MAHARASHTRA WATER SECTOR IMPROVEMENT

PROJECT DIST.JALNA SUCSESS STORY

TITLE OF PROJECT:

"USER CENTERED AQUIFER LEVEL GROUNDWATER MANAGEMENT PILOT," DISTRICT JALNA.

INTRODUCTION:

For the first time in the concept of aquifer as a unit has been introduced groundwater management under user centered Aquifer level Groundwater Management Pilot. The farmers realized the advantages of aquifer management strategies instead of adopting water as a unit for groundwater management. The stakeholder accepted the paradigm shift towards sharing of groundwater among different groundwater user groups and necessity to control groundwater extraction for sustainable utilization of the resources. Water sharing for irrigation has been successfully adopted by the community by diversifying the cropping pattern and switching over to low water consuming crops. Sugarcane cultivation has been discontinued and the flow irrigation method is slowly replaced by drip and sprinkler irrigation system. This has reduced total groundwater extraction by 12 to 15 %.

Prior to implementation of User Centered Aquifer Level Groundwater management Pilot most of the villages were depending upon tanker water supply for drinking water during May- June. After the demand control measures adopted by the community during 2008-09, the demand for tanker water supply has reduced except for 3 villages in aquifer. This has assured safe and sufficient drinking water supply that has brought cheers among the community.

Thus User Centered Aquifer level Groundwater Management Pilot is an ideal vehicle for introducing participatory groundwater management initially in over extracted and critical areas in the state which could be extended to other areas. Technical Support Group was formed to offer technical guidance support to Ground Water Management Association (GWMA) and Gram Panchayat Level Committee (GPLC) in selection of appropriate groundwater recharge structures and preparing Ground water Management Action Plan including self regulations for controlling groundwater extraction and O&M of the physical works by the community.

A systematic assessment of experience of User Centered Aquifer Level Groundwater Management Pilot in Jalna district has brought to focus a number of lessons that are valuable while formulating new participatory groundwater management initiatives in other areas in the State. Community mobilization, enabling institutional arrangement, capacity building approach and participatory management strategies for sustainable groundwater development are the main areas of innovative pilot. The success story of the project encouraged us to apply this type of Project to implement for better future for the sustainable development of Ground Water In Over Exploited or water stress areas in other dirstircts.

PURPOSE & PRIORITIES OF THE PROJECT :

- The clients for the present project are the stakeholders from the area in Bhokardan and Badnapur talukas of Jalna district and extends over 8 villages i.e. Talani and Lodhewadi from Badnapur Taluka and Talegaon, Pimpri, Khadgaon, Ita, Ramnagar and Latifpur from Bhokardan taluka covering total area of the aquifer is 5674.74 hectares.
- The goals for the satisfaction of client are as follows:
  1. Mobilize the stakeholders and create awareness about the prevailing groundwater situation in the aquifer.
  2. Capacity building of the stakeholders to take up responsibility of groundwater management.
  3. Make the farmers vigilant about groundwater dynamics and consequences of over-extraction and ensure self regulation for appropriate remedial measures through Information, Education and Communication (IEC).
  4. Promote crop water budgeting as a tool to empower farmers for deciding appropriate crop system matching with the available groundwater recharge.
  5. Institutionalize participatory management of groundwater for dealing with issues related to sustainable management.
  6. Organize the Stakeholders and community members into GPLC at village level and GWMA at aquifer level and train them to monitor rainfall, groundwater levels and groundwater use for different purposes.
  7. Empower the community for financial management of funds in most transparent manner as also for operation and maintenance of the groundwater recharge structures in the aquifer.

With above objectives under MWSIP for User Centered Aquifer Level Groundwater Management Aquifer was selected in Jalna District.

- **Implementation Methodology**
  - **Selection of Aquifer**

User Centred Aquifer Level Groundwater Management Pilot, was selected based on the following criteria.

a. Groundwater situation in the aquifer has reached a critical stage of development as has been manifested by the progressive decline of water level and reduced agricultural productivity in the area.
b. The pilot aquifer selected represents regional hydro-geological, agro- climatic and economic conditions prevailing in the region.

