

ANNEXURES

Impact Assessment of Groundwater Collectivisation In Andhra Pradesh and Telangana

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The report is available in a separate document [here](#).

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Annexure I: Codebook

Parent code	Sub-codes	Explainer
Motivation	<p>Fragmented land</p> <p>Access to water resources</p> <p>Subsidised pipeline networks</p> <p>Subsidised fertiliser and seed/ sapling</p> <p>Subsidised micro-irrigation (MI) -Drip and sprinkler irrigation</p> <p>Trust on implementation agency</p>	<p>Farmers with scattered land holdings and borewells</p> <p>Water resources easily available to the farmers.</p> <p>Reduced cost of pipeline networks</p> <p>Reduced costs for agricultural inputs like fertilisers, seeds and saplings</p> <p>Discounted micro-irrigation systems, with help from related government schemes</p> <p>Confidence of farmers on the implementing agency</p>
Training and support	<p>Trainings</p> <p>Awareness</p> <p>Mobilising/meetings</p> <p>Exposure visits</p>	<p>Trainings conducted by the WASSAN team on natural farming, usage of the pipelines etc.</p> <p>Spreading awareness through self-help groups meetings and other channels</p> <p>Meetings conducted periodically with the water collectives members</p> <p>Visits to successful project villages for learning.</p>
Formation process of water collectives	<p>Land/ borewell survey</p> <p>Identifying community leaders</p>	<p>Feasibility survey or study for pipeline installation</p> <p>Identifying local leaders for guidance throughout the programme</p>

Parent code	Sub-codes	Explainer
Agreement and rules	Water sharing rules	Guidelines for equitable water distribution between the borewell-owning and non-borewell-owning farmers.
	Borewell digging rules	Rules for further digging of borewells
	Maintenance rules	Guidelines for infrastructure (example- pipes) upkeep.
	Verbal/Informal agreement	Informal community agreements amongst the farmers
	No formal/informal rules	Lack of formal or informal rules.
Monitoring systems		Structures in place to monitor users or to monitor resources
Conflict resolution mechanism		Structures in place to resolve disputes amongst the farmers.
Positive programme impacts	<ul style="list-style-type: none"> • Agriculture productivity • Irrigation area • Micro-irrigation • Income/profit • Water availability • Borewell deepening • Borewell failure • Borewell drying • Borewell digging • Crop failure • Loan/debt • Water extraction • Diversified cropping choices 	<ul style="list-style-type: none"> • Increased crop yields. • Increase in area covered by irrigation. • Adoption of drip/Sprinkler systems. • Increase in income or profits from improved practices. • Better water access. • Decrease in borewell water levels • Decrease in borewell failures • Reduction in number of borewells drying • Reduction in number of borewells being dug • Decrease in crops failing due to low water availability • Reduction of financial pressure due to debt/loans • Better water extraction practices • Wider variety of crops grown.

Parent code	Sub-codes	Explainer
Negative/No programme impact	<ul style="list-style-type: none"> • Agriculture productivity • Irrigation area • Micro irrigation • Income/profit • Water availability • Borewell deepening • Borewell failure • Borewell drying • Borewell digging • Crop failure • Loan/debt • Water extraction • Diversified cropping choices 	<ul style="list-style-type: none"> • Decreased/same crop yields. • No expansion in irrigated land. • No change in adoption of drip/sprinkler systems • No change in income/profit • No improvement in water access. • Increase in borewell levels • Increase in borewell failures • Increase in number of borewells drying • Increase in number of borewells being dug • Crops fail due to lack of water or other issues. • No reduction in financial debt or burden. • No change in water extraction • No diversification of crops.
Agreement and rules	<ul style="list-style-type: none"> • Canals • MGNREGA • Lack of awareness • Caste barriers • Financial barriers • Frequency: Never • Frequency: Often/Regular • Frequency: Rare • Reasons for meeting 	<ul style="list-style-type: none"> • Better water availability due to canal projects • Better water availability due to MGNREGA projects • People don't know about the programme. • Caste discrimination prevents participation. • Inability of farmers to afford the subsidised pipelines. • Meetings haven't been held • Meetings are held regularly (once in a week/fortnightly) • Meetings are held rarely (once in few months) • The issues discussed in meetings

