

Securing Rainfed Crops and Livelihoods: Water Resource Management for Extensive Protective Irrigation under IJP Proposal for Groundwater Collectivisation in IJP Blocks in Doulatabad Mandal, Mahabubnagar District

Indira JalaPrabha has taken up irrigation development for SC/ ST farmers at a large scale as a sequel to the Comprehensive Land Development Program (CLDP). Digging of Borewells is taken up for provision of irrigation at the rate of about one per 10 acres.

Without proper measures, it is commonly experienced that the life of borewells is limited and it is only a matter of time by when the extraction of groundwater from these aquifers proliferates making the borwells dry. Such an eventuality will waste all the precious public investments on irrigation in IJP.

The present proposal is to bring in the concept of “**collectivisation of groundwater for secure rainfed crops**” to avoid the above eventualities.

WASSAN’s proposal for the concept of “Collectivisation of Groundwater” has emerged from the AP DAI program jointly supported by the Rural Development Department and the World Bank. The lessons from this successful experience of APDAI program works out well for making the IJP more effective and sustainable.

The concept includes the following elements:

INVESTMETNTS

- a) to take a larger area of about 50 to 75 acres (usually the entire patch of the assigned / SC/ST lands) and pool all the existing borewells and the new ones proposed into a common grid of pipe lines so that irrigation can be provided for all lands through outlets.
- b) An assessment of sustainable water yields of the borewells will be made before designing the system and irrigation planning will be made accordingly.
- c) Micro-irrigation systems (mostly sprinklers) are used at the each outlet for irrigation.
- d) Each block will have a compost pit with biomass trees around to produce quality compost required for that block.
- e) The farmers will be organised into a collective (smaller outlet groups and the groups federated at the system level) – for maintenance of the system, irrigation scheduling, collection of member fees, user charges etc. for maintenance of the system.
- f) The private borewells existing in the block shall also be integrated into the system.
- g) Appropriate groundwater monitoring tools will be installed and the farmer groups trained on collecting and using the data.

- h) Crop planning (including securing seed etc.), crop management trainings be imparted.
- i) Efforts organising and strengthening farmers' groups to perform various functions.

CONDITIONALITIES:

- a) Agreement on no new private borewells in that area at least for 10 years; if any new borewells come they must be integrated into the system
- b) Only rainfed crops be taken up during kharif season – no irrigated crops like paddy and no water intensive ID crops. – this is in tune with making protective irrigation available for the larger patch of land.
- c) Maintenance of the system is taken up by the Committee constituted from the groups
- d) Annual contribution of the members for maintenance

The detailed process steps are in the Annexure.

The main theme is to encourage and support for rainfed crops in kharif on a larger area as the main crop system and support that with irrigation rather than growing paddy or irrigated dry crops in smaller area. This way the crop systems will be secure against any failure of rainfall and consumption (and extraction from groundwater) drastically reduced to keep it in sustainable extraction limits.

The program “Securing Rainfed Crops” has evolved in this context. The purpose is to make investments comprehensively in water resources development and its sustainable use for primarily securing crops, livestock and livelihoods of farmers in rainfed areas. As several studies have shown, supportive/ protective irrigation will also increase productivity by about 30 per cent in addition to substantially reducing the frequency of crop failures.

At the same time, increasing water use efficiency through improved methods of soil moisture management (harvesting and storing rainfall in the soil profile) and using micro irrigation methods.

Access to protective irrigation protects the farmers from the following vulnerabilities:

S.NO.	Type of Disturbance	Consequence
1	Delay in onset	<ul style="list-style-type: none"> • Late sowing • Changes in crops (contingency crops)
2	Disturbance during early period - Dry spells -	<ul style="list-style-type: none"> • Loss of crop and need for repeat sowing
3	Dry spells during vegetative period	<ul style="list-style-type: none"> • Loss in productivity
4	Dry spells during flowering stage	<ul style="list-style-type: none"> • Serious loss in productivity

Depending on the span of drought spell, the crop losses may range from moderate to total failure. These failures result into loss of investment making farmer indebted and also, causes substantial decline in productivity. Failures in early stages might also increase the investments as farmers have to re-sow the crop. Crop losses often results into acute fodder scarcity affecting the livestock sector.

The program strategy essentially addresses these problem arising out of Climate Change.

THE PROPOSAL:

WASSAN proposes to work intensively in the Daulatabad Mandal of Mahabubnagar district on a saturation basis grounding the groundwater collectivisation concept in all the 12 IJP blocks identified in the Mandal (Table 1). It covers 235 households and 568 acres. The Table also gives the year-wise break up.

Table 2 provides the Budget Summary while Table 3 provides detailed budgets.