The area of the aquifer is large enough for detail study on management activities while not being so large that the number of villages covered makes the management infeasible.

DATE OF IMPLEMENTATION OF THE PROJECT

The project initiated in the year 2005 when the stakeholders of the pilot area approached the officers regarding the permission for digging the more number of wells. The officers denied the permission considering the over-exploitation of the groundwater from the watershed area. People then approached GSDA and asked the solution for the situation. GSDA with the peoples participation studied the properties of aquifer and worked on the water budgeting, capacity of aquifer and use of

groundwater by stakeholders. The aquifer management studies were carried out by actual participation of the stakeholders and success is achieved.

STRATEGIES ADOPTED FOR BRINGING ABOUT THE TRANSFORMATION AND POSITIVE IMPACT

❖ **Baseline Survey for Resource Inventory**

Baseline survey have been conducted for resource mapping in the pilot aquifer which included collecting hydro-geological and agricultural information based on 100% well inventory. Besides, social assessment of the aquifer area has been conducted by engaging a consultant. Participatory Rural Appraisal (PRA) techniques have been adopted for resource inventory with related indicators.

ROLE OF VARIOUS STAKEHOLDERS – MOST IMPORTANTLY, ROLE AND DETAILS OF INVOLVEMENT OF THE NOMINEE(S) IN THE INITIATIVE:

➢ During the first three years of the project implementation, the activities concentrated for creating awareness among the community about the current problem and the project objective to improve the water situation in the aquifer through participatory approach. To facilitate organizing the community and to build the capacity and empower them to plan, implement and manage groundwater sources as also to enable the community to operate and maintain groundwater recharge structure through a participatory process of informed decision making and collective action

The nominee and 8 village animators had worked with the community and created awareness about the project. This has been achieved through various communication strategies.

➢ **Organizational Arrangement**

❖ **Constitution of Gram Panchayat Level Committee**

The local community in each village has been organized into Gram Panchayat Level Committee (GPLC) having village level representation. GPLC in all 8 villages have been constituted and registered under the Society Registration Act.

❖ **Formation of Ground Water Management Association (GWMA)**

After the formation of GPLC and election of executive members, all the GPLC in the pilot aquifer have been federated into Ground Water Management Association (GWMA) at the aquifer level. GWMA is an apex body for the aquifer and has a supervisory role for equitable utilization of groundwater recharge and over viewing of the activities of GPLC and controlling the actions that are detrimental to the sustainable development and management of groundwater within the aquifer.

The byelaws of GWMA prepared and have been approved by GWMA in its meeting held during December, 2007. GWMA for pilot aquifer in Jalna has been registered under the Society Registration Act on January 28, 2008. The members of GWMA elected 16 members of Executive Committee including President, Vice President, Secretary, Treasurer and 12 Office bearers.

MEMORANDUM OF UNDERSTANDING ON ROLE AND RESPONSIBILITIES OF GPLC / GWMA:

User Centered Aquifer Level Ground Water Management Pilot has facilitated the participation of GWMA and GPLC and the community in the process of equitable

allocation of available groundwater among different users based on rainfall and groundwater recharge. With this premise, the Pilot Team Leader and GWMA, GPLC have executed a memorandum of understanding to understand the role and responsibilities of respective parties for groundwater management

❖ **Technical Support Group**

User Centered Aquifer Level Ground Water Management Pilot is an intervention for empowering the community for sustainable groundwater management.For implementation of project a team of multi disciplinary professionals from Water Resources, Agriculture, Hydrology, Social Welfare, Co-operative, Water Conservation Departments of Govt. of Maharashtra has been constituted as a Technical Support Group (TSG) to help GWMA and GPLC.

The members of Technical Support Group have assisted GWMA-GPLC in assessing the need for augmenting groundwater recharge and have facilitated selection of appropriate type and location of groundwater recharge structure proposed by the community. TSG have ensured that the design and cost of structures prepared by the community are technically correct and guided the community during execution of groundwater recharge activities.