Annexure II: FGD Questionnaire for Water Collectives Members

Section 1: Introduction

Focused group discussion

- Date
- Name of the facilitator
- Contact details
- District
- Block
- Gram panchayat
- Village
- Stakeholder type
- Number of stakeholders participating in the discussion

Section 2:

I	Formation and functioning of water collectives
1	What is the story of the GroundWater Collectivisation programme by WASSAN? How were your water collectives formed? What types of training and support have you received from WASSAN?
2	Why did you participate in the programme?
3	How often do you meet and what are the main topics of discussion?
5	After joining, what have been the benefits?
6	How have your farming practices changed since joining the water collectives? Such as crop patterns or types? If yes, how so, If no, explain.
II	Experiences with formal agreements and rules
7	What are the most important rules in the agreements in your water collectives?
8	Have there been disputes around the rules? How do you resolve them?
III	Water sharing
9	Why are you sharing water with non-borewell members? Do you think water extraction has changed since joining the initiative? If so, how? Anything more you want to share on water sharing?
IV	Change in productivity and crop choice
10	Have you made any changes to your cropping choices since joining? If yes, please explain. Has this impacted your production for income versus subsistence since joining the water collectives? Please explain. Have you received training that supports crop switching? Have they been helpful?

V	Change in cropping and irrigation area
11	How has the programme been able to affect your irrigation area and crop types since joining the water collectives? If yes please explain. If no, why not?
VI	Experience with borewell failures
12	What has been the impact of the initiative on risks of borewell failure since joining the water collectives? What about risks associated with cropping decisions and income?
13	Have there been other factors affecting borewell failures or groundwater availability? For example, canals, MGNREGA, land use change?
VII	Suggestions
14	Is there anything further you would like to share on water collectives programming that we didn't cover today? Any questions for us before we conclude?

Annexure III: FGD Questionnaire for Non-members of Water Collectives

Section 1: Introduction

To be administered with non members of water collectives members & control groups

- Date
- Name of the facilitator
- Contact details
- District
- Block
- Gram panchayat
- Village
- Stakeholder type
- Number of stakeholders participating in the discussion
- Number of stakeholders participating in the discussion

Section 2:

S.No	Questions
1	Have you heard about WASSAN's initiative on the groundwater collectivisation programme? If yes, why did you not participate in the programme?
2	Do you think water collectives members are benefitting from the programme? How? Why?
3	Do you think water extraction has changed after the programme? If yes, can you explain how it has changed and whether it has increased or decreased?
4	How has the programme been able to affect the water accessibility for irrigation in the region?
5	Have you observed any change in the production rates for the group members compared to non group members? If yes, please explain. If not, why do you think that is?
6	Have you changed the types of crops you grow over the last 10 years? If yes, please explain how and what motivated this change. If no, explain why not.
7	Before we conclude, are there any additional topics or points you'd like to discuss that we haven't covered today? What changes to the programme, if any, would motivate you to join a water collective in the future?

Annexure IV: Village-wise Outcome and Functionality Score Based on the Presence and Absence of Defined Components

Village	Functionality Score	Outcome Score
Pallevandlapalli	16	9
Kummaravandlapalli	16	5.5
Korrkodu	9	0
Patnam	7	3.5
Donnikota	7	3
Chellapur	7	0
Devireddy Palli	5	-1.5
Thimmapeta	5	-0.5
Edurupadu	5	0
Nagamapalli	4	-0.5
Timmareddypalli	4	0
Sirivaram	4	-3

Annexure V: Village-wise Functionality Score and Functionality Category

Village	Functionality Score	Category
Pallevandlapalli	16	Good
Kummaravandlapalli	16	Good
Korrkodu	9	Good
Patnam	7	Medium
Donnikota	7	Medium
Chellapur	7	Medium
Devireddy Palli	5	Medium
Thimmapeta	5	Medium
Edurupadu	5	Medium
Nagamapalli	4	Poor
Timmareddypalli	4	Poor
Sirivaram	4	Poor

