance of project interventions which themselves should be demand-driven;
- Project interventions must focus on the immediate and pressing needs of the poor and other disadvantaged sections of society such as water, fuel wood, fodder, and livestock improvement;
- Project should pay adequate attention to employment/income generating activities such as promotion of household and cottage enterprises along with suitable marketing arrangements;
- Capacity building of both project staff and the primary stakeholders should receive a high priority.

The above lessons of experience have been incorporated in phase II of the IWDP (HILLS), which starts in mid 1999.

CONCLUSION

The construction of a large number of village ponds and water harvesting structures has improved the availability of water. Substantial improvements in productivity and employment generation motivated the stakeholders to take the responsibility for protection of adjoining hilly forest catchments by forming village cooperatives. After a long time nature has been allowed to spread its green protective cover on eroded and barren hill slopes. All this has resulted in overall improvement in the standard of living as indicated by the increased number of tractors, television sets and availability of surplus milk for sale. The significant contribution includes forceful demand of the communities for continuing the project even at higher rate of cost sharing because the project has brought back the lost smile and hope to the desperate sections of the society. In addition, there is a serious commitment of the state governments in timely release of funds irrespective of general financial crisis, and appreciation by the politicians on the positive impact of poverty alleviation and natural resource conservation.

IWDP (Hills) has ushered in a new chapter in watershed development with a sharp focus on resource conservation and poverty alleviation. In order to provide the requisite thrust to watershed development programs, the Government of India and the donor agencies are introducing uniformity of approach to establish complementarities between various programs. The institutional and technical coordination within ministries involved is being strengthened for effective implementation of watershed management initiatives in the country.

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