HIGHLIGHTS/POSITIVE FEATURES OF THE INITIATIVE UNDER EACH OF THE FOLLOWING IMPORTANT DIMENSIONS:

❖ **Transparency and stakeholder participation**

GPLC and GWMA have been enabled to deliberate on the current groundwater situation in the aquifer and have adopted appropriate interventions to improve groundwater efficiency, reduce groundwater extraction and arrest declining of water levels. Operational guidelines have been prepared by GSDA and provided to GWMA-GPLC for smooth implementation of the project activities by the stakeholders and other agencies. The operational guidelines have laid down the procedure for the selection of groundwater recharge structure, execution of the same by community, collection of the community contribution, procurement of material, flow of funds, financial management by the community, bookkeeping and maintaining records of all financial transactions including community contribution and payment labours and material. GPLC have maintained the records of business and transactions in the register provided by GSDA which have been verified by the competent authority from GSDA.

❖ **Innovativeness of the Project and its replicability**

➢ A systematic assessment of experience of User Centered Aquifer Level Groundwater Management Pilot in Jalna district has brought to focus a number of lessons that are valuable while formulating new participatory groundwater management project in other areas in the State. Community mobilization, enabling institutional arrangement, capacity building approach and participatory management strategies for sustainable groundwater development are the main areas of innovative pilot. And there is a paradigm shift from watershed development concept to aquifer.

➢ The groundwater recharge structures are intended to increase recharge in the aquifer and thereby increase groundwater resource. Based on the findings of the Baseline surveys conducted by senior Geologist GSDA, GPLC identified the number and type of groundwater recharge structures proposed for increasing groundwater resource.

The groundwater recharge structures proposed by GPLC was discussed in Gram Sabha and finalized through consultative process. PTL had facilitate GPLC and GWMA on the technical feasibility of each of the proposed structure. The criteria for identification and selection of groundwater recharge structures include a) in meets the objectives of the pilot project, b) only community works would be considered, c) no activity that benefits individual member/individual land singularly shall be considered.

- The approach was something that other people/organisations had used but which was completely new to our organisation.
- The various communication media and tools used by the PTL for mobilizing the community and creating awareness for participatory management in the aquifer are given below:

Communication Media and Tools used		
Sr. No.	**Communication Media**	**Communication Tool**
1	Local community in the village	Local Folk songs and acts.
2	Print media	Pamphlets, Banners, Posters, Newsletters
3	Social Display	Wall paintings
4	Facilitators	Meetings and Workshops

Besides, 8 training programmes and two workshops were conducted by Gplc And Gwma with support from GSDA,

Increased efficiency of outputs/processes and effectiveness of outcomes

- The reduction in groundwater extraction has been possible through motivating the farmers to realize that the groundwater resources need to be shared among all stakeholders and required crop diversification by selecting such crops for which the total crop water requirement is within the available groundwater recharge without loss of farm income to the farmers.
- **Saving in Groundwater Utilization**

The statistical data collected for the aquifer area shows that the cultivated area during Rabi has increased from 2655 hectare during 2005 to 3159 hectare during 2009. However the estimation of groundwater extraction for agriculture use has revealed that the groundwater withdrawal for agriculture has reduced from **542.31** ham during 2005 to **330.49** ham during 2011. Thus despite increase in the cultivated area during Rabi the groundwater extraction reduced between 2005 and 2011. Simultaneously, the net increase in groundwater recharge from the 29 structures completed by the community has been estimated at 4.35 ham which increases to 5.90 ham.

❖ **Display of leadership / Team work by the nominee(s)**

- Right from the beginning, converging the social and technical elements dominated the process of implementation of User's Centered Aquifer level Groundwater Management Pilot. Firstly the communities were organized into GPLC and GWMA adopting PRA process and involving the community in the decision making process at Gram Sabha. All groundwater stakeholders were involved in the project implementation process at every stage.