Annexure VI: Farmers' Questionnaire

S.No	Farmer questionnaire (To be administered with water collectives and non-members of water collectives)		
	Question	Response	Cues
General			
1	Do you want to participate in the survey?	Yes/No	
2	Name of the block		
3	Name of the village		
4	Lat/long		
5	Name of the gram panchayat		
6	Name of the respondent		
7	Age	Male/Female	
8	Gender	Yes/No	
9	Caste	SC/ST/OBC/EBC/Gen	
10	Ownership		
11	Are you a member of the water collectives?	Yes/No	
Family details			
12	Name of family member		
13	Relationship		
14	Age		
15	Education status		
16	Occupation		
17	What factors made you join the Groundwater Collectivisation Programme?	To minimise operational expenses/ to irrigate farther parcels of land/ for water accessibility in Kharif season/ for taking two crops a year/others	
18	When did you join the initiative?		
19	To what extent has the initiative contributed to the increase in irrigation coverage on your farm?	Not at all, Slightly, Moderately, Significantly, Completely	

20	Has the initiative assisted you in adopting water-saving technologies?	Not at all, Slightly, Moderately, Significantly, Completely	Not at all, Slightly, Moderately, Significantly, Completely
21	What other benefits have you gained from participating in the collectivisation initiative?		
22	What concerns do you have about participating in the collectivisation initiative?		
23	Land resources		
24	What is your owned Land Holding Size (in acres)?		
25	Total uncultivable land (in acres)?		Out of total owned land holding
26	Total fallow land (in acres)?		
27	How much of the land is irrigated (in acres)?		Out of total owned land holding
28	Have you leased-in agriculture land holding (in acres)?		Out of total owned land holding
29	Have you leased-out agriculture land holding (in acres)?		Land taken in lease from others in rabi
30	How many fragments are there of your total land?		Land given in lease to others in rabi
31	Total number of functional borewells?		
32	Total number of defunct borewells?		

33	Farming details (Question 31-58 asked multiple times - once for each crop sown over the past two seasons - Kharif 2010, 2019,2023 & Rabi 2011, 2020, 2024)		
34	Crops grown		Kharif 2010,2019,2023 & Rabi 2011,2020,2024)
35	In which season	Kharif/rabi	
36	What was the cropped area (in acres) for the crops?		
37	What was the source of irrigation?	Rainfed/Groundwater-pipeline/ Canal/Both (groundwater-pipeline+canal)/Both (rainfed+groundwater-pipeline)	
38	How many times was the crop irrigated over the crop life cycle?		
39	No. of hours of pump per irrigation per irrigation		
40	What was the type of irrigation?	Flood/Drip/Sprinkler/Manual	
41	Did the borewell-owning farmer decline to provide water for irrigation after joining the water collectives? If yes, when and how many times?		Skip question for borewell-owning farmer
42	Total number of farm machinery		Only numbers
43	Total number of livestock/poultry		
44	Do you have a storage facility?	Yes/No	Only numbers category wise
45	How would you rate improvement in access to agricultural input after joining the initiative?	Scale (1 - 5)	

46	Farming expenses		
47	Crops		
48	Type of seed used	Native/Hybrid	
49	Total cost of seeds		
50	Total cost of fertilisers		
51	Total cost of pesticides?		
52	Other cost (if any)		Field preparation, Harvesting, Labour, etc
53	Total cost		
54	Production and income details		
55	Crops		
56	Total production for you (in bags/trays)		
57	What is the common yield per acre for this crop?		
58	Size of bags/trays		
59	Total production (in kgs)		
60	Self consumption (in kgs)		
61	Total sold (in kgs)		
62	Price (INR/kgs)		
63	Total income (inferred)		
64	Crops affected after joining the initiative		Kharif 2023, Rabi 2024

