



PEOPLE'S SCIENCE INSTITUTE ANNUAL REPORT 2011-2012

People's Science Institute (PSI) is registered as a society in New Delhi under the Societies Act (1860) and the Foreign Contributions Regulations Act (FCRA). Its stated mission is, "To help eradicate poverty through the empowerment of the poor and the productive, sustainable and equitable use of available human and natural resources." Operationally it provides technical and managerial support to communities and organizations that work with them, implements development programmes and undertakes public interest research. The Institute is known in India's voluntary sector for its pioneering work in the fields of natural resources management, community-led watershed-based livelihoods development, environmental quality monitoring and dissemination of appropriate technologies.

PSI's activities are grouped under three units: (1) Natural Resource Management Group (2) Environmental Quality Monitoring Group and (3) Innovative Projects Group. Each unit implements development projects, undertakes research and provides training and professional support to other voluntary organizations and government agencies. PSI has a competent staff of socially conscious engineers, scientists and social workers to carry out these tasks. This annual report outlines the major activities of each group in 2011-12.

I. NATURAL RESOURCES MANAGEMENT

The Natural Resources Management Group (NRMG) anchors the Institute's natural resource management activities. It is involved in innovating and extending NRM-based food and livelihoods security related policies and programmes.

In 2011-12 the NRM team was largely involved in enhancing food and livelihoods security in Uttarakhand, Bundelkhand and Himachal Pradesh (HP) through projects on upscaling the System of Crop Intensification (SCI) in these regions and implementing a project on Sustainable Mountain Livelihoods (SML) in Uttarakhand and (HP). Training of watershed development teams (WDTs) and community representatives from various districts in Himachal Pradesh on Participatory Watershed Development was another major activity.



Transplanting 8-12 day seedlings in Bundelkhand

I.1 Upscaling SCI in Uttarakhand and Bundelkhand (2011-12)

PSI extended its SCI programme in 2011-12 with the financial assistance of Sir Dorabji Tata Trust (SDTT), to enable farmers in 8 districts of Uttarakhand and 4 districts of Bundelkhand to address their food and livelihood security needs. The project aimed at SCI's adoption for paddy cultivation by 11,350 farmers in the *kharif* season and for wheat cultivation by 3300 farmers in the *rabi* season. It partnered with 15 local voluntary organizations (VOs) in Uttarakhand and four in Bundelkhand to reach out to farmers across 193 villages in Ukd and 68 in Bkd.

The extension work was carried out with the help of 54 master trainers (MTs) and 161 village level support persons (VLRPs). With the support of PSI they conducted orientation



Use of a weeder in an SRI field

workshops to train 12,766 farmers in the *kharif* season and 3,737 in the *rabi* season. After the farmer orientations in each season, the practicing farmers were provided field support by the MTs and VLRPs. In addition PSI's field staff undertook regular monitoring and field support activities during the various stages of crop growth till harvesting. Before harvesting exposure visits were organized for prospective practitioners in each season. Crop cutting exercises and district level experience sharing workshops were conducted in September-October 2011 when the paddy crop was ready for harvesting.¹ A regional

workshop was conducted in Dehra Doon to disseminate results to scientists, government officials, policy makers and media. Details of the programme's achievements are given in Tables 1a and 1b.

Shri Puran Singh is a farmer in Khamkhera village of Damoh District (MP) with a total land holding of 2 acres. Due to his father's illness he was in debt. He attended a farmer orientation program organized by PSI's partner Gramin Vikas Samiti. He was impressed by the principles and methods discussed during the workshop and took the initiative of adopting the SRI method. "Many of my neighbouring farmers who were doubtful about SRI called me mad," says Puran. But he persevered and harvested 360 kg of paddy from a field of 800 sq m (yield of 4.5 T/ha) as against an average of 2.0 T/ha harvested by the conventional method. Puran has continued to expand his area under SCI crops. He has cleared his debts and obtained better treatment for his father.



¹ For wheat the crop cutting exercises and experience sharing workshops were organised in April-May 2012.

Table 1a: SRI Coverage and Results for Paddy (*Kharif* 2011)

Particulars	Uttarakhand		Bundelkhand	
	Conventional	SRI	Conventional	SRI
No. of SRI farmers	8756 (8750)		2565 (2600)	
Area (ha)	-	420.60 (547.92)	-	255.2 (372)
Average grain yield (T/Ha)	2.4	5.9 (5.5)	4.7	7.5 (5.5)
Average straw yield (T/ha)	9.9	14.4	13.3	17.3
% change in grain yield	73 (60)		60 (60)	
% change in straw yield	45		30	

Note: Figures in brackets give the programme targets

Table 1b: SWI Coverage and Results for Wheat (*Rabi* 2011-12)²

Particulars	Uttarakhand		Bundelkhand	
	Conventional	SWI	Conventional	SWI
No. of farmers	1999 (2113)		1015 (1000)	
Area (ha)	-	72.18 (72.16)	-	48.18 (29.21)
Average grain yield (T/Ha)	3.6	5.7 (4.0)	3.3	5.6 (4.0)
Average straw yield (T/ha)	7.2	10.0	5.1	8.2
% change in grain yield	60 (60)		60 (60)	
% change in straw yield	40		40	

Note: Figures in brackets give the programme targets

I.2 Promoting SCI in Mountain Farms of Himachal Pradesh

PSI selected 12 partners (including its own SML team in Hamirpur) to popularize SCI for addressing the livelihoods and food security needs of small and marginal farmers in seven districts of HP (Bilaspur, Chamba, Hamirpur, Kangra, Mandi, Sirmour, Shimla and Solan). During the *kharif* season (2011) PSI and its partners worked in 274 villages for widespread extension of SCI. Teams of trained MTs and VLRPs provided field support to the participating farmers. With the help of PSI's programme staff these local resource persons trained 9,553 new farmers during *kharif* and 5,087 new farmers during the *rabi* season. Farmers orientation workshops, in which district agriculture officials also participated, educated farmers in the principles and procedures of the SCI methods. Demonstrations were conducted to explain the use of equipment to them. Copies of the



Grain yields from different SWI practices (upper two) and traditional cultivation

² The productivity data was gathered in crop cutting exercises done in April and May 2012



SRI and SWI manuals prepared in Hindi by PSI were distributed to the new farmers. Poster sets describing recommended SCI practices were displayed these workshops. A strategy to manage the availability of organic manure and weeders for the prospective SCI farmers was also formulated at these workshops. In addition, 181 farmers applied the SCI method for cultivating other crops like mustard, peas, Bengal gram during rabi over a total area of 12.8 ha.



