IMPACT ASSESSMENT OF UPWSRP PROJECT FOR JAUNPUR BRANCH SUB BASIN (JBSB)

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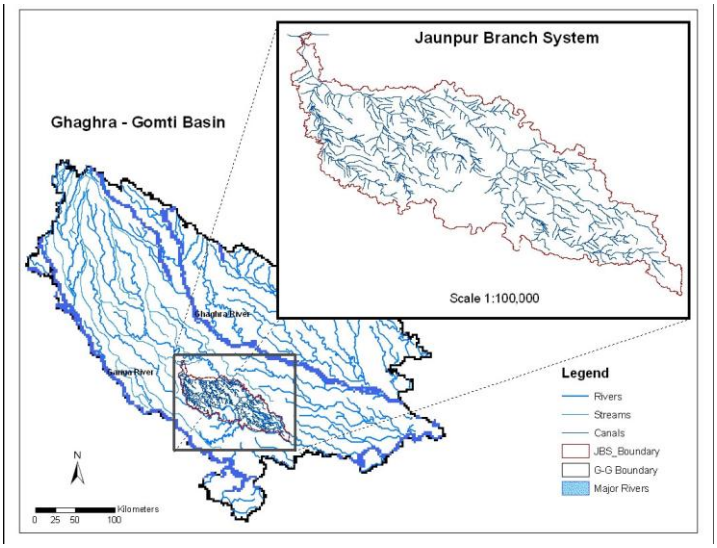
Introduction

Ghagra-Gomti Basin (GGB) basically is a part of the Ganga basin which is a large basin. The GGB contains four major surface irrigation systems, the Sarda System, the Sarda-Sahayak System, the Saryu-Rapti system and the Gandak system. There are also some small pump canal systems. The selection of Ghaghra–Gomti basin for the project interventions was particularly influenced by its poverty status because the percentage of families living below poverty line is substantially above the State average. In addition, a wide range of water management issues are present in this basin where highly under-utilized surface water irrigation potential has been created. Considerable groundwater resources have been tapped in the basin by the private sector; however, excellent potential still exists for further groundwater exploitation, which could significantly increase cropping intensities. Impeded drainage results in substantial yield reductions for the Kharif crop and in delayed planting of the Rabi crop, which makes the Rabi crop vulnerable to pests. Poor water quality due to agricultural, industrial and domestic pollution present major health hazards. Conservation and effective management of village ponds and other aquatic eco-systems is lacking. Therefore, an integrated water resources management (IWRM) approach and modernized operation and management of the irrigation and drainage infrastructure was piloted in two selected areas (JBS and HBS) within this basin under the project.

Background of study area



Map-1: Location Map of the Jaunpur Branch System

The Study Area covers the Jaunpur Branch Sub-basin (JBS) and falls in the Gomti and the Ghagra river basins. Jaunpur Branch Sub-Basin (JBS) covers 0.6 million ha areas located between Sai and Gomti Rivers, of which 0.32million. ha is in the canal command. It lies in parts of Barabanki, Jaunpur, Pratapgarh, Raebareli and Sultanpur Districts covering 43 blocks. Jaunpur Branch Sub basins including the Haidergarh Branch comprises the present study area. The Haidergarh Branch which is the carrier branch for Jaunpur Branch takes off at km 171.5 of the main Sarda Sahayak Feeder Channel and has a head discharge capacity of 165.5 cumec. The Jaunpur Branch takes of at km 22.98 of the Haidergarh Branch and has a head design discharge capacity of 123.2 cumec. During the Kharif season in 2004-05, the Jaunpur Branch was rostered for about 210 days to deliver 1298 MCM of irrigation. This is equivalent to about 24 cm depth of irrigation over the gross area of JBS or 47 cm over the CCA. If the Jaunpur Branch operated at design capacity over the entire season, it would be able to deliver approximately 2235 MCM, equivalent to approximately 81 cm over the CCA. This means that the canal at the project initiation stage was running only at the 58% of the original capacity in Kharif season.

During the Rabi season in 2004-05, the Jaunpur Branch was rostered for about 140 days to deliver 613 MCM of irrigation. This is equivalent to about 11 cm depth of irrigation over the gross area of JBS or 22 cm over the CCA. If the Jaunpur Branch operated at design capacity over the entire Rabi season, it would be able to deliver approximately 1450 MCM, equivalent to 53 cm over the CCA. This means that the canal initiation stage was running only at the 38% of the original capacity in Rabi season.

In JBS-basin the average groundwater level is within 5 m of the natural surface at the end of the monsoon, and several meters lower at the end of the dry season. The groundwater is generally of good quality for irrigation and can be readily accessed by shallow tube-wells. There are several areas at the tail-ends of canal systems where the groundwater is more than 10 m below the natural surface. JBS drains to the Sai and Gomti rivers. These rivers have relatively small catchments, originating within U.P. To provide Irrigation in an area, a wide network of canals is constructed so as to carry water from a natural source such as River, Lake, and Ponds etc. and to distribute it in a fairly uniform and equitable pattern in the entire command area.

The system has under gone modernization and restructuring. The Project monitoring & impact assessment of an innovative project, such as, UPWSRP- Phase-1, is essential not only for the present project, but also for future project planning & execution. The UPWSRP envisages multifarious activities ranging from sectoral reforms through establishment of apex policy & technical institutes to providing policy and multi –sectoral technological manpower support on a continuum basis, for integration scientific water resources management. This in turn will help in scientific rehabilitation of irrigation & drainage network encompassing socio-economic, environmental and agri-horti-animal husbandry development with participatory irrigation management in sustainable manner. Also, the effective outcome is expected to create positive impact on the farm productivity there by better income, its equitable distribution leading to better health, education etc. to the farmers.