65	Total yield reduced (inferred Q45-Q44)		Kharif 2023, Rabi 2024
66	How many times have you faced crop loss since joining the initiative?		
67	How does this compare to the crop loss you faced before joining the initiative?		
68	What are the crops you grow in the same fragment of land? What is the benefit from it?		
69	Revenue sources		
70	What is your primary source of income?	Off farm employment/ Rentals/Livestock/ Horticulture/Business	
71	What is your secondary source of income?		For last season (2023)
72	What is your annual income from primary sources?		For last season (2023)
73	What is your annual income from secondary sources?		
74	Debt levels		
75	Has there been any change in frequency of taking debts after joining the initiative?	Yes/No	
76	Do you have any outstanding debt related to farming? If yes, how much?		
77	When did you last take out a loan for farming? What was the amount?		

78	Source of debt?	Bank, microfinance, SHG, moneylenders, Cooperative Societies, Friends/families	
79	Economic stability and security		
80	Do villagers migrate to nearby cities/towns?	Yes/No	for 2023
81	If yes, what are the reasons for migration?	Search for employment opportunities/higher studies/ better living conditions/others	
82	How has your income changed since joining the water collectives	Decreased, No Change, Increased	
83	Satisfaction with current income level	Scale (1 - 5)	
84	Main sources of financial insecurity		Use terms like money problems while asking this question
85	Frequency of financial crises in the past 5 Years		
86	Ability to save money	Yes/No	
87	Amount saved annually		E.g., Government welfare programmes, community Support
88	Access to social safety nets		E.g., Better market access, Water availability etc
89	Support needed to enhance economic stability		

Annexure VII: Borewell Inventory

S.No	Borewell inventory (to be administered with every borewell-owning farmers from the village)			
Question				
Ownership details				
1	Do you want to participate in the survey?			
2	Name of the block?			
3	Name of the village?			
4	Name of the gram panchayat?			
5	Name of the respondent?			
6	Age			
7	Gender	Male/Female		
8	Caste	SC/ST/OBC/EBC/Gen		
9	What is the name of your group?			
10	Number of borewell-owning members in the group			
11	Number of non-borewell-owning members in the group			
12	Number of women members in the group			
Borewell depth details				
13	How many borewells do you have (including failed borewells)?			
14	Depth of borewell currently (in ft)			
15	Depth of motor currently (in ft)			
16	Depth of casing (in ft)			
17	Installation year			

18	Has the borewell ever been deepened?	Yes/No
19	Year of deepening	
20	Depth of borewell (ft)	
21	Depth of motor (ft)	
22	What was the reason for deepening (yield reduction, complete drying etc)	
23	What was the cost of deepening	
24	Water level at the time of installation (in ft)	
25	Lowest water level in summer season (in ft)	
26	Current water level (in ft)	
27	How many hours of electricity do you get for agriculture?	
28	Borewell setup cost	
29	Initial drilling cost	
30	Power of your pump (in HP)?	
31	Cost of pump?	
32	Cost of casing (iron)?	
33	Cost of pipeline (numerous 20 ft pipes that go inside the borewell)	
34	Other cost (wiring, labour, equipment, electricity connection etc)	
35	Total cost	
36	Operation and management cost	
37	Electricity charge (probably monthly fixed charge)	

38	Motor repair (over past 15 years)	
39	Overland pipeline repair (over past 15 years)	
40	Other cost (wire change, etc)	
41	Total cost	
42	Water flow/yield	
43	Has the borewell ever got dry?	Yes/No
44	If yes, in which year did the borewell first go dry?	
45	How many times in the past 15 years?	
46	If the borewell has failed, in what year were you last able to use your borewell	
47	In which month does the water in the pipe start reducing generally?	
48	In which month does the water in the pipe dry up generally?	
49	Does it change if it is a good or a bad year? How?	