Shri Anant Ram is a small farmer in Karsog, Mandi District (HP). He visited PSI's partner SKVM several times to learn about the SRI method. Full of doubts about the method he planted paddy in a small trial plot of just 40 sq m. in 2007. After 30 days he was satisfied with the number of tillers in the plants. His field became a center of attraction in the village. A comparative analysis of SRI and conventional paddy grown on his own land showed an SRI yield of 7.2 T/ha as compared to 3.8 T/ha in the conventional method. By 2011 Anant Ram had extended SCI practice to 1600 sq m. Last year he obtained a yield of 8.6 T/ha from his SRI plot against 6.7 T/ha on his conventional field. Now he is a resource person of SKVM who trains other farmers in the surrounding villages.

In all almost 900 new farmers were taken on exposure visits to SRI and SWI farms during the *kharif* and *rabi* seasons. Seven one-day experience sharing workshops were organized in October 2011 along with crop cutting exercises for the paddy crop. These workshops were attended by agriculture extension officers, scientists and trainers from KVKs, media persons and progressive local farmers, PSI resource persons and Project Advisory Committee members.³ A one-day state-level workshop was conducted on 2nd September 2011 where SCI farmers could discuss their experiences with agriculture officers, scientists and experts.

Details of the extension programmes and their achievements are given in Tables 2a and 2b below.

Table 2a: Paddy Coverage and Results in Himachal Pradesh (*Kharif* 2011)

S. No.	Particulars	Conventional	SRI
1.	No. of Practicing Farmers (Villages)	-	9317 (274)
2.	Area in ha	-	616.22
3.	Grain Yield (T/ha)	3.9	7.4
4.	Straw Yield (T/ha)	11.5	18.1
5.	% Increase in Grain Yield	-	89
6.	% Increase in Straw Yield	-	57

Based on field data collected from different districts

³ Six workshops were also organized in April-May 2011, at the time of harvesting the wheat crop.

Table 2b: Wheat Crop Cutting Results in Himachal Pradesh, (Rabi 2011-12)⁴

S. No.	Particulars	Conventional	SRI
-	No. of Practicing Farmers (Villages)	-	3966 (231)
2.	Area (ha)	-	200.45
3.	Grain Yield (T/ha)	2.6	4.7
4.	Straw Yield (T/ha)	4.6	8.1
5.	% Increase in Grain Yield	-	78
6.	% Increase in Straw Yield	-	78

Based on field data collected from different districts

With funding from the Department of Agriculture (GoHP) under the RKVY scheme, training workshops for capacity building of agricultural officials from Himachal were held in September-October 2011. The main objective was to guide state officials and KVK scientists to achieve a quantum expansion in the use of the SCI technique in Himachal Pradesh. A total of 509 officers were trained at 15 training workshops organized in 10 districts.



Training of agricultural officers, HP

Review of PSI's SCI Activities

Combining data for Uttarakhand, Bundelkhand and Himachal Pradesh it can be seen that the Institute and its partners were able to reach over **28,000 farmers** during the *kharif* (2011) and *rabi* (2011-12) seasons. Increases in grain yields due to SRI ranged from 73% in Ukd to 60% in Bkd and 89 % in HP.⁵ Fodder (straw) yields also increased significantly in all the three regions. A panel of experienced monitors -- Programme Advisory Committee (PAC) -- including members of its senior staff and external experts who regularly appraised the programme, also helped guide the farmers and the programme staff.

The program evaluation mission of SDTT appreciated the extension strategy developed by PSI for upscaling SCI in Uttarakhand and Bundelkhand. The Department of Agriculture (HP) also expressed appreciation for the work done by PSI with its partners in HP.

The productivity data of the past 5-6 years shows that the SCI method can increase food grain yields very significantly. Farmers have expressed immense satisfaction with the results leading to a substantial increase in the number of SCI practicing farmers in PSI's field areas. Yet most farmers, particularly in Uttarakhand, appear to be reluctant to expand the area under SCI. A close look at the area coverage reveals that the average landholding under SRI and SWI per

⁴ The productivity data was gathered in crop cutting exercises done in April and May 2012

⁵ SWI yields showed increases of 60% in Ukd and Bkd and 66% in HP.



farmer is only 0.06 ha and 0.04 ha respectively. This is quite low when compared with the average landholding size of 0.4 ha (of which about 0.1 ha is irrigated) in Uttarakhand.

Many farmers are known to drop SCI practice despite productivity gains. Such dis-adoption has also been reported from other parts of the country.⁶ Field observations reveal a lot of variations in the adoption of the different elements of the SCI technique. Discussions with farmers and our partners have revealed various reasons for dis-adoption, limited area coverage and deviations from recommended practices. Some of the important reasons are:

- Limited availability of irrigation facilities
- High labour input
- Inadequate and inappropriate equipment
- Inadequate manure availability

To reduce dis-adoption levels and enhance area per farmer under SCI, PSI has discussed these issues with farmers, its POs and other experts during review meetings. The following recommendations have emerged from these discussions:

- (i) Plan and develop irrigation infrastructure in villages through rain water harvesting, laying out of irrigation channels or digging wells, as necessary.
- (ii) Ensure adequate availability of appropriate equipment, especially weeders.
Enhance availability of nutrients through construction of compost pits.
- (iii) Develop farmer-friendly region specific packages of SCI practices for other crops like coarse grains (finger millet, maize, sorghum and pearl millet), pulses (gram and pigeon peas) and vegetables (brinjal, cabbage, capsicum, cauliflower, chilli and tomato).
- (iv) Promote farmers' groups to ensure staggered nurseries, cooperative cultivation, timely operations and better access to equipment, manures and other entitlements.

These issues highlight the need for rethinking PSI's SCI extension programme in the future. In 2012-13 the Institute proposes to undertake SCI extension only during the *kharif* season and then redesign a future strategy for achieving its goal of assisting small and marginal farmers to achieve livelihood and food security in Uttarakhand, Himachal and Bundelkhand.

I.3 Sustainable Mountain Livelihoods

Communities residing in the rural areas of Uttarakhand and Himachal Pradesh traditionally practice subsistence agriculture for their sustenance. Low farm productivities and scarcity of fodder and fuel wood significantly affect their livelihood status leading to large-scale out-migration. Immediate interventions are required to enhance food security and to increase the primary income from local natural resources. Therefore the NRM Group at PSI began a pilot "Sustainable Mountain Livelihoods (SML)" project in 2011 as a follow up to its earlier watershed development programme in the two states with financial assistance from the Navajbai Ratan Tata Trust (NRTT). A Programme Advisory Committee (PAC) guides and monitors the programme.

⁶ K.PALANISAMI et al: "SRI: How effective under different irrigation sources and farm size categories?", ITP Research Series-2010 (1), IWMI, Hyderabad (A.P.), 2010.