Methodology

In order to translate the envisaged field activities and also to gain confidence of the users a pilot demonstration of irrigation system rehabilitation program, including activities like irrigation & drainage networks rehabilitation, Agricultural Intensification and Diversification (AID) activities, Social institutions developed at the grass root level for water and resource management, conjunctive water use, etc. has been taken up on 3, 23,000 ha cultivable command of Jaunpur & Haidergarh branch command. M/s. DHV Consultants have been entrusted with the assignment of Project Management and Monitoring Information System (

PM-MIS) so as to develop an IT based framework (software) to assist PACT for their monitoring the component- wise project activities and performance evaluation towards fulfilment of the aims of the Uttar Pradesh Water Restructuring Project (Phase-1). The indicators to be monitored in the project are listed below:

- **State Level Performance Indicators:**

The category broadly addresses the issues that are not very specific to this project but for the other projects operating under the irrigation department. The list of indicators is:

- Fiscal Deficit (yearly)
- Establishment of Apex Water Institutions
  - ✓ Establishment of inter- sectoral Water Allocation Knowledge Base, analytical tools and mechanism
  - ✓ Establishment of formal likes between agriculture and water sectors, public & private sector Institutions.
- Rightsizing of class C and D staff and setting up methodologies for their large scale reduction.
- Introduction of effective use of modern skills and tools adoption level of MIS.
- Establishment of Legal framework to enable User's Participation in Irrigation and Drainage operation.
- Procurement of key civil works, goods and Consultants services
- Project schedule
- Preparation of activities for next Phase of the Project

- **Performance Indicators for the Project Area:**

Under this category the indicators are again sub divided primarily domain wise to reflect the domain specific output and possible impacts. Sub-category-wise indicators are given below:

Technical and Operational Aspects (Primarily Addressing Irrigation and Drainage Domain):

- Rehabilitation and Modernization of Irrigation and Drainage infrastructure through participation of stakeholder
- Implementation completion report for each minor sub-basin.
- Efficiencies of Distribution in Conveyance, Adequacy, Dependency and Timeliness.
- Installation of Regulation Structures.
- Organization of Staff and Functions.
- Establishment and Effective Participation of Stakeholder groups.
- Progress in Unbundling of Irrigation and Drainage activities in to commercially oriented bulk water operations and retail operations through WUAs and other entities.
- Transfer the Management of one Distributary to private sector.
- Peak Irrigation Demand of MSB & Canal Capacity to Deliver Water at System Head.
- Total Annual Volume of Irrigation Water Delivered and Demand.
- Total Annual Volume of Irrigation Water Inflow.
- Total Command Area Serviced by the System.
- Total annual cropped irrigated area.
- Total Volume of Water Consumed by each Crop.
- Development of Decision Support System and supporting Telemetry.
- Development of Kakaraha Canal Based Hydro.
- Training locally and internationally.

- **Agricultures, Socio-Economic and Financial Aspects:**

  - Land holding, cropping and income at MSB level.
  - Changes in land use/land cover.
  - Intensification of agriculture.
  - Diversification of agriculture.
  - Fisheries improvement and revenues.
  - Gross annual agricultural produce and its value.
  - Recovery of O&M cost through water service charges.
  - Improvement in equity in income distribution.

- Total management, operation and maintenance (MOM) cost crop season-wise.
- Total cost of personnel engaged in I&D services.
- Number of personnel engaged in I&D services.
- Maintenance costs.
- Division level annual financial report.
- Adoption of new technologies by WUAs and their enthusiasm to participate in User Groups.

➢ **Social and Environmental Aspects:**

- WUA formation, functioning and training.
- Adoption of new technologies by WUAs and their enthusiasm to participate in user groups.
- Land holding, cropping and income at MSB level.
- Changes in land use/land cover.
- Number of ground water level bores monitored/density of bores in the area.
- Development of conjunctive use plan and operation as per plan.
- Critically waterlogged areas (> 2m bgl).
- Semi- critically water logged area (between 2 to 3 m bgl).
- Salinity indicators of soil and ground water.
- Salt balance of MSBs (+/- Tones).
- Alkalinity levels of irrigation and drainage waters.
- Average annual depth of water table (m), water logged and alkali affected area.

Following criteria was adopted for the selection of farmers in the focused minor for carrying the demonstration activities:

- Member of the water user association.
- He should be farmer and owe land.
- Farmer should be progressive in nature and ready to adopt the practices in future.
- Should be ready to adopt modern practices.
- Should be able to give irrigation through tube-well also.T conjunctive use was propagated)

Results and Discussions

Impact related to Apex Institution establishment

All the envisaged apex institution. Viz; SWaRA, SWaRDAC, SwaTRaC & JBSDMB have been constituted,. SWaRA & SWaRDAC have already stared providing technical support with their built up date base to other consultancy assignments. Simultaneously, by assimilation new technologies in the process they have developed knowledge base which will be an asset to them as also to Irrigation Department. Apart from these the JBSDMB has created enough awareness among the users through the meetings held at the division level, thus providing a platform for interaction between the users & officials.

IT infrastructure developed & capacity building activities has started showing its effect on use of on line mechanism for communicate from conventional to about 25% of the official communication are non done by this mode, When the development will be complete its use would increasing proportionately.

The establishment of 422 nos of minor and its outlet level official water management institution (WUA) along with their capacity building has started showing the development on field level water management by the users. Gradually, their participation in water management activities is in increasing. About 90% of them are being their outlet command maps, 80% of them are capable of writing proceedings, about 45% can prepare their O&M estimates & about 25% are capable of writing cash books . Also, their capacity building has reflected on their technology adoption.