EXPECTED OUTPUTS:

The program results into the following outputs:

1. The 12 IJP blocks taken up under this program will be completed in 3 years time. The area of the SC/ STs adjoining these blocks shall also be included.
2. Intensively trained human resources in the form of Community Based Resource Persons on groundwater collectivisation shall be available for further scaling up.
3. Each IJP block will have :
 - a. Farmers organised into groups (bassed on irrigation outlets) and federated into a larger Ground Water Collectivisation group at the unit (Block) level.
 - b. Maintenance systems of the borewell network are in place with clearly demarcated responsibilities among the consumers.
 - c. The groups will work learn crop planning and work out mechanisms of irrigation scheduling

All the plots in the area shall have:

- d. All the outlets shall have micro irrigation systems for irrigation.
- e. All the sub-plots under the out lets shall have manure preparation pits with biomass and constant addition of organic matter to improve soils productive capacity.
- f. Field level demonstration within all the blocks on comprehensive and integrated water management : from soil moisture, water harvesting to using groundwater.

4. The IJP blocks will be reasonably secure against short and medium term drought spells and other aberrations of rainfall.
5. The income of the participating farmers in the IJP blocks shall enhance by about 20%
6. Taking IJP an opportunity; substantial impact can be created within the Mandal with 12 groundwater collectivisation blocks operational. This will stimulate other borewell owners to look at the possibilities of collectivisation.
7. All the necessary modalities for scaling up shall be established with preparation of required human resources.

TIME FRAME:

The program will be completed in five years. Table 1 and the budget Tables provide the yearly break up of the target achievements.

CONVERGENCE

In addition to what has been proposed, WASSAN will converge various other initiatives from the line departments of agriculture and horticulture with the program. Farmers will be mobilised to take up farm ponds, silt application, and other measures in using the MGNREGS.

Table 1 :IJP Blocks proposed for Groundwater Collectivisation in Doulatabad Mandal, Mahabubnagar district

Sl.no.	Gram Panchayat	Block	SC beneficiaries		ST beneficiaries		Other beneficiaries		Total		Year wise Area Break up		
			Nos	Area in acres	Nos	Area in acres	Nos	Area in acres	Nos	Area in acres	1st year	2nd year	3rd year
1	Anthwar	MadigaKunta	10	34.85					10	34.85	34.85		
2	Anthwar	YerramannuChenu	10	33.6					10	33.60	33.60		
3	Challapur	Kummarikunta	34	67.11	0	0	0	0	34	67.11	67.11		
4	Devarfaslwad	Adivichelka	38	71.73	7	9.81	0	0	45	81.54		81.54	
5	Doultabad	BuddelliKunta	7	22.1	0	0	0	0	7	22.10		22.10	
6	Gundepally	KarollaChelka	9	21.03	0	0	0	0	9	21.03		21.03	
7	Matur	Gondeli	6	26.85	0	0	0	0	6	26.85		26.85	
8	Matur	Korthigutta	20	44.45	0	0	0	0	20	44.45		44.45	
9	Matur	Malallachenu	13	22.46	0	0	0	0	13	22.46		22.46	
10	Thimmareddy Pally	Chittivonikunta	55	116.4	0	0	0	0	55	116.40	116.40		
11	Thimmareddy Pally	BheemlaNaikThanda	1	1	13	48.89	0	0	14	49.89	49.89		
12	Thimmareddy Pally	Bangla Thand	0	0	12	48.16	0	0	12	48.16		48.16	
	Total		203	461.6	32	106.9	0	0	235	568.44	301.85	266.59	0

Table 2 : Detailed Budget

S.NO	Component	Size of the unit	Unit cost (Rs)	1st yr	2nd yr	3rd yr	Total budget	Source of Budget	
								IJP	MGNREGS
	Total No of GPs			3	3	6			
	Total Area proposed year wise	Acre		301.85	266.59		568		
A	Site identification & Community mobilization	Acre	300	90555	79977	0	170532	170532	0
B	Bore wellpooling net work								
i	PVC water pooling pipe line net work including material and installation charges	Acre	14280	4310418	3806905.2	0	8117323	8117323.2	0
ii	Civil work (Pipe line trenching supplying and refilling of trench)	Acre	11729	3540499	3126923	0	6667422	0	6667422
C	Water use efficiency improvement * Micro sprinklers one set per 5 acre area	Acre	3000	905550	799770	0	1705320	0	0