The basic programme goal is to enable the rural communities in 21 villages of Himachal Pradesh and Uttarakhand to achieve sustainable livelihoods and food security in a two year period from January 2011 to December 2012. An estimated 63 per cent of the 802 households in the selected villages live below a perceived poverty line (BPPL) of Rs.8,000/person/yr (2009 data). Thirty two per cent of the households belong to Scheduled Castes and another 15 per cent are OBCs.

PSI began activities in January 2011 by strengthening the project's institutional base. It organized meetings with its partner organizations (POs) and two orientation programmes for the POs' livelihood development promotion teams (LDPTs) and PSI's support team.

Between April and June 2011 active villagers, LDPT members and some of PSI's project



SCI maize cultivation in the middle Beas cluster of H.P.

team visited Nuapada district in Odisha, HARC in Naugaon (Uttarkashi) and Gobind Ballabh Pant University of Agriculture & Technology (Pantnagar) to study VLIs, Gram Swaraj Abhiyan, micro-enterprises in vegetable cultivation, poultry rearing and the functioning of SHGs. Training programmes were organized for farmers groups on fodder grass development, the system of crop intensification (SCI), vegetable cultivation, composting, mushroom cultivation and poultry rearing. Village Development Committees (VDCs)/Gram Swaraj Samitis, Saving and Credit Groups and Mahila Mandals in all the villages were trained in record/accounts keeping. A pickle-

making micro-enterprise was started by the Middle Beas cluster SCGs with the support of Samridhi, a Palampur-based co-operative society.

SCI cultivation is one of the main activities proposed for increasing agricultural productivity and thereby the food security of the participating families. During the *kharif* 2011 season 315 farmers adopted SCI principles for the cultivation of paddy and other crops like *mandua*, *rajma* and maize over 8.15 ha. During the *rabi* season 544 farmers adopted SWI covering 44 ha.

Vegetable cultivation was proposed to generate additional income from farms. A total of 646 farmers cultivated vegetables like peas, garlic, onion and potato covering an area of over 30 ha in all the clusters. Of these 336 were BPPL households. In the two Uttarakhand clusters 39 poly tunnels were also constructed. To promote organic agriculture and improve the soil quality and household incomes, 269 vermi-compost pits out of the total 415 compost pits proposed were



SWI in middle Beas cluster (H.P.)

constructed in all the four clusters in 2011-12. Fruits saplings (5526) were distributed among 438 households.

Himmothan Society's recent experiences in Uttarakhand have shown that fodder development can enhance milk production and lead to remunerative dairying activities in mountain villages. To encourage animal husbandry and dairying, fodder grass development was started in the SML clusters. Eight fodder tree nurseries were raised in the clusters. 547 farmers planted fodder grass on their field bunds covering 27.2 ha area (proposed area 20ha) in all the clusters. To improve the nutrition of milch animals, construction of cattle troughs has been proposed in the programme. Besides improvement in dung and milk yields this intervention is expected to reduce the drudgery of women. Out of the proposed 232 cattle troughs 170 were constructed in all the clusters in 2011-12.



Cattle trough

Kuroiler based backyard poultry is being promoted as the main secondary income generation activity among the rural communities. This is PSI's first experience in poultry farming. In the two clusters of Uttarakhand 101 poultry sheds have been constructed. Chicks were distributed to 76 households. A local feed unit and systematic marketing of eggs and meat have been established. Producer groups were formed in every village of Uttarakhand's Hilaungad cluster.



Kuroiler rearing in Hilaungad cluster (UKD)

Construction of irrigation works and soil and water conservation structures were started in all the clusters. Thirty six young villagers have been taught basic engineering skills to provide technical support during construction work. Proper systems for management of accounts were developed and members of all the VDCs were trained in accounting systems. Norms for community contributions have been worked out.

Programme Review

The programme got off to a slow start. It had taken the Tata Trust two years to review and approve the livelihoods development plans that had been prepared by the village communities. It took almost six months for the village *aam sabha* meetings to be held regularly in most of the villages. The level of participation of the local villagers is now satisfactory. The village *aam sabhas* serve as platforms to discuss the progress of the SML project. Many women have acquired confidence and some of the more dynamic ones have become role models for



other women. In addition, all the VDCs, GSSs, SCGs and MMs/MMDs also hold regular monthly meetings.

A long delay in the onset of the south-west monsoon in the region led to a near abandonment of paddy cultivation by the SRI method. Only 2.42 ha were cultivated by 73 farmers. As a fall back measure the farmers were encouraged to cultivate low water consuming food grains. Thus during the *kharif* season, 242 farmers cultivated maize, *mundua* (foxtail millet) and *rajma*. Extra efforts were made before the start of the *rabi* season to encourage farmers to practice the system of wheat intensification (SWI). These efforts received a significant response and 544 farmers – 71 per cent of the target – adopted the new technique on 44 ha against the targeted 29 ha.⁷

Poultry rearing has been a learning experience for PSI and its partners. In spite of an initial setback the rearers have begun to make significant profits. The average profit is Rs. 3000 per farmer per cycle (9 months). With the experience gained we expect even better results in the remaining period.

The entire programme is designed in such a way that almost 50% of the programme funds need to be mobilized from other sources and community contributions. Proposals for convergence funds were submitted to the concerned departments. Though the convergence funds have been approved, the real challenge lies in the implementation. The LDPTs are trying to ensure job cards for the households and application for the job. The panchayats are delaying the implementation of works on one or the other pretext. Initiative has been taken by people to implement the approved works under MGNREGA. The village organizations have started to put pressure through demonstrations.

The programme is slightly behind schedule and we may have to seek an extension of the programme.

I.4 IWMP Training & Orientation Courses

PSI organized 32 training workshops under Integrated Watershed Management Program (IWMP) during the financial year 2011-12. The objective of these training cum orientation courses was to develop an understanding on the concept of watershed management and utilization of land, water and forest resources in a sustainable manner. These training workshops were organized for the stakeholders of micro watersheds including Watershed Development Team (WDT), PRIs, user groups, SHG members and junior engineers belonging to 5 districts (Sirmour, Bilaspur, Shimla, Mandi and Kinnaur) of Himachal Pradesh. The participants were trained in the concepts of watershed management, soil and water conservation measures, benefit sharing mechanism etc., through lecture, audio visual, group discussion and field exposure sessions.

⁷ Post harvest SWI data shows that the additional wheat production per farmer ranges from 300-400 kg. This is a significant step towards food security. Preliminary data shows that vegetable cultivation in the first year has yielded additional revenues of Rs. 1500-2000 per farmer.