Over the years about 0.95 MCM and 1.88 MCM silt has deposited in Haidergarh and Jaunpur branch respectively. This heavy silt load has reduced water carrying capacity of Haidergarh Branch from

5850 Cusec (169.5 cumec) to 3000 Cusec and in JBS from 4350 cusec (123.2 Cumec) to 2000 cusec that is to say JBS and Dy discharge capacity has reduced to 7o% to 60 % and all the branches and dys have not been in position to run at f.s.l. Due to elevated bed levels, waterlogging is witnessed all along the canal 1km buffer. Improvement in canal carrying capacity is seen after the implementation of UPWSRP and de-siltation of branch canals in one go during April, May, June of 2006. The overall impact was assessed in two ways one at macro level for all the indicators and other at micro level for the important indicator. The table below depict the overall performance of the project on the macro level.

Capacity Building

In Jaunpur branch, only about 2.65 percent respondents indicated that they received training on agriculture and water management. In Haidergarh branch, one of the respondents said that they received any training. Also about 3 percent and 1.15 percent of the respondents respectively from Haidergarh and Jaunpur branch got their land levelled as revealed by DHV reports of survey.

Irrigation & Drainage Networks Maintenance.

About 41 percent respondents in Haidergarh branch and about 20 percent in Jaunpur branch informed that their respective minors were de-silted. There is a significant increase, over the two years, in positive response in this aspect from Haidergarh branch. The majority of those giving positive response (95% in HB and 99% in JB) said that the silt was disposed off on canal banks itself. Regarding the proper maintenance of outlets and fields channels, about 22 percent from HB and only about 3 percent respondents from JB gave positive/affirmative response, thee is about 21% increase in positive response in this regard from Haidergarh branch. Similarly, about proper maintenance of field and link drains, about 19 percent form HB and only about 2.5 percent from JB gave positive/affirmative response. Here also there is about 18% increase in Haidergarh branch in 2006-07 over 2005-06 response. Reported by DHV surveys for impact assessment.

Table-1: Project Impact Summary

Project Impact	Unit	Before Implementation (2002-03)	After Implementation (2007-08)	Increment/Reduction
Irrigated area	ha	109589	139712	30123
Irrigated Kharif area	ha	50032	76913	26881
Irrigated Rabi area	ha	59557	62799	3242
Water Logged Area	ha	191763.11	150151.35	- 41611.76
Wheat productivity (demo area)	qt/ha	27.64	45.99	18.35
Rice productivity (demo area)	qt/ha	17.69	65.51	47.82
Pulses productivity (demo area)- Arhar, Moong & Urad	qt/ha	7.39, 3.63, 3.93	14.93, 6.8, 4.8	7.51, 3.17, 0.87

Maize productivity (demo area)	qt/ha	15.38	20.38	5
Mustard productivity (demo area)	qt/ha	9.92	15.71	5.79
Incremental benefits from increased agricultural production per year at project completion	Rs in Cr	0	36.37	36.37
Income through wetland rehabilitation	Rs in Cr	0	1.98	1.98
Rain water harvesting	Rs in Cr	0	0.13	0.13

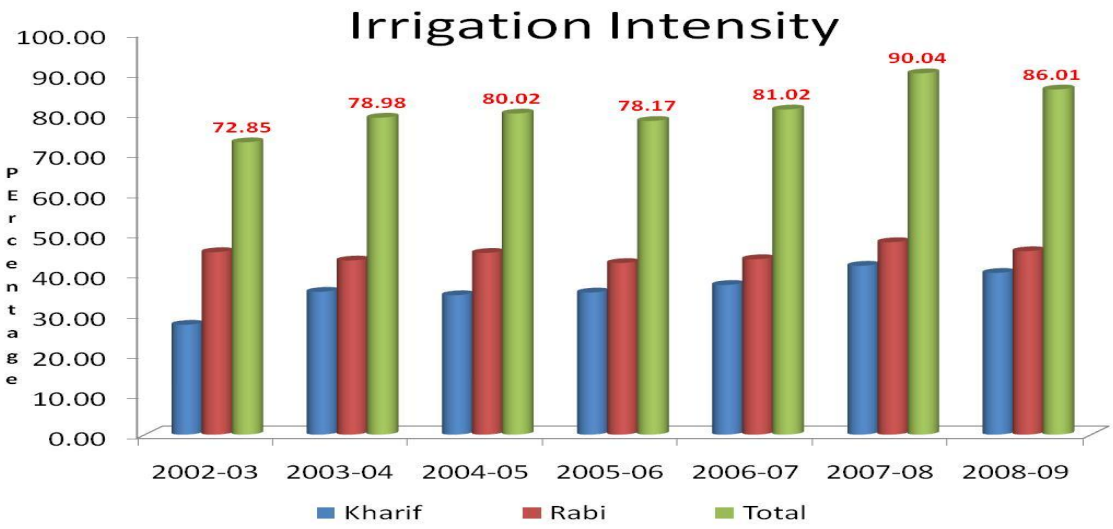
As this is the irrigation project the emphasis was on the evaluation of increase in area and revenue. The rehabilitation work depends on the closure of the canal system, and also, the delay start of the project are few factors responsible for less encouraging results obtained so far. Since the project is still ongoing we expect good results by the end of the project. The table-2 below gives year wise increase in areas as well as revenue from the baseline year 2002-03.