D	Installation of Ground water monitoring systems	Acre	600	181110	159954	0	341064	341064	
E	Soil fertility enhancement through compsting - upto III years	Acre	12252	3698396.599	3266375.847	0	6964772	0	6964772
	Bundplantation upto III years	Acre	20087	6063110.025	3266375.847	0	9329485.872	0	9329485.872
	Program Sub total	Acre	62248	18789639	14506281	0	33295920	8628919	22961681
F	Field level program facilitation costs **								
	No of GPs			3	6	6			
F.1	Unit level facilitation costs	GP Per year	24000	72000	144000	144000	360000	360000	0
F.2	Institution and capacity building	5%	3112	939482	725314	0	1664796	1664796	
	Sub total	Acre	3562	1011482	869314	144000	2024796	2024796	0
G	Mandal level Facilitation Costs								
G.1	Facilitation costs of the organisation ##	6%	3735	1127378	870377	0	1997755	0	998878
G.2	Design & technical services	2.00%	1245	375793	290126	0	665918	665918	
	Sub Total	Acre	4686	1503171	1160502	0	2663674	665918	998878
	Grand total	Acre	70496	21304292	16536097	144000	37984389	11319634	23960558
	% of each fund source						100	30	63
	Cost per acre	Acre					66822	19914	42151
	Cost per hectare	Hectare					165051	49186	104114

Notes: ** the field level facilitation costs may be released to the local Village Organisation or be paid directly from DWMA to the field facilitators.
: the facilitation costs of 6% is only on IJP works, while it is assumed that the MGNREGS works will be facilitated by the field and technical assistants. The IJP facilitation costs are for organising and building capacities of the community, negotiating on the norms etc., over the three year period. Detailed Budget break up is in Annexure 1.

The total budget expectation from IJP is Rs.113 lakhs (Rs.19, 928 per acre) out of the total cost of the program at Rs.189.58 lakhs. Substantial resources will be mobilised for IJP work from MGNREGA and **Additionally Soil fertility and biomass intensification (45 crores) will be accessed from MGNREGS** and farmers' contribution will be mobilised and deposited in GWMC

**** Unit cost will be taken as per new CSSR as then it changes****

Table-2: Source wise Summery Budget

Sl.No	Cost of Head	Total proposed budget	Source of Budget				
			IJP	MGNREGS	APMIP	Farmers' contribution	WASSAN RRA CP
1	Program block level infrostructure facilities	33295920	8628919	22961681	1705320	0	0
2	Village level Facilitation	360000	360000	0	0	0	0
3	Mandal level facilitation (6%)	1997755	0	998878	0	0	998878
4	Institution and capacity Building (5%)	1664796	1664796	0	0	0	0
6	Design technical services	665918	665918	0	0	0	0
	Total	37984389	11319634	23960558	1705320	0	998878

Table-4: Budgets to be released

Sl.No	Cost of Head	Total Budget from IJP & MGNREGS	Budgets to be released to	
			GWMC	GwRRC of WASSAN
1	Program block level infrostructure facilities	31590600	8628919	0
2	Facilitation at the village level	360000	360000	0
3	Mandal level facilitation (6%)	998878	0	0
4	Institution and capacity Building (5%)	1664796	0	1664796
6	Design technical services	665918	0	665918
	Total	35280192	8988919	2330714

ANNXURE: 2

Groundwater Collectivisation for Protection of Rainfed Crops

Process Steps for Scaling Up in IJP

From WASSAN's Experiences

Why Rainfed Crops?

The groundwater resources are very scarce and must be used to benefit maximum number of poor and to get maximum benefits per unit of water. In the marginal lands of the poor, even if IJP can get access to groundwater, using it for irrigated crops will have limited benefits as the soils are poor and water use is intensive.

Instead, using the groundwater sourced for securing rainfed crops of the collective of poor households at the ratio of 1 borewell : 10 acres will help in stabilising livelihoods of poor and getting maximum benefits per unit of water.

Moreover, one or two support irrigations to rainfed crops during critical stages which primarily use rainwater for its growth gives about 30 to 40% increase in productivity.

Rainfed Crops & Vulnerabilities

These are the crops cultivated purely with naturally occurring rainfall. They are prone to risks of production losses or total crop loss due to failure in the distribution of rains. Two types of drought spells – short to medium and long duration are quite common sources of risks and consequent livelihood losses.

Securing Rainfed Crops

First Step:

The crops can survive shorter drought spells if much of the rainfall is harvested into soil profile (root zone) and stored in the soil profile. Organic matter content in soils is crucial for this purpose. Soil mulch or good soil cover through inter-cropping helps in reducing the soil temperature.

IJP must have a strong activities in addition of soil organic matter (bulk composting of biomass in the field), intercrops and raising biomass (gliricidia and pongamia) on bunds and boundaries.

Without this first and important initiative Groundwater Irrigation would be highly inefficient considering the kinds of soils that poor have.

Most of the shorter drought spells can be adequately managed by good soil moisture harvesting and management, including agronomic practices.

Second Step:

It is difficult to survive the longer drought spells. Availability of protective irrigation during the critical crop growing periods makes :

- Helps in timely sowing
- Secures the crop from failure
- Increases productivity
- Water can be allocated for biomass raising and composting.
- Not only the rainfed crops in IJP lands, but also, the adjoining lands of the poor can be covered.
- There can be intensive small plot high value crops like vegetables in the Rabi seasons if the rainfed farmers can strike a balance with MACTS (5 lakhs)

What is Groundwater Collectivisation?