Details of the IWMP training for the financial year 2011-12

Total Trainings held	Total no. of participants	Total Districts Covered	Total Blocks covered	Target group
32	916	5	11	WDT members and other stakeholders of the micro watersheds PRI, Users groups JEs and SHG members.

Table 3: NRM Group Financial Statement (2011-12)

S. No.	Project	Funding partner	Opening Bal. (Rs)	Income Rs.	Utilisation Rs.	Balance Rs.
1.	Upscaling SCI for Food Security In Ukd & Bkd	SDTT, Mumbai	2,638,984	10,799,000	7,367,095	6,070,889
2.	Promoting SCI in Mountain Farms of Himachal Pradesh	Dept of Agr (GoHP)	Nil	7,623,000	7,450,886	172,114
3	Promoting SRI in HP	WWF	1,026,939	Nil	1,026,939	Nil
4	Sustaining Mountain Livelihoods (SML) Phase-II	NRTT, Mumbai	1,834,567	3,500,000	5,125,729	208,838
5	Drought Mitigation Program	JTT, Mumbai	932,368	Nil	932,368	Nil
6	Training & Development Support	DoRD, various districts HP	Nil	6,121,100	6,121,100	Nil
		Total	6,432,858	28,043,000	28,024,117	6,451,841



Irrigation guhl constructed under SML in Jolagad cluster (Ukd)



II. ENVIRONMENTAL QUALITY MONITORING

The Environmental Quality Monitoring Group (EQMG) at PSI studies problems of environmental pollution and its impact. It supports communities and organizations working with them by building their capacities to gather and interpret pollution data and plan for mitigating pollution-related problems. The Group also assesses the environmental impacts of development projects. It operates a well-equipped laboratory in Dehra Doon.

In 2011-12 the major activities of the EQM Group were centered around a project on promoting participatory ground water management in the Himalayan region. This is a three year programme -- from January 2011 to December 2013 – funded by Arghyam, a Bangalore based support agency. It also began a study on the impact of the System of Root Intensification (SRI) on soil nutrients in mountain farms with a small grant from Sir Dorabji Tata Trust (SDTT). In addition it carried out a few small projects on river water quality monitoring besides being involved in a number of public interest activities. The year's activities are outlined below.

II.1 Participatory Ground Water Management

As control of natural resources has shifted from local communities to administrative agencies of the government conflicts arising out of inequity in resource sharing have intensified and have become unending. The Himalayan region is characterized by steep slopes and a tortured geology consisting of highly fragmented and fractured rocks. This is not conducive to the formation of large underground aquifers. Over millennia mountain communities have developed a tradition of harvesting small subterranean flows. But Himalayan ground water resources are threatened by inadequate recharge, over-extraction and pollution.

These problems prompted a group of organizations (ACWADAM, ACT, WASSAN and PSI) to work together to promote an understanding of geo-hydrology among communities in an attempt to enhance rational and equitable use of groundwater and to promote the lessons learnt through India's mainstream watershed management programmes. EQMG is anchoring the ground water quality component of the programme. Its overall focus is to:

- Create a resource base of people knowledgeable about groundwater
- Undertake action research projects that lead to rational and equitable use of ground water resources
- Enhance equity in ground water use through community based institutions
- Minimize degradation of groundwater resources

An important programme activity in 2011-12 was to build PSI's own knowledge resources about groundwater. Four EQMG colleagues, Dr. Anil Gautam, Ms Chicu Lokgariwar, Dr. Sunesh Sharma and Ms Shubhoshree Banerjee, underwent training in geohydrology at ACWADAM in Pune.

A draft situation analysis report on the status of groundwater in the Indian Himalayan region has been prepared. Its publication should provide a useful reference document for people working in watershed and groundwater management sectors in the Himalayan region.

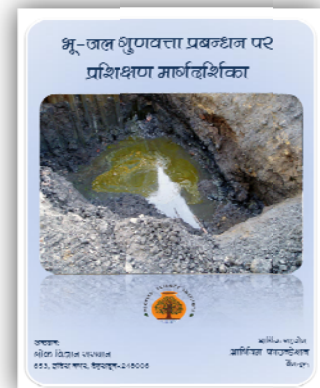


PGWM workshop at Dehra Dun

During the review period PSI's PGWM team visited 35 locations in Himachal Pradesh and Uttarakhand to determine suitable clusters for the action research projects. Among the criteria for project site selection are the status of local water resources, hydrogeology, local resource use patterns, conflicts and institutions. ACWADAM provided field support to understand the local geo-hydrology at a few locations.⁸

The programme team conducted its first regional training programme in geo-hydrology of the Himalayan region between November 28, 2011 and December 9, 2011. Twenty participants representing 14 VOs from Uttarakhand and Himachal were trained on the critical aspects of groundwater and its equitable and sustainable management, groundwater quality monitoring and the role of geohydrology in watershed management.

The PGWM team also published a 48-pages ground water quality manual in Hindi titled "भूजल गुणवत्ता प्रबन्धन पर प्रशिक्षण मार्गदर्शिका". It was given to all the participants as a reference manual on groundwater quality monitoring. It also provided field support in groundwater quality monitoring and training to the other regional partners – ACT, WASSAN and ACWADAM – of the PGWM programme.



Training Manual

II.2 Other Projects

Impact of SRI on Soil Nutrients in Mountain Farms: Like a vast number of farmers in the plains regions, many mountain farmers also follow a paddy-wheat two crop annual cycle. Since 2007, PSI has also been promoting SCI for paddy and wheat cultivation on mountain farms. SCI practicing mountain farmers have reported very significant gains in the crop yields. Consequently questions have arisen about the sustainability of soil fertility in the SRI farms. As part of a nation-wide effort to investigate this issue, PSI's EQM Group began a systematic study in 2011-12 with a small grant from SDTT.

⁸ In June 2012 five villages of the Thanakasoga panchayat in Sirmour district of Himachal Pradesh were selected for the action research project.



The study will determine and analyze the status of micro and macro nutrients for different paddy (*khari*) and wheat (*rabi*) crop rotations over a three year period. Ten fields in Rudraprayag district have been selected for each of the following rotations.

- Practice-1 (P-1): SRI-paddy crop followed by conventional-wheat crop
Practice-2 (P-2): SRI paddy followed by SRI-wheat
Practice-3 (P-3): Conventional paddy followed by SRI-wheat
Practice-4 (P-4) (Control): Conventional paddy followed by conventional wheat

Initial soil nutrients analysis show that the soils are acidic (pH ranges from 5.1 to 5.3), with moderate potassium and low phosphorus contents. Almost all the farms were nitrogen deficient. Calcium (Ca^{2+}) and Sulfate (SO_4^{2-}) concentration were found to be adequate for plant growth.