It is seen from the table that revenue increase in by 1.31 times since base year 2002-03. In figure this increase is from Rs 289 lakh to Rs 379 lakh. Rate of increase in revenue (@31%) surpassed to rate of increase in irrigated area(@27%). The increase in area irrigated is 1.27 times from the base year 2002-03. Reduced Water depth in kharif 0.92 m against 1.78 m and in rabi 0.52 m against 0.92 m is the positive impact of cannal rehabilitation. Water availability has increased to 66% of designed roster. In kharif 748 MCM against 1134 MCM and In rabi 322 MCM against 530 MCM.

Table-2: Project impact on area and revenue assessed

Year	Area Irrigated (ha)			Revenue (Rs.in Lakh)		
	Kharif	Rabi	Total	Kharif	Rabi	Total
2002-03#	50032	59557	109589	125.71	163.68	289.39
2003-04	65056	56814	121870 (1.11)	174.33	145.19	319.52 (1.1)
2004-05	63502	59288	122790 (1.12)	168.63	152.52	321.15 (1.11)
2005-06	64734	55984	120718 (1.10)	171.24	148.53	319.77 (1.10)
2006-07	68181	57249	125430 (1.14)	188.15	149.99	338.14 (1.17)
2007-08	76913	62799	139712 (1.27)	212.43	166.48	378.91 (1.31)
2008-09	73663	59855	133518 (1.22)	201.99	158.7	360.69 (1.25)

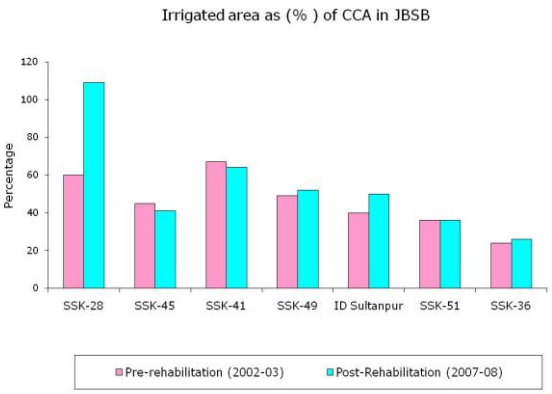
The canal was designed to give protective irrigation for sustaining crop production in the area. There are number of rationale responsible for lower irrigation intensity in the JB command due to change in cropping pattern. Shift towards rice wheat crop rotation. Here increased areas of paddy, a high water-use crop with a very high peak demand during transplanting reduce water supply towards tail. The total proposed area designed to be irrigated during kharif season was about 1.8 lac ha but, only 76.9 (2007-08) thousand ha is actually irrigated. The total proposed area designed to be irrigated during Rabi season was about 1.3 lac ha but, only 62.8 (2007-08) thousand ha is actually irrigated. Paddy covers around 88.7% of the total Kharif area actually irrigated by canal and utilizes 93% of the total available water. Paleva before wheat is another water demanding activity consume 3% of the actual Rabi irrigated area. Paddy sown area of canal command is only 9000 ha in Jaunpur & the irrigation intensity is very low i.e., 12% . (due to problem of water distribution in canal command). The irrigation intensity for Rabi and Kharif season along with the total canal irrigation intensity of JBS is given in the graph below.



Improvement in canal carrying capacity, though have not witness additional water supply (due river water constraints), but have till date the following beneficial results have been reached. The SSK-28 division of JBS which is at the head of the system has seen an increase of irrigated area 50% of CCA in 2004-05 to 109% of CCA in 2007-08. This is because the main canal had been desilted for the first time sice commissioned in 1978. This divsisonal assessment is depicted through graph given below. Reduced withdrawal of canal water from branch in Deeh Dy of SSK-45 division and Jais Dy of SSK-41 division is due to reduced f.s.l in branch and Dys. SSK-45 and SSK-41 have seen decline in performance.this can be increase with more availability of river water. The down stream divisions (SSK-49, ID Sult, SSK-36) have registered increased irrigated area, because more water have been transferred to lower reaches due to branch desilting, except SSK-51 which remains unaffected. As a matter of fact irrigation in Kharif is increasing at regular pace, but decline during rabi has been recorded due to less water availability.

Table-3: Division-wise increase in area

Name of Divisions from head to tail	Pre-rehabilitation Irrigated area as % of CCA	Post-Rehabilitation Irrigated area as % of CCA
SSK-28	60	109
SSK-45	45	41
SSK-41	67	64
SSK-49	49	52
ID Sultanpur	40	50
SSK-51	36	36
SSK-36	24	26



The productivity levels in canal command area was quite low. A general complaint is that canal water deliveries do not match crop water demands. The mismatch is both in quantity and timing. This problem has been resolved through conjuctive use of surface and ground water. For equitable sharing of surface water osrabandi on all outlets of all 421 minors of the pilot project command area have been prepared by the farmers and for their supplementary irrigation requirements about 46,000 ground water user groups of 4 ha. each, each having at least one private tube-well for common use, have been created. Thus farmers can have assured irrigation water for their crops, by taking canal water as per their share through osrabandi and meeting the balance need of water from ground water.