➢ The User Centered Aquifer Level Groundwater Management Pilot approach viewed from the present context has been a transition towards sustainable groundwater management by the community and it had created a strong ground for GWMA and GPLC to implement project activities. This aspect is important for replication of the experiences under the pilot in other areas in the State.

❖ **Sustainability of the Project**

➢ For the first time in the concept of aquifer as a unit for has been introduced under groundwater management under user centered Aquifer level Groundwater Management Pilot. The farmers realized the advantages of aquifer management strategies instead of adopting water as a unit for groundwater management .

➢ The stakeholder accepted the paradigm shift towards sharing of groundwater among different groundwater user groups and necessity to control groundwater extraction for sustainable utilization of the resources. Water sharing for irrigation has been successfully adopted by the community by diversifying the cropping pattern and switching over to low water consuming crops. Sugarcane cultivation has been discontinued and the flow irrigation method is slowly replaced by drip and sprinkler irrigation system.

➢ This has reduced total groundwater extraction **(j) Outcomes i.e. impact/benefits resulting from the initiative, for example:**

Improvement in delivery time of services

Joint discussions between TSG and members of GWMA-GPLC about community awareness and situation specific issues have accelerated the decision making skills of GWMA-GPLC. This has helped to understand the extent of groundwater over extraction and its impact on crop productivity. The process has helped to bound all members to adopt decisions taken by GWMA. During this consultative process between the members of GWMA-GPLC and TSG, some key community decisions have been taken for reducing groundwater use such as:

a. Community agreed to treat groundwater as a common natural resource.
b. Community understood that the knowledge about Groundwater recharge and crop water requirement is necessary and should be calculated before selecting suitable crop plan.
c. Each farmer has restricted the pumping operations to reduce groundwater extraction.
d. Farmers agreed to reduce and ultimately discontinue cultivation of sugarcane in the area.
e. Large and medium farmers agreed to adopt drip and sprinkler irrigation for cotton, wheat, vegetable and horticulture crops cultivated in the area.
f. GWMA has decided to prohibit construction of new irrigation wells.
g. The community has agreed to adhere to the decisions of GWMA and GPLC.

Accordingly, GWMA in consultation with GPLC have decided to diversify the crops and switch over to low water consuming crops. GWMA has resolved to adopt following practices.

1. Discontinue cultivation of sugarcane.
2. Increase the area under drip irrigation for cotton crops.
3. Partly replace the area under wheat by Mustard.
4. Encourage increase in the area under horticulture with drip.

As result of the demand control measure adopted by GWMA there has been a significant change in the crop pattern during Kharif, Rabi and Hot weathered season between 2005 and 2009. (Table 4).

Table 4 - Transition in Cropping Pattern between 2005 and 2009 in the aquifer area

Season	Crop	Area under crop in Hectare				
Year		2005-06	2006-07	2007-08	2008-09	2009-10
Kharif	Maize	513	513	818	820	1108
	Bajra	465	465	360	340	126
	Pulses	278	278	160	150	134
	Cotton (Two seasons)	1596	1592	1595	1600* (200 Hectares under drip)	1605* (200 Hectares under drip)
	Soyabin	0	0	30	50	87
Rabi	Jawar	689	689	705	698	506
	Wheat	264	264	308	560	560 (100 hectares under sprinkler)
	Vegetable	18	18	40	50	55
	Mustered	0	0	0	0	350
Perennial	Sugarcane	51	51	0	0	0
	Horticulture crop	14	14	30	30	33

Note: * The plant spacing for drip irrigation for cotton has been changed from 1 x 1 meter to 1.6 x 0.3 meter since 2008. This has reduced the water requirement of crops and has increased crop yield from 20 quintals per hectare to 30 quintals per hectare.

Better beneficiary's feedback

✓ The User Centered Aquifer Level Groundwater Management Pilot approach viewed from the present perspective has been a conversion towards sustainable groundwater management by the community and it had created a strong ground for GWMA and GPLC to implement project activities. This aspect is important for replication of the experiences under the pilot in other areas in the State.