River Water Quality Monitoring: With the financial support of Guru Ganga Envirotech Trust PSI provided technical support for river water quality monitoring at the request of Dr. G.D. Agarwal, former Chairman of PSI. In April 2011 Dr. Agrawal led an awareness march along River Ganga from Allahabad Sangam to Sringeripur and returned back to Allahabad Sangam via the opposite bank. The main objective was to identify point and non-point sources of pollution like sewage drains, run-off from garbage dumping sites, agricultural fields and cultural activities along the selected stretch and to assess the quality of the river water. Dr. Anil Gautam and Pavitra Singh of EQMG measured several parameters like river flows, pH, EC, DO, turbidity and benthic macro-invertebrates' diversities.

With the help of data reported in "*Assessment of Environmental Flows for the Upper Ganga Basin*" done by a group of scientists and other experts led by WWF-India (in which PSI was also represented) it was recommended that the minimum flow of water in Ganga river at the Allahabad Sangam throughout the year should be 100 cumecs and it should not be less than 200 cumecs during major festivals like Magh Mela, Kumbh, etc. The increased river flow will dilute or wash out the contamination caused by the drains, make the water safe for mass bathing, reduce episodic pollution levels on such occasions and also improve the river's benthic ecology.



Sampling of drain water in Haridwar

The Ganga river water quality was monitored again at Allahabad during the Magh Mela 2012 (January-February). In this period, from January 16, 2012 to February 7, 2012, high fluctuations ranging from about 50 to 240 cumecs were recorded in the river flow. Variations in DO and turbidity values were related to the bathing activities which increased during the day time. Large variations in the EC values were directly related to the flow in the river.



The Ganga river water quality and effluent quality of several drains discharging into the river were also monitored in Haridwar during the Magh Mela 2012. The study was carried out in February-March 2012. The parameters measured were river flow, pH, turbidity, EC, DO, BOD, total and fecal coliform. According to municipal data the average wastewater discharge of Haridwar is about 90 million litres daily (MLD) out of which only 45 MLD are treated at two STPs in Jagjeetpur village. The remaining waste water is released untreated into the Ganga river.

The following table shows the river water and effluents' quality at different sampling sites. The TC values for R. Ganga ranged from 6200 to 13800 CFU/100 ml and FC values ranged from 1800 to 5200 CFU/100 ml. The TC values for the drains ranged from 120,000 to 2,300,000 CFU/100ml and the FC values ranged from 64,000 to 1,100,000 CFU/100ml.

Table 4: Average Values Of Parameters At All The Selected Sampling Stations

Sampling Locations	pH	EC (Micro mho/cm)	DO (mg/l)	BOD (mg/l)	Turbidity (NTU)
Ganga river quality (moving downstream)					
Upstream of Har-ki-Pauri at Saptrishi	7.5	259	6.7	8.3	6.1
Ganga at Har-ki-Pauri	7.9	203	7.0	7.4	9.3
Ganga at Neel Dhara	7.9	175	5.3	4.5	5
Irrigation escape channel	7.8	287	5	25.5	80
Ganga d/s of Jageetpur	7.0	240	5.9	32.5	17.0
Drain effluents quality (moving downstream R. Ganga)					
Bhupatwala drain	8.2	320	6.7	19.4	22.5
Drain near Hotel Rest Inn	7.5	570	4.5	23.1	20.0
Drain in between Kirali & Dhaga Dharamshala	7.6	545	3.2	29.3	40.0
Laltarao bridge	7.4	455	1.9	75.5	78.3
Balmiki Basti Rishikul	7.4	886	1.5	79.9	67.0
Balmiki Basti	7.3	733	2.5	83.8	57.5
Prem Nagar Ghat Drain	7.3	423	3.3	53.1	26.3
Matri Sadan Drain	7.3	579	0.5	94.2	100.9
STP	7.3	619	2.3	81.8	94.9

The above data shows that even at Saptrishi, upstream of the main Haridwar city, the BOD of the river water is well above 3 mg/l which is the standard for class C according to the CPCB surface water quality classification. Since February and March represent very low flow months for R. Ganga in its upper stretch upto Haridwar, it appears that during the low flow season the release of untreated water in Rishikesh and from other areas up to Haridwar imposes a heavy pollution load on the river. A comparison of the drains' effluents quality data of 2012 and similar data obtained in January 2010 showed that there was an improvement in the

effluents being released into the river. A major change in this period has been the diversion of the Bhupatwala drain effluents to the Jagjeetpur STP and the pondage of effluents in the other drains before they are released into the river.

Narmada River Water Quality From Amarkantak To Dindori: In May 2011 PSI provided technical support to Sahjeevan Samiti, Shahdol for assessing the Narmada river water quality in its upper reach from Amarkantak to Dindori. Data from this study are shown below.

Table 5: Water Quality Assessment of Narmada River from its Origin to Dindori

S. No.	Sampling location	Distance from origin (km)	Flow (cumecs)	pH	Turbidity (NTU)	TDS (mg/l)	TH (mg/l)	DO (mg/l)	BOD (mg/l)	COD (mg/l)
1	Gaumukh (Amarkantak)	0	0.001	6.8	<10	154	80	4	1.8	22
2	D/s of Kalyanika school drain	0.5	nil	6.4	75	213	64	3.1	7.5	85
3	Near Chaman Rishi Cave	4.5	0.01	7.4	45	190	80	3.4		
4	Kapil Dhara	6.5	0.018	6.9	<10	188	48	5.4	4.3	76
5	Doodh Dhara	7	0.017	7.5	<10	175	72	5.7		
6	JugraTola	18	0.31	8.1	<10	294	124	6.1		
7	BheemKundi	39	0.38	8.2	<10	338	140	5.8	2.8	35
8	After Samrar river confluence	54	1.4	8.3	19	343		6.1		
9	After Shivani river confluence	66	1.8	8.3	62		152	5.8		
10	Shival Ghat	85	2.2	8.4	24	310	144	6.8	3.2	46
11	Chandan Ghat	102	2.5	8.6	<10	255	134	7.6		
12	Ghana Ghat	140	3.6	8.3	<10	2.68	112	6.7	2.4	28
13	Dindori city near the bridge	154	3.7	8.2	17	272	158	6.2	8.3	110
14	D/s of Dindori city	160	3.8	8.6	<10	281	128	7.3	3.5	52

The above data shows that effluents carried by drains in the towns of Amarkantak and Dindori into the river degrade its water quality. Several fresh water streams that meet the Narmada between Amarkantak and Dindori revive its water quality.

II.3 Other Activities

EQMG assisted Guru Ganga Envirotech Trust in conducting a technical paper contest for civil engineering students in north India on “Prospects and Problems of Hydroelectric Projects in Indian Himalayas” and a study tour of major hydro-electric projects in Uttarakhand, Himachal Pradesh and Punjab.