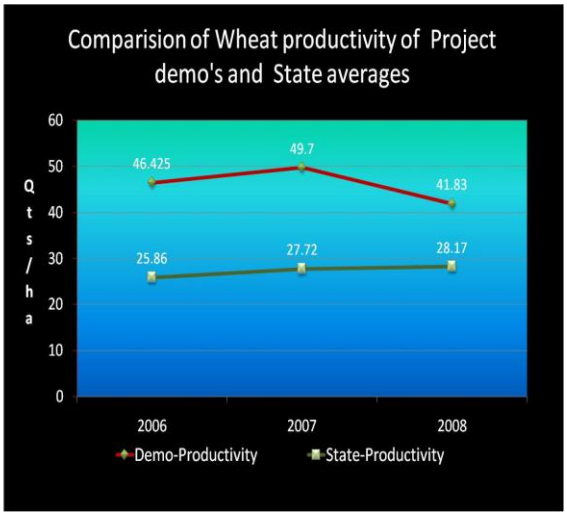
The improved package of agricultural practices is being practiced in the command area to increase the crop productivity. Such package primarily focuses on the following aspects:-

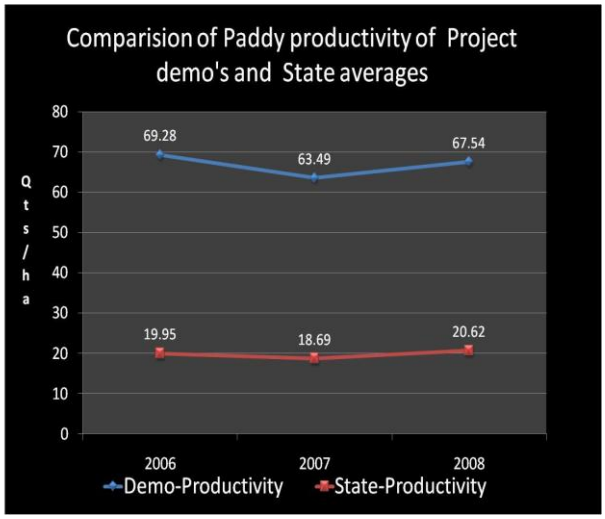
1. Quality seeds.
2. Balance fertilizer use.
3. Timely Sowing/Transplanting.
4. Proper Plant speacing.
5. Sowing and Transplanting in East-West direction
6. Proper Placement of Seed & Fertilizer.
7. Eco-Friendly Pest Management.

With above package of improved practices demonstrations were given at farmer's field. The site of demonstrations plot has been kept as 0.4 hectare. These demonstrations have been taken up in head, middle and tail reaches of minor canals. The selection of farmers willing to take up demonstration was done in open meeting of concerned Water User Association.

The demonstrations conducted by the farmers on their fields for Rice and Wheat have shown that by adopting package of improved agricultural practices the yields have been doubled, than the prevailing yields associated with 3 to 4 fold economic returns. The visible results of the demonstrations have convinced the farmers and they are gradually adopting the package of improved agricultural practices.

Considering lesser canal water availability during Zaid the farmers usually keep most of their fields fallow. The farmers were motivated and mobilized to take up Moong & Urd with irrigation supplemented through ground-water during this season. The results of these demonstrations have not only added to increased income and nutrition but have also helped in conditioning the soil. This encouraged us to demonstrate a feasible cropping pattern initiating with Urd & Moog in Zaid, Rice in Kharif and Wheat in Rabi. The change in wheat and rice productivity is visible from the graphs given below





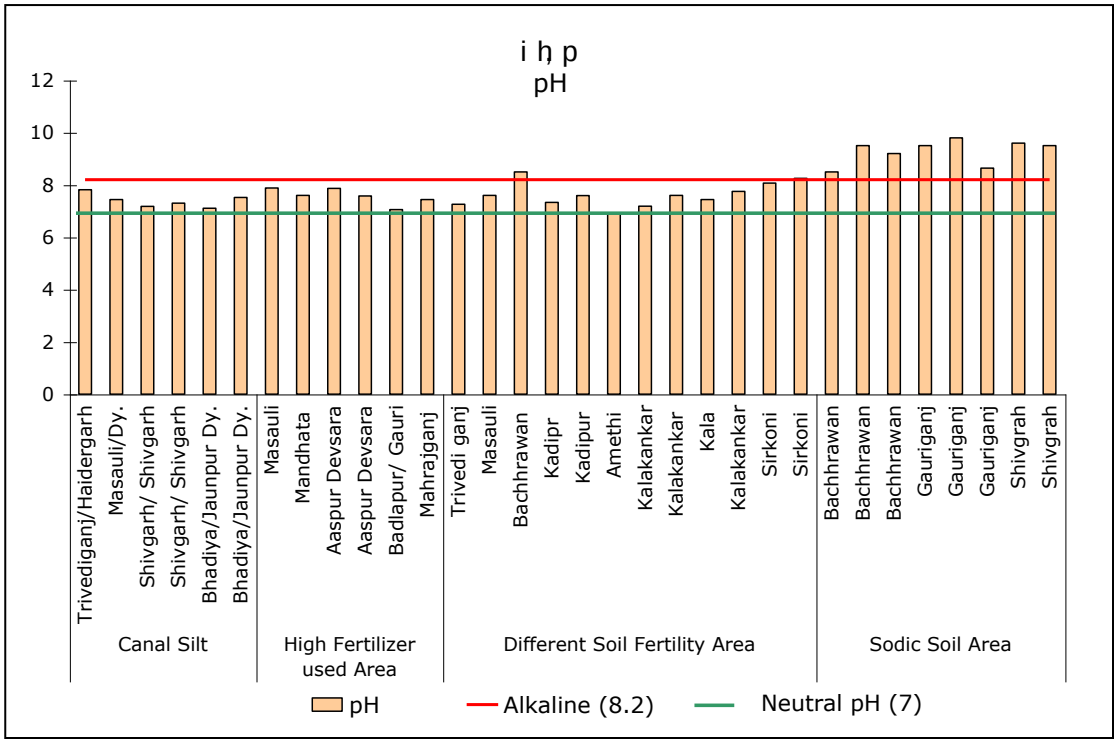
WUAs Participation

The Awareness meetings and later training to the farmers were organized by WUAs and Culaba samitis. The input distribution was done Culaba-wise under the umbrella of Culaba-Adhaksha and WUA chairman. The signatures of the beneficiaries receiving inputs were taken on the register by the WUAs- chairman. The inputs were procured from the Agriculture department of the project districts. The whole exercise was facilitated by divisions of irrigation department, NGO and Experts at PACT office.