Each successful borwell can support about 10 acres of rainfed lands for protective irrigation which is necessary only when rainfall distribution failure occurs.

Collectivising of groundwater borewells in a patch of 50 to 100 acres of rainfed lands has the following elements:

- a) A pipe-line grid is laid out along the main line into which water from all bore-wells are pooled;
- b) The pipe-line grid will have outlets each of which can cater to a specific area – this will reduce the time and labor for irrigation.
- c) Sprinkler sets are given in the collective for irrigation for each of the outlet.
- d) The irrigation system is operated by groups formed for each of the outlet and their collective management; i.e. institutional arrangements.

Why Groundwater Collectivisation?

The following are the direct benefits :

1. Rainfed crops in all the identified patch of land can be protected (in IJP patch and outside also depending on the yield of the borewell).
2. As the several borewells discharges into the pipeline grid simultaneously, the pressure in the system is higher improving efficiency in irrigation and reducing the time required.

3. Pipe lines (as against channel irrigation) and sprinklers improve irrigation efficiency by about 40%
4. Reduces labour for irrigation.
5. With compost pits and biomass trees near ever outlet – biomass required for soils can be regenerated which helps in moisture conservation.
6. Reduces risks as even if one borewell fails others in the pool can be of help.
7. Collective maintenance and better risk coverage/ distribution.

Risks Involved:

- If the norms are not well laid out and if the community is not well prepared there will be potentially high intensity of conflicts.
- Conflicts and institutional failures makes the infrastructure investments a wastage.
- Bad technical designs increases risks of failures and conflicts & also increases maintenance costs.

INSTITUTIONAL PREPARATION MUST PRECEDE GROUNDWATER COLECTIVISATION. THE PROGRAM IS NOT ABOUT PIPE-LINES – IT IS ABOUT INSTITUTION DEVELOPMENT.

This is a high risk program without institutional investments.

How to go about Groundwater Collectivisation in Indira JalaPrabha?

Process Steps:

1. Identify the successful borewells
2. Identify other borewells around and explore the possibilities of collectivisation
3. Measure and generate data on borewell discharge
4. Demarcate a patch of 50 to 100 acres based on the number of borewells / discharge
(Module 1 : Technical Assessment)
5. Identify a local facilitator anchored in the local Village Organisation
6. List the farmers in the identified patch along with the primary data on borewells, crops grown etc.
7. Participatory exercise and orient the farmers on the benefits of collectivisation for protective irrigation. Leave the idea with them. **(Module 2 : Participatory Analysis of Feasibility and Basic Orientation to farmers)**
8. Second meeting with the group – clearly state the conditionalities and the investments available in the program and the contribution expected. **(Module 3 : Orientation on Institutional Systems, Arriving at Basic Design and Mobilising farmers' contribution)**. Farmers' contribution is essential as a *proof-of acceptance* of the terms and conditionalities of borewell sharing, soil moisture management and biomass regeneration.
9. Mobilising contribution into a bank a/c of the GWMC/ Village Organisation.
10. Survey of the site with GPS and levelling instruments (where needed), preparation of maps etc.
11. Intensive training on water management, agronomic practices, measurement and monitoring of groundwater **(Module 4 : Intensive training on water management and groundwater monitoring)**
12. Establishment of observation borewells for participatory hydrological monitoring and rain gauge.
13. Third meeting with the farmers to Develop the Institutional Systems and Norms of regulation, sharing, and systems of irrigation **(Module 4: Arriving at Institutional Norms leading to preparation of an MOU to be signed by all – witnessed by MRO of the Mandal)**
14. Preparation of soil moisture conservation, biomass regeneration, composting, horticulture and bund plantation plans; also, farm ponds..all to be included into the shelf of works.
15. Technical Design and preparation of Estimates
16. Submission of the proposal to DWMA
17. Call for expression of interest & selection of suppliers (including lay out)
18. Commencement of work
19. Application for Sprinklers by the **'Outlet Groups'** & payment of contribution etc.
20. Refresher training and making them ready for take over **(Module 5: Preparation for handing-over and evolving first season plans)**
21. **Handing over**
22. **Monitoring exercises, particularly on the adherence of sharing and other norms – three times an year- for the first 2 years, including suggesting course corrections.**

WASSAN shall develop the necessary Modules listed above.

Operationalisation:

1. Identify patches and map their locations.
2. Identify the facilitating organisation – NGO or MMS
3. Identify the local facilitator within the IJP borewell pool area
4. Contract with the local organisation; each organisation deploying two persons can look after about 10 (??) IJP patches / blocks.
5. WASSAN can train these local organisations and provide technical support – both training and technical support as per the Modules listed above in the sequence – with each Module resulting into an output in the ground.

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