Dr. G.D. Agrawal addressing the students



Under a consultancy from Sri Bhuvneshwari Mahila Ashram-Plan in Uttarkashi district (Uttarakhand) EQMG tested the water quality in 25 schools of Bhatwari block. It collected the water samples and tested physico-chemical and bacteriological parameters as per the APHA Standards in its laboratory. Fecal coliform contamination was observed in 23 out of the 25 schools. Low residual chlorine values indicated inadequate chlorination.

EQMG operates a state-of-the-art laboratory in Dehra Doon, equipped with sophisticated instruments like atomic absorption spectrophotometer (AAS), gas chromatograph, respirable air and gas sampler, flame photometer, spectrophotometer and a TKN assembly among others. In 2011–12, over 200 drinking water samples were tested at the lab. Most of them came from SWAJAL projects supported by the Government of Uttarakhand and institutions like Lal Bahadur Shastri National Academy of Administration, Doon School, etc. The Group also produces two types of water testing kits, viz, comprehensive and domestic. In 2011–12, it sold 41 kits and supplied 36 refill orders.

II.3 Remarks

The review period was notable for the PGWM project gaining momentum. The EQMG team underwent rigorous training in geo-hydrology with ACWADAM. The latter's continuing support in various phases of the project has helped build the confidence of the PGWM team. The first of a series of five geo-hydrology training workshops for the Himalayan region has helped the team to identify its shortcomings and ways to overcome them. The preparation of a situation analysis report on the status of groundwater in the Indian Himalayas will add to the Group's knowledge of the subject while the action research projects will provide valuable field experience.

Much of the rest of its activities have been in the nature of providing technical support services to other organizations. Income from sale of kits and sample analysis remains stagnant. The EQM Group has prepared a proposal for establishing a Fluorosis Mitigation Centre to build on its earlier experiences in community based fluorosis mitigation. The team also has many capabilities to carry forward the Institute's past work on river conservation. Thus there is room for significant growth given that the group has an experienced team.

Table 6: EQM Group Financial Statement (2011-12)

S.No.	Project	Funding Partner	Opening Bal. (Rs)	Income	Funds Utilized	Balance
1	PGWM - Participatory Ground Water Management	ARGHYAM	668,806	1,990,359	1,223,054	1,436,111
2	River Water Quality Monitoring	GGET	Nil	350,000	315,440	34,560
3	Kits Sale		Nil	265,970	265,970	Nil
4	Sample Analysis		Nil	386,025	386,025	Nil
	Total		668,806	2,992,354	2,190,489	1,470,671

- (iv) Improved social indicators through better access to education, health and other government services through functional VLIs;
- (v) Improved quality of work through community monitoring and
- (vi) Real-time administrative monitoring through the use of a Decision Support System.

In each selected district vulnerable panchayats were chosen based on the following parameters:

- Percent SC- ST population in the Panchayat
- Percent female literacy
- Percent agricultural laborers
- Percent unemployment
- Percent marginal workers
- Percent cultivable waste area
- Percent of irrigated area
- Percent of BPL households



Villagers handing over their Village Development Plan (VDP) to the Pradhan and Secretary in Amarpura village, Chattarpur

The 2001 census data for all the above parameters of all the villages in the five districts were collated and a vulnerability score was given to each village. Using PSI's Village Information System (VIS) a vulnerability map was created which showed the geographical spread of vulnerable areas. Field visits to clusters of the most vulnerable villages and meetings conducted by PSI and its POs to 125 villages led to the selection of 46 villages in 15 panchayats.

Each village chose a *lok sevak* who would act as a local facilitator. In all 37 *lok sevaks* were selected of whom 26 were males and 11 females. Two training workshops were conducted for *sahayaks* (PO reps) and *lok sevaks* in November 2011 and January 2012 to orient them about Gram Swaraj Abhiyan, issues of development in Bundelkhand, PRA methodologies and PSI's micro level planning (MLP) process.

Each panchayat selected one educated person to be trained as a village engineer. The latter's role will be to provide the villagers with technical help in planning physical works, ensure proper measurements and quality of work. Two modules have been conducted so far on concepts of scale and measurement, map reading, use of GPS, measurement of slopes, leveling and design of soil and water conservation works.

The trained *sahayaks* and *lok sevaks* initiated the MLP process in their respective areas. Each team consisting of a *sahayak* and the *lok sevaks* in the panchayat stayed in a selected village for 20-25 days at a stretch to facilitate the use of PRA tools and help the villagers analyze their developmental problems, particularly the nature and causes of their poverty. This analysis forms the basis of the village development plans (VDPs). Once the plan document is ready -- on the last day -- a meeting of all the villagers is called and all the maps and documents are presented before them. All day long there are animated discussions and amendments to the

document. Finally a resolution is passed by the villagers ratifying the VDP. A district wise status of the MLPs is given below.⁹

S.No.	District	Total Villages	Complete	In Progress
1	Chattarpur	10	6	3
2	Damoh	13	6	3
3	Panna	8	2	2
4	Mohoba	5	2	1
5	Lalitpur	10	0	2
	TOTAL	46	16	11

Unity Brings Benefit

A *gram sabha* was organized to ratify the Village Development Plan (VDP) prepared in Amarpura village of Chhatarpur district on April 20, 2012. The Gram Panchayat Sarpanch Sunita Varma, Secretary Sandhya Upadhyay and Assistant Secretary Pidaha were also present in the *gram sabha* meeting.

During the meeting, an old man raised the issue of drinking water scarcity for the livestock. He said, "As summers are harsh, rivers and streams have gone dry. Ghita pond has also dried up. In such a situation most of the villagers provide water to their livestock from hand pumps or wells. But even hand pumps are going dry. So it will be difficult to get water for the cattle." The discussion led to a decision to construct small tanks (*Haudi*) for storing water for the cattle. The entire discussion among the villagers was facilitated by the *lok sevak*, Baladin Yadav.



Led by Ganapat Yadav, Hataku Yadav, Hatak Bhaiyya, Sura Adivasi, Ghanshyam Adivasi, Shyam Bai and Raghunandan Yadav the villagers began "*shramdan*" for constructing the *Haudi*. The *sarpanch*, Sunita Varma, agreed to provide construction materials like cement, gravel and sand. Nupti Yadav promised to supply water free of cost from his bore-well. With the enthusiasm of the villagers the tank was speedily constructed. Now water is available for the cattle.

The community is now confident that if they are united any problem can be resolved.

⁹ The MLP process had to be stopped in Mahoba and Lalitpur due to announcement of U.P. State legislative assembly elections in February-March, 2012 and the subsequent imposition of the model code of conduct.