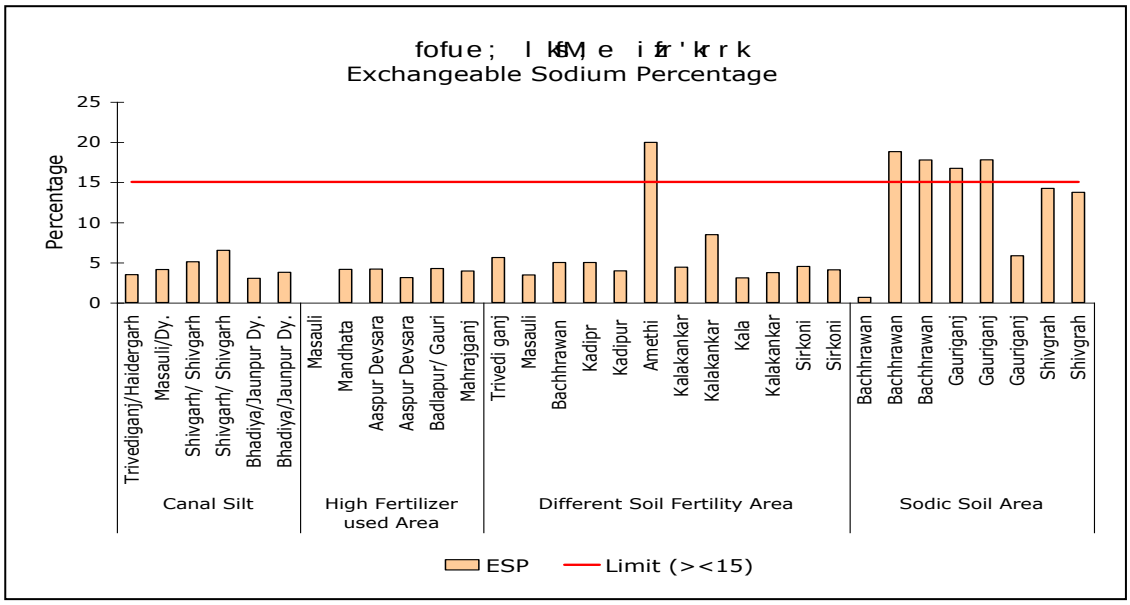
Environmental impact on soil and water quality

A total of 36 samples comprise of canal silt, high fertilizer used areas, different fertility areas and sodic areas were tested as per standard methods of IARI and ICAR. Significant indicative parameters are as below;

pH is an indication of the saline or alkaline soil. pH More than 8.2 is alkali soil. 7.0- 8.2 indicate alkaline tendency.The values varied from 6.9 (Soil fertility area of Amethi block of Sultanpur district) to 9.8 (sodic area of Gauriganj block of Sultanpur district). A total of 10 (31.2%) samples were found having above 8.2 shows soil is alkaline out of which 6(60%) samples are having more than 9.0 pH value which belongs to sodic area samples.



Exchangeable Sodium Percentage (ESP) indicates a degree of saturation of the soil exchange complex with sodium. The value <15 refers saline soil while >15 refers alkali soli. The values varied from 0.63 (Sodic area of Bachhrawan block of Raebareli district) to 19.93 % (Soil fertility area of Amethi block of Sultanpur district). A total of 5 (15.6%) samples were found having >15 values which belongs to sodic area samples except one of Soil fertility area of Amethi block of Sultanpur district.