Improvement in measurable indicators

- We systematically measured the client satisfaction results of the initiative using indicators established in the approach.
- The systematic and planned monitoring of the scheme lead to the quantitative and qualitative results for improved client satisfaction and they show the improved positive trends as compared with the baseline data.
- Prior to implantation of User Centered Aquifer Level Groundwater management Pilot most of the villages were depending upon tanker water supply for drinking water during May- June. After the demand control measures adopted by the community during 2008-09., the demand for tanker water supply has reduced except for 3 villages in aquifer. This has assured safe and sufficient drinking water supply that has brought cheers among the community.

Thus User Centered Aquifer level Groundwater Management Pilot is an ideal vehicle for introducing participatory groundwater management initially in over extracted and critical areas in the state which could be extended to other areas.

Simplified procedures

- ✓ The client satisfaction arrangements are found to be better in this initiative.
- ✓ The results obtained from this particular approach are used as indicators in the review because of better improvement.
- ✓ A systematic assessment of experience of User Centred Aquifer Level Groundwater Management Pilot in Jalna district has brought to focus a number of lessons that are valuable while formulating new participatory groundwater management project in other areas in the State. Community mobilization, enabling institutional arrangement, capacity building approach and participatory management strategies for sustainable groundwater development are the main areas of innovative pilot.

Key result Areas:

1) Drinking water scarcity in pilot area is under control .

2) Stakeholders themselves have started collecting technical data like rainfall and static waterlevel on the basis of water accounting they decide cropping pattern each year.

3) There is change in status of watershed from critical to safe .The % of development changed from 93.17% to 77.70 %

4) The earlier SWL premonsoon and postmonsoon waterlevel trend was declining now shows rising trend. In case of observation well premonsoon SWL in March 2007 is7.20m. and may 2010 – 6.10m while postmonsoon SWL for Oct2007 was 2.85m and in 2010 – 1.45m

5) Stakeholders following self regulations as follows

   i)Community agreed to treat groundwater as a common natural resource

   ii) Drilling of borewell for irrigation banned

   iii) Discontinue cultivation of sugarcane which was 51 Ha in 2007 became nil in 2010

   iv) Encouraging horticulture area which has been increased from 14ha in 2007 to 33ha in 2010

   v) Promoting low water consuming crops due to which there is water saving of 11.79ham

   vi) Total area of cultivation of Maize, Cotton, Soyabean, Wheat, Mustard, Horticulture increased while Bajra, Pulses and Jowar decreased

6) Usage of microirrigation started on 300 ha area of land for crops like Cotton, Wheat and Vegetables. Hence reduced groundwater extraction by 12 to 15 %

7) Net increase in recharge by construction of 29 structures has been estimated as 5.90ham

8) New institutional set up of " Girja bhujal vyavsthapan sangh" established which is looking after groundwater management and O&M of structures

9) Stakeholders and members of GPLC have prepared groundwater management action plan (GWMAP)

10) Works completed as per operational guidelines i.e. procedures laid down

11) GPLC and GWMA following bookkeeping of financial records

I) KEY PERFORMANCE INDICATORS

Sr. No.	Indicator	Pre project indicators' / observations	Post project indicators/Result
01	Drinking water	In all eight villages there was drinking water scarcity from the month of January and villages like Talni, Lodhewadi, Talegaon, Khadgaon, Latifpur were tankerfed	From year 2007 drinking water scarcity is under control and villages become tankerfree
02	Static Groundwater level (Observation well Latifpur)	2007 Pre monsoon water level- Declining (-0.019193) Post monsoon water level trend- Declining (-0.003730)	2010-11 Declining-(-0.000400) Rising-(+0.003646)
02	Groundwater Assessment	Year 2007 Annual Groundwater recharge 510.01 ham Net annual Groundwater availability 484.51 Annual Gross groundwater withdrawal 451.44 Groundwater balance 17.23 Stages of Development 93.17% Water table trend pre monsoon Falling Water table trend post monsoon Falling Status of Watershed Critical	Year 2009-10 465.57 438.89 330.49 108.4 77.70 % Rising Rising safe
03	Water Budget	2006 - 07 Rainfall 0.934 Area in ha 5448 Available water 5088 <u>Receipt</u> Surface storage 126.00 Runoff- 865 Soil Moisture 1527 Groundwater 763 Total 3281 <u>Expenditure</u> Evaporation 1934 Drinking water 18	2010 -11 0.657 5448 3579 126 482.49 1073.80 536.90 2219.19 1360.15 17.78 2093.57