Once the MLP is complete and physical works are identified by the villagers a team of engineers visit the village to study the technical feasibility of the proposed works. During their visit it interacts with the villagers to assess the feasibility of the sites. The village engineers along with the engineering team then determines profiles and measurements of the sites to prepare the design and estimates of the feasible structures.

Village Information System: VIS is a web-based GIS system developed by PSI which provides information at the district, tehsil and village levels on demography, infrastructure and natural resources. The village-wise data from census 2001 is attached to a geo-referenced digital map with village boundaries to show the spatial variation of the attributes. The VIS for all the 13 districts of Bundelkhand has been prepared and put on the web at bundelkhandportal.org.

Decision Support System (DSS): A DSS is being prepared for all the selected villages. It is a GIS based system which provides detailed information for each plot of the village. Based on plot-wise data, it generates thematic maps like land use, landownership, soil type, irrigated area etc. These thematic maps laid over each other help in analysis of the present resource situation and for planning different activities. The DSS for eight villages have been completed so far.

III.2 Remarks

The programme which started in June, 2011 has gained momentum. One of its biggest achievements so far has been the creation of a resource pool of committed and dynamic *sahayaks* and *lok sevaks* who have a good understanding of development issues. The other big achievement has been organization of regular *aam sabhas*. Earlier no *aam sabha* was conducted in a village. During the MLP process, in about 15 panchayats the communities have been mobilized and are now aware of their right for conducting *aam sabhas*. Villagers, specially those belonging to the weaker sections, now get an opportunity to participate in the planning process. Many self-help initiatives have also been taken like putting pressure on school teachers to come regularly, sending children to school, getting the hand pumps repaired, etc.,. The prepared plans are ratified by the *aam sabha* and forwarded for implementation. Formation of strong Village Level Institutions (VLIs) will be the focus in the coming months.

Table7: IP Group Financial Statement (2011-12)

S. No.	Project	Funding Partner	Opening Bal. (Rs)	Income (Rs)	Utilization (Rs)	Balance Rs.
1.	Gram Swaraj Abhiyan	NIRD	Nil	4,513,821	5,321,679	- (807,858)

IV. OTHER PROJECTS AND ACTIVITIES

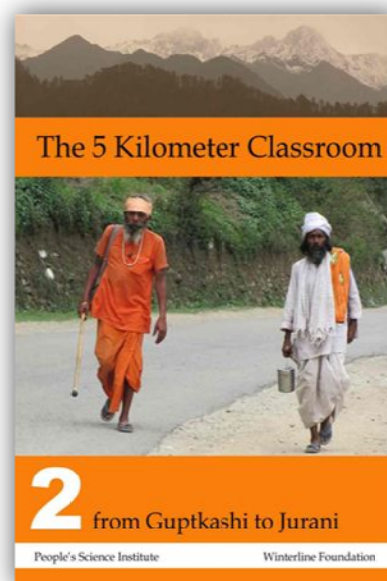
Akola Project: PSI received a grant of Rs. 1,443,822 during the year from Vishal Himalaya Foundation (VHF), USA for undertaking village development activities including construction of check dams, sanitation and drinking water facilities, and plantation works in Akola district of Vidarbha region in Maharashtra. The region is water-stressed and has experienced regular droughts in the past decades.

During the period, four cement concrete check dams were constructed in Sanglud (2) and Ghusar (2) villages with a potential to irrigate 290 acres benefitting 50 families. Two nurseries were also established in Dapura and Gonapur villages with a total of 2500 saplings of various tree species like *karanj*, *badam*, *neem*, *gulmohar*, *aonla*, *jamun*, and *guava*. These nurseries are being managed by poor households of the village itself. During the winter, 90 trees were planted in village lanes of Dapura. The survival rate of seedlings in the nurseries is about 90 per cent. A total amount of Rs. 1,047,138 was utilized for the above activities.



A small check dam in Ghusar village, Akola

The 5 Kilometer Classroom: In 2009-10 PSI received a grant to further its efforts in the field of environmental education. In 2011-12 it produced a booklet titled "The 5 Kilometer Classroom". The Five Kilometer Classroom booklets are a series developed and funded by Winterline Foundation based on a concept by Richard Wechter a former science teacher at Woodstock School. Woodstock published the first book in the series in 2005. PSI's booklet is based on a short five kilometer walk along the Kedarnath pilgrim route from Guptkashi to Jurani village. It provides visual lessons about the region's history, geography, geology, eco-systems, flora, fauna, people, culture and more.



2012 Calendar: One of PSI's more well-known activities is the production and sale of its annual calendar-planner. Since 2009 PSI has been producing calendars under the Himalayan Rivers series. The 2012 calendar features Uttarakhand's Pindar River. It is the only glacial river that rises in the Kumaon Himalayas and joins the Ganga river system in Uttarakhand itself. The Pindar is one of the few undisturbed major rivers in Uttarakhand. But now its unhindered flows are threatened by a major 252MW hydro-electric project at Devsari, near Debal. It will divert the river into a tunnel and dry up a pristine 22km stretch destroying the river and its biota. Almost the entire local population has stood up to oppose this project. Small hydropower projects are planned on almost all the tributaries of the Pindar.



Shri Salil Das and Shri Devraj Agrawal trekked up to the Pindari glacier and took pictures of the river in remote locations. Additional pictures were provided by Shri Anup Sah, Uttarakhand's most well-known nature photographer.

Research Papers and Reports: Research at PSI is undertaken to improve the implementation of field projects, identify new areas of work and to innovate new technologies and social processes. One research paper and one research report was prepared in 2011-12 based on work done at PSI.

Srikanth R., Gautam A., Jaiswal S C. & Singh P.: 2012, "Urinary fluoride as a monitoring tool for assessing successful intervention in the provision of safe drinking water supply in five fluoride affected villages in Dhar district, Madhya Pradesh, India," *Environmental Monitoring & Assessment*, Springer-Science & Business Media B.V., New Zealand, 2012, 10 pages.

Chicu Lokgariwar, Ravi Chopra, Vladimir Smakhtin, Luna Bharati and Jay O' Keeffe: "Including Cultural Water Requirement In Environmental Flow Assessment: An Example From The Upper Ganga River, India," 20 pages (accepted for publication).

Miscellanea: During the course of the year PSI staff continued to associate themselves with public interest activities in different parts of the country. In particular various colleagues from PSI spoke out on the state of Indian rivers and the current approach to hydro power development which destroys rivers and the local environment. In March 2012 the Indian Institute of Technology-Bombay presented its 2012 Distinguished Alumnus Award to Dr. Ravi Chopra for his contributions in the area of Water Resources Management, Environmental Quality Monitoring, Disaster Mitigation and Conservation of Rivers. While thanking IIT-Bombay for the honour bestowed on him, Dr. Chopra said that he considered the award to be a recognition of the work done by PSI.