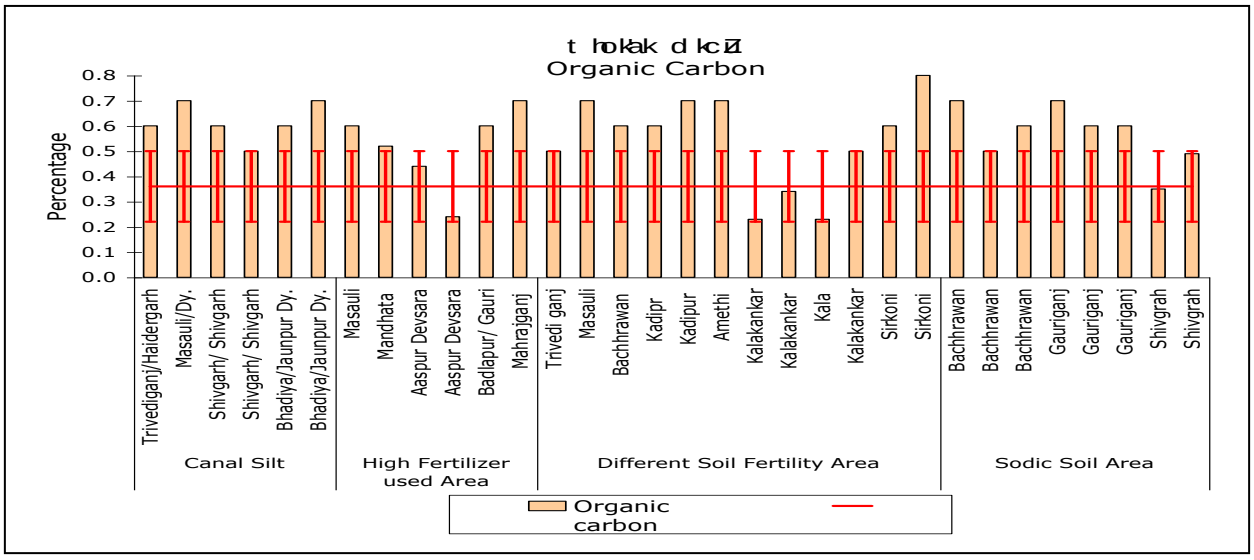


Organic Carbon (OC) is prime indicator of soil fertilty status. The range prescribed for agriculture purposes by State Agriculture Department is: upto 0.20 very low, 0.21-0.51 low, 0.51-0.8 medium and >0.80 high. The values varied from 0.23 (Soil fertility area of Kalakanker block of Pratapgarh district) to 0.8% (Soil fertilty area of Sirkoni block of jaunpur district). A total of 21 (65.6%) samples were found having below 0.51 % of lower value while none of the samples are having very low (<0.21%) OC.

Available Nitrogen (N) is prime indicator of soil fertilty status. The range prescribed for agriculture purposes by State Agriculture Department is: <280 low, 280-560 medium and >560 high. The values varied from 29.1 (Sodic area of Gauriganj block of Sultanpur district) to 470.4 kg/ha (Soil fertility area of Bachhrawan block of Raebareli district). A total of 17 (53.1%) samples were found having below 280 show soil is deficient in nitrogen.

Available phosphorus (P) is prime indicator of soil fertilty status. The range prescribed for agriculture purposes by State Agriculture Department is: upto 10.0 very low, 10.1-20.0 low, 20.1-40.0 medium and >40.0 high. The values varied from 5.4 (Canal silt of Bhadaiya nala of Jaunpur Dy) to 79.1 kg/ha (Soil fertility area of Kalakanker block of Pratapgarh district). A total of 3 (9.4%) samples were found having below 10.1 showing very low value while 12 (37.5%) samples having >20 kg.ha value showing medium posphorus.

Available potash (K) is prime indicator of soil fertilty status. The range prescribed for agriculture purposes by State Agriculture Department is: upto 50.0 very low, 50.1-100.0 low, 101-250 medium and > 250 high. The values varied from 17.8 (Soil fertility area of Masauli block of Barabanki district) to 234 kg/ha (Sodic area of Gauriganj block of Sultanpur district). A total of 1 (3.1%) samples were found having below 51 showing very low value while 31 (36.9%) samples having >100 kg.ha value showing medium potash.

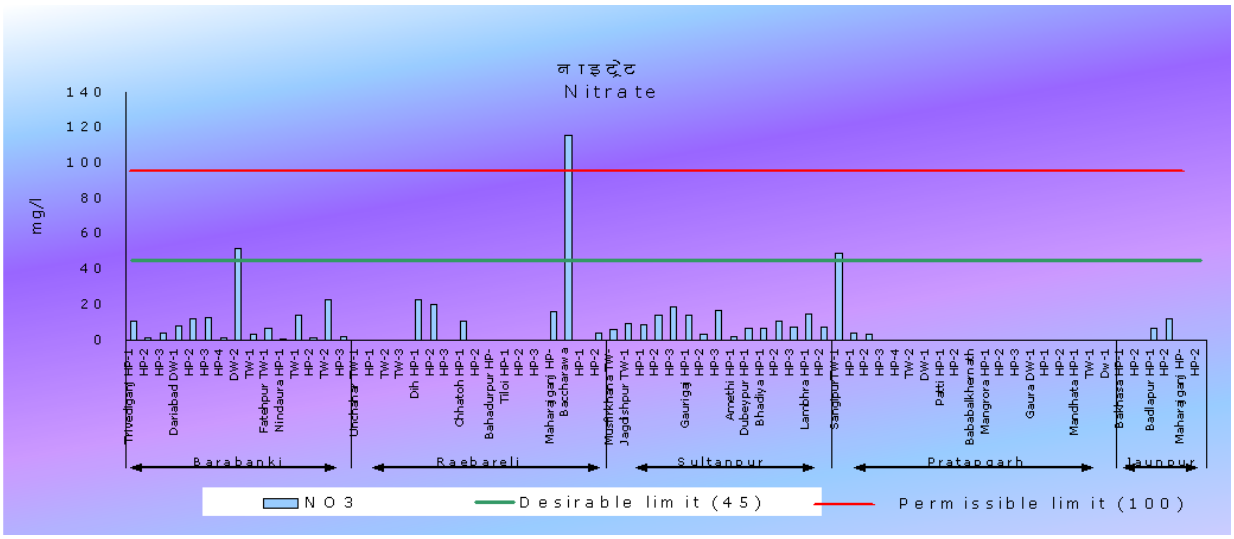


Assessment of water quality in the five pilot districts of Ghagra-Gomti basin as part of the Social and Environment assessment (GG-BSEA) under Uttar Pradesh Water Sector Restructuring Project (UPWSRP) was important for development of environment plan. Water quality is closely associated with crop productivity, industrial development and the health of the inhabitants of the area. The hot spots based on secondary data were identified and grab sampling was carried out from existing ground water structures, such as Piezometer, India Mark II hand pump, Tube well and dug well. The ground water samples size was 72 collected from ground water structures. Drinking water requirements are mainly met out through ground water (India MK-II hand pumps or private