Annexure VIII: Classification of Water Intensive Crops

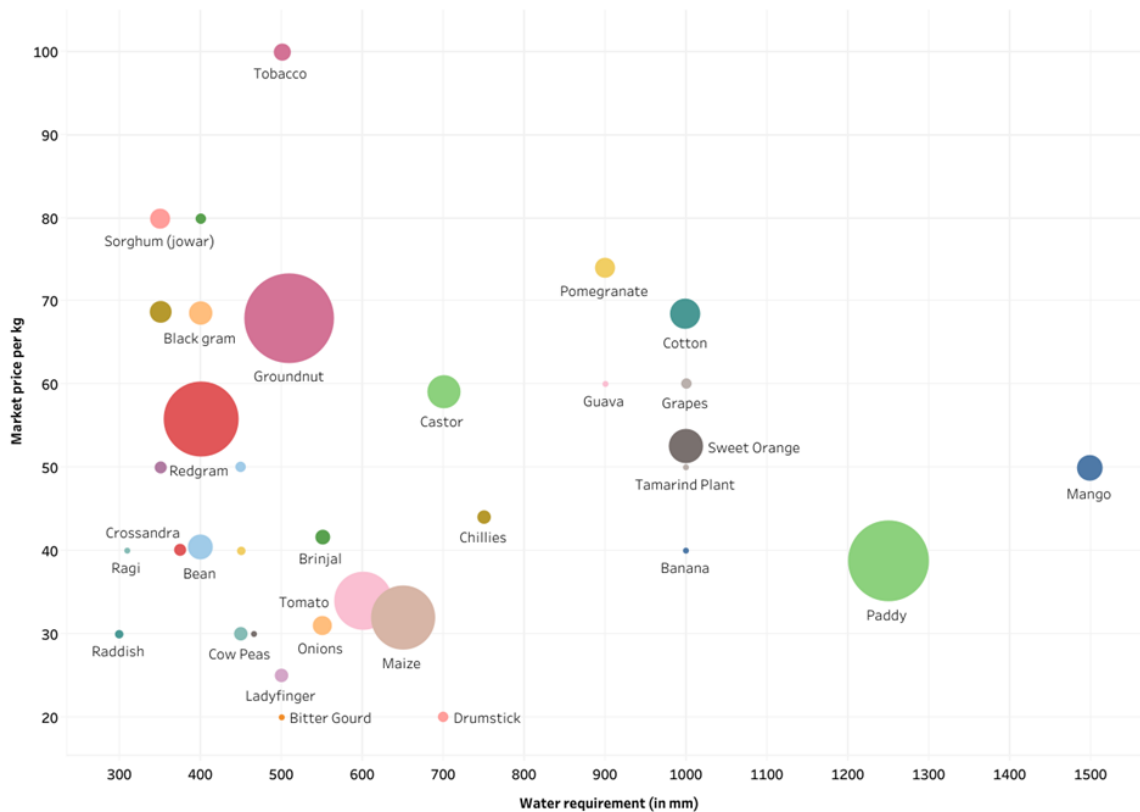
Classification	Crops
High water intensive crops (>1,200 mm per season)	Paddy, Banana, Papaya, Musk Melon, Sweetcorn, Mulberry
Medium water intensive crops (500 - 1,200 mm per season)	Mango, Tomato, Guava, Chilli, Maize, Brinjal, Curry leaves, Sweet lemon, Bittergourd, Ladies' Finger, Sweet lime (Mosambi), Groundnut, Sunflower, Chrysanthemum, Cowpea, Marigold, Broad Beans, Bean, Redgram, Crossandra, Tobacco, Cotton, Drumstick, Sweet Orange, Pomegranate, Watermelon
Low water intensive crops (<500 mm per season)	Sorghum, Pearl Millet, Horsegram, Ragi, Black Gram, Castor, Onion, Radish, Foxtail Millet, Legumes

Source : FAO, ICAR, AICRP, TNAU, Ministry of Agriculture (Govt. of India).

Annexure IX

The figure illustrates farmers' crop choice behaviour in relation to market price and crop water requirement. Each bubble represents a specific crop, with its position indicating the crop's average market price and water requirement. The size of the bubble reflects the number of farmers who selected that crop.

Crop water requirement v/s market price (Bubble Size- Frequency)



The report is available in a separate document [here](#).

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