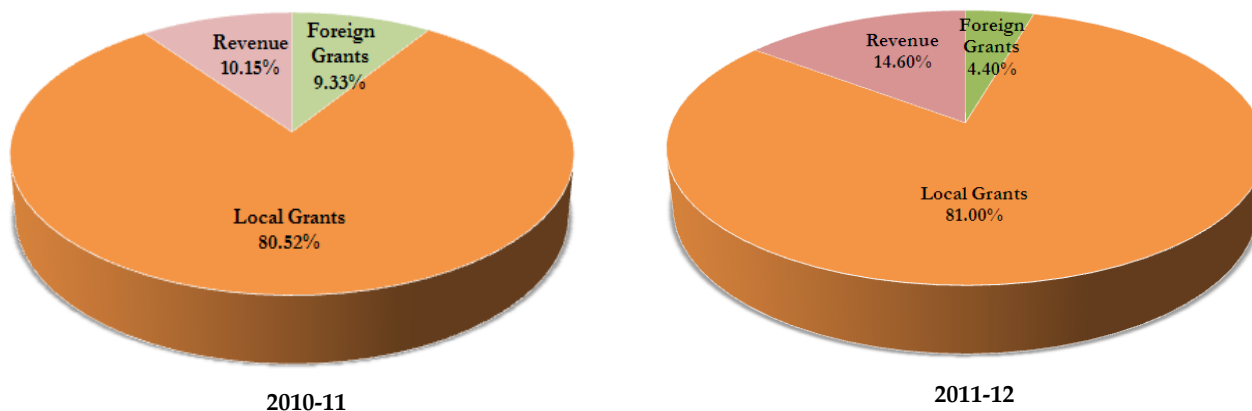


V. FINANCIAL REPORT

PSI's balance sheet and consolidated income and expenditure account for 2011-12, ending March 31, 2012 are attached as Annexures 1a and 1b.

During the year it generated grants worth Rs. 30,220,002¹⁰ and donations worth Rs. 130,090. Other receipts from consultancies, sale of products and publications amounted to Rs. 8,120,417. Adding the opening balance and other incomes the total income for 2011-12 amounted to Rs. 48,295,702. The Institute spent Rs. 36,470,903 leaving a balance of Rs.11,824,799. Of this balance Rs. 1,698,943 were refunded as unspent grants. It is proposed that Rs.1,600,000 be transferred to the campus fund. With unutilized grants carried forward amounting to Rs. 8,062,548 the surplus transferred to the capital fund is Rs.463,307.

The pie-charts below shows the sourcing of income from local grants and donations, foreign grants and donations and revenues from the sale of goods and services for 2011-12 and the previous years.



The main donors for local and foreign grants are listed below. PSI is thankful to all of them for their support. Revenue income was earned from consultancies, training programmes, sales of publications, calendars, water quality testing kits and posters.

Indian

Sir Dorabji Tata Trust, Navajbai Ratan Tata Trust, Government of HP, National Institute of Rural Development (GoI), Arghyam, Guru Ganga Envirotech Trust.

Foreign

Vishal Himalaya Foundation, India Friends Association, Indians for Collective Action, Winterline Foundation

¹⁰ All figures in this section are rounded off to the nearest rupee



VI. EXECUTIVE BOARD 2011-12

Dr K.S.Chawla	Chairperson	Geotechnical Engineer
Mr A.K. Roy	Treasurer	Chemical Engineer
Dr B.K.Joshi	Hony. Dean of Research	Political Scientist
Ms MadhuSarin	Member	Architect
Dr LeelaVisaria	Member	Sociologist
DrS.Jeejeebhoy	Member	Sociologist
Dr Ravi Chopra	Director (Ex-Officio)	Scientist

VII. PSI STAFF 2011-12

S.N.	Name	Date of Joining	Date of Leaving
1	Deepak Ahirwar	01.03.12	
2	Shubhoshree Banerjee	15.07.10	
3	Nidhi Barthwal	08.03.07	08.04.2011
4	Puran Bartwal	03.01.11	
5	Anupriya Chauhan	01.11.11	
6	Rita Chandola	23.12.10	31.05.2011
7	Ravi Chopra	27.06.88	
8	Gayatri Darmwal	01.03.11	16.05.2011
9	Salil Das	21.02.90	
10	Akshay Das	27.07.09	03.03.2011
11	D.N. Dwivedy	17.08.98	
12	Anil Kumar Gautam	01.03.02	
13	Vishal Gupta	16.12.11	
14	Ajay Jairwan	01.05.08	
15	Anil Kumar Joshi	02.07.10	30.06.2011
16	Pushpa Juyal	21.12.92	
17	Ranjana Khare	01.12.11	
18	Manoj Kumar	10.07.06	
19	Pravin Kumar	01.09.08	15.10.2011
20	Arvind Kumar	02.08.10	



21	Harendra Kumar	02.08.10	
22	Heera LAI	01.04.02	
23	Mitthan Lal	26.07.10	
24	Malavika Mysore	16.06.11	10.11.2011
25	Jay Sankar Nagwan	01.08.11	31.10.2011
26	Toshar Diliprao Palaskar	01.12.11	
27	Chicu Lokgariwar	22.09.08	31.08.2011
28	Deepak Negi	04.04.03	31.12.2011
29	Ashish Panwar	01.12.11	
30	R.S. Prasad	01.11.94	
31	Mahendra Singh Rajwar	01.01.08	
32	Seema Ravendale	05.03.12	
33	Ramesh Singh Rawat	16.09.04	
34	Subhash S. Rawat	01.06.02	
35	Abhijit Sarkar	05.08.11	30.11.2011
36	Debashish Sen	01.03.88	
37	Devesh Mohan Semwal	01.11.08	31.07.2011
38	Dinesh Sharma	02.10.97	
39	Rajesh K. Sharma	20.08.98	
40	Sunesh Kumar Sharma	01.04.11	
41	Kanchan Sharma	08.06.11	31.07.2011
42	Vijay Pal Singh	08.09.08	
43	Pavitra Singh	01.11.06	
44	Vikram Singh	01.02.00	
45	Yashpaul Singh	03.01.11	
46	Shiv Kumar Soni	01.10.11	
47	Shashi Kant Singh	05.04.11	30.06.2011
48	C. Tripathi	15.06.88	
49	Anil Tyagi	01.12.02	
50	Suresh Tiwari	01.03.12	
51	Meena Yadav	07.11.08	