		Irrigation 2388 Total 2406 Balance 10 ham (Surface runoff as rejected recharge)	2219.19 106.52 ham
04	Cropping pattern	2007-2010 Kharip Maize 513 ha Cotton 1596 Soyabean 0 Rabbi Wheat 264 Vegatable 18 Mustard 0 Perennial Horticulture 14 Kharip Bajra 465 Pulses 278 Rabbi Jawar 689 Perenial sugarcane 51	2010 - 11 Increase in area of cultivation 1108 ha 1605 87 560 55 350 33 Decrease In area of cultivation 126 134 506 0 Nil
05	Use of Microirrigation practices	Type of crop Area under Irrigation 2007 Cotton Nil Wheat Nil	2010 200 ha under drip 100 ha under sprinkler
06	Conversion of wasteland under cultivation	In village Talni area which was not cultivated after completion of cement Bandhara, WAT and farm pond 25 Ha land came under cultivation. In village Lodhewadi 5 Ha and in village Talegaon 15 Ha land came under cultivation	In three villages at higher reaches Talni, Lodhewadi and Talegaon 45 ha land came under cultivation.
07	Groundwater quality	All 15 samples of observation wells in pilot area analysed for bacterial contamination all were contaminated by coliform, and E.coli	Sample of pre and post is bacterially safe

III) Socioeconomic Indicators

Sr. No.	Indicator	Preproject indicators' / observations	Postproject indicators/Result
1	Migration in search of work	Stakeholders use to migrate in search of work	Work has been created in village for stakeholders hence migration reduced
2	Rise in income per head	---	In village Vita, Ramnagar rise in income by 15%, in Khadgaon, Latifpur by 10% and Talegaon, Talni and Lodhewadi by 5%

✓

(A comparative analysis of the key result areas, key performance indicators and other socio-economic impact parameters, before and after the implementation of the initiative, in the form of a table, is a MUST)

5. Has the outcome or impact of the initiative been audited or evaluated by any independent agency for reality check of the realized benefits vis-à-vis those envisaged?

[√] Yes
[ ] No

(If Yes, please provide brief details thereof, in not more than 100 words)

- ✓ Prior to scion of User Centred Aquifer Level Groundwater management Pilot most of the villages were depending upon tanker water supply for drinking water during May-June.
- ✓ After the demand control measures adopted by the community during 2008-09., the demand for tanker water supply has reduced in the aquifer.
- ✓ This has assured safe and sufficient drinking water supply that has brought ovation among the community.
- ✓ Thus User Centred Aquifer level Groundwater Management Pilot is an ideal vehicle for introducing participatory groundwater management initially in over extracted and critical areas in the state which could be extended to other areas.

Members of GWMA and GPLC have informed about calculation of groundwater recharge from rainfall and requirement for drinking and agriculture use. This exercise need to be continued and carried forward to enable the community to calculate groundwater recharge and allocation of groundwater for drinking and agriculture. GSDA has prepared guidelines in local language for calculating groundwater recharge and estimating groundwater withdrawal. These are provided to the community. However it is necessary to organize training program for GWMA - GPLC and train them in the calculation of groundwater recharge every year.

As it is the joint venture of the state GSDA, GWMA, GPLC, NGO and local villagers, the outcome or impact of the initiative has been audited or evaluated by all of them in tune with the better results.