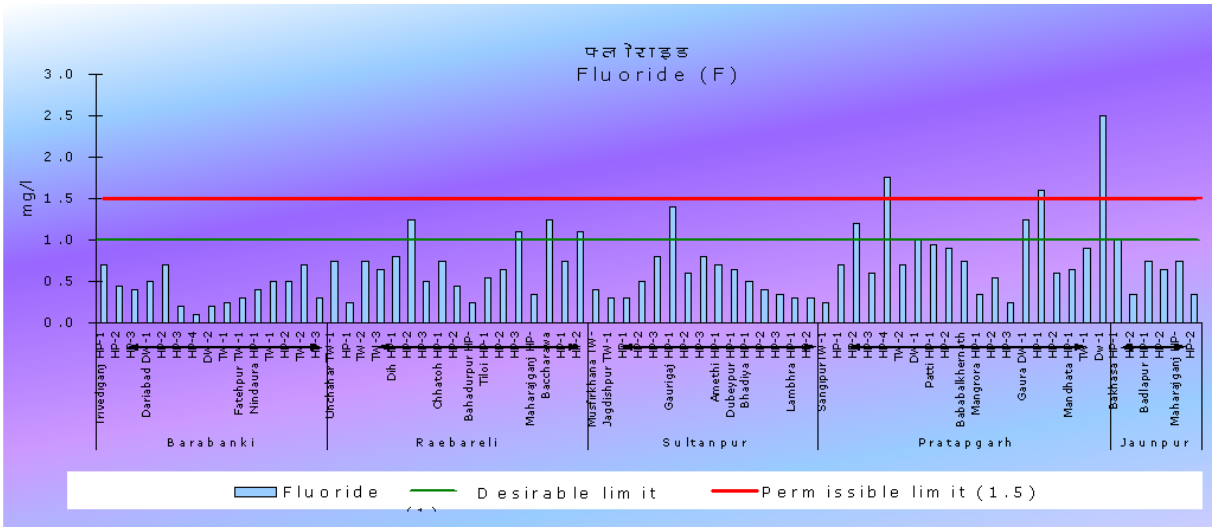
hand pumps and tube wells) resources. The sampling was carried out during post monsoon period (October-November2007). The sampling, their preservation, transportation and storage in the laboratory were carried out as per procedures laid down in "Standard Methods for Examination of Water and Waste Water" -APHA, AWWA & WFA-19th edition. Seventy-two Ground water samples were analyzed for 6 parameters i.e. pH, Nitrate, Arsenic, Mercury, Cadmium, and Fluoride. Several water quality standards have been prescribed by different countries. Uniform standards for all the countries are not possible due to divergent climatic conditions, habits, technology and financial constrains particularly for the developing countries. Apart from various countries, W.H.O has prescribed standards for domestic supplies. In India, standards have been prescribed by Indian Council of Medical Research (ICMR-1975) and by Bureau of Indian Standards (BIS-1991). For the present study, standards prescribed by B I S-1991 with amendments made in 1993 and 2003 are used. The sample size was taken to be 72 and the sampling error calculated at 95% confidence limit is 11.2%. The precision level is 8.6%.

The over all UWQI for the JBSB was calculated as 84.5 which almost fell under the "good water" class according to the UWQI categorization scheme. Out of the total 72 sample analyzed only five falls in "fair" category remaining 67 fall under "good" category. The sample collected from the Hand-pump of Kumbhima village in Sangipur block of district Raebarelli reported the lowest index (67.11). The highest index was calculated for 37 village spread all over the pilot area. If the individual parameters are considered than the sampling result shows that the maximum limit of Cadmium, Mercury, Arsenic and pH are within the permissible limit, but nitrates and Fluoride are beyond the permissible limit.

The graph below shows the places where the nitrate limit exceeds the permissible limit.



The nitrate concentration is highest in Bacharawa block of Raebareli with the value (116mg/l) recorded from the sample of Dug-well. Nitrate samples exceeding the permissible limit are from Barabanki, Raebarelli and Pratapgarh district. Nitrate in India MK II hand pumps is recorded well below the desirable limits. Similarly nitrate concentration in tube well water samples is found of negligible concentration. Human excreta disposable through soak pits is one of the major sources of pollution in the rural areas. Another reason for the presence of nitrate is that this area is agriculture driven and excessive use of nitrogenous fertilizers leads to the nitrate penetration in the ground water.



Fluoride: The perusal of analysis data and plotting reveals that fluoride concentration in India MKII sample is much more below the desirable limit of 1.0mg/l. In majority of water samples, the value ranges between 0.1 – 0.75mg/l. In two water samples of Gaura and Badlapur blocks of Pratapgarh and Jaunpur districts fluoride is found above the permissible limit (1.60 and 1.5 mg/l respectively). In dug well water sample of Pratapgarh districts 2.0mg/l fluoride is recorded. In tube well water samples the status of almost same as in India MKII hand pumps.

Ground water status

Pizometers are install in the grid of 1000X1000 meter square in the pilot area.Data for rainfall distribution were obtained from IMD and ground water level data from the ground water department. The data were analyzed and following observations were obtained:

- Decrease in water logged area (0-3 m) in post monsoon period from 27% of GCA to 12% GCA observed over 3 years of project intervention.
- Waterlogged area (0-3m) in pre monsoon May is 1.18% (2006), 3.0% (2007) respectively and in Jan 2009 9.26% of GCA. In 2006 canal remained closed for desilting and major rehabilitation activities taken place.
- Water application depth reduced from 1.06 m (2002-03) to 0.76 m (2007-08) a positive sign of awareness amongst farmers and better water management by project divisions.
- Canal irrigation and ground water irrigation clearly shows upstream and down stream divide.
- Rainfall distribution mapped for 2005 to 2007 suggests that in upstream command less rainfall

The full impact would off course be visible only after completion of the civil works in the project area and when at least one complete cycle of normal weather is experienced in agriculture production.

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