Field Visit and Analysis Report

PoCRA Cell
IIT Bombay
20th January 2018

This is a brief report on our observations of the conduct of PoCRA project at the locations of Malkapur, Shegaon, Jalamb and Karanja in the period 3-6th January,2018.

I. Secondary and primary analysis.

1. Village Selection. The choice of villages for the project, at least in Karanja, indeed seems most appropriate. These villages are indeed some of the most blighted and backward villages with poor and highly vulnerable agriculture. The problems seem to be multiple – poor land management including highly degraded forest lands, inadequate water conservation works, inefficient and inadequate use of surface water sources, encroachment by wild animals.

2. Land Use. As per the crop-sowing data obtained from concerned TAOs, we have the following table.

Table 1: Village Land Use data (NA where empty)

Village, Taluka	Population	Total Area (Ha.)	Agricultural Area (Ha.)	Non-agricultural degraded lands (Ha.)	Kharif sown (2017-18) (Ha.)	Rabi sown (2017-18) (Ha.)
Wadhvi, Karanja	1400	660	479	181	479	12
Wai, Karanja*	1585	1261	964	114	964	114
Lohara, Karanja	2224	672	605	67	584	12
Kinkhed, Karanja	1155	385	375	10	375	15
Deochandi, Karanja		297	216	81	216	5
Isafpur, Karanja		129	116	13	116	6
Mandawa, Karanja		416	279	137	269	6
Kisan Nagar, Karanja						

*Data for Wai is based on 2016-17 Jal Yukta Shivar report

This table shows considerable non-agricultural land in Wadhvi, Wai, Mandwa and Deochandi villages.

3. Water Budget. The gross water budgets from our CTARA-V1 model [1] run for the two major Kharif crops soyabean and tur (on untreated lands) and years 2015, 2016 and 2017 is in the table below. It shows that, in the given conditions, some land-use types have significant groundwater recharge. Whence, non-agricultural land can be an important contributor to overall water security.

Table 2 Water balance for main kharif crops

Village, Taluka	Year	Crop/LU	Rainfall (mm)	Runoff in Monsoon (mm)	Soil Moisture Crop end (mm)	GW Recharge in Monsoon (mm)	AET Crop End (mm)	PET Crop End (mm)	Crop duration Deficit(PET-AET) (mm)
Wadhvi, Karanja	2015	soyabean	552	237	26	12	277	460	183
		scrub open	552	244	1	12	295	541	
		scrub forest	552	156	1	62	332	667	
		deciduous open	552	153	1	30	339	667	
		overall	552	234	24	13	280	460	
Wadhvi, Karanja	2016	soyabean	929	459	59	41	358	463	105
		scrub open	929	506	1	37	385	544	
		scrub forest	929	412	1	100	415	670	
		deciduous open	929	464	1	46	418	670	
		overall	929	459	54	43	361	463	
Wadhvi, Karanja	2017	soyabean	473	130	55	11	277	452	176
		scrub open	473	130	1	10	332	529	
		scrub forest	473	85	1	40	347	655	
		deciduous open	473	100	1	21	351	655	
		overall	473	128	51	12	282	452	
Wadhvi, Karanja	2015	Tur	552	247	2	13	291	644	354
		scrub open	552	244	1	12	295	541	
		scrub forest	552	156	1	62	332	667	
		deciduous open	552	153	1	30	339	667	
		overall	552	242	2	15	293	644	
Wadhvi, Karanja	2016	Tur	929	476	3	26	425	645	220
		scrub open	929	506	1	37	385	544	
		scrub forest	929	412	1	100	415	670	
		deciduous	929	464	1	46	418	670	

Village, Taluka	Year	Crop/LU	Rainfall (mm)	Runoff in Monsoon (mm)	Soil Moisture Crop end (mm)	GW Recharge in Monsoon (mm)	AET Crop End (mm)	PET Crop End (mm)	Crop duration Deficit(PET-AET) (mm)
		open							
		overall	929	475	2	28	423	645	
Wadhvi, Karanja	2017	Tur	473	144	2	9	319	639	321
		scrub open	473	130	1	10	332	529	
		scrub forest	473	85	1	40	347	655	
		deciduous open	473	100	1	21	351	655	
		overall	473	141	2	10	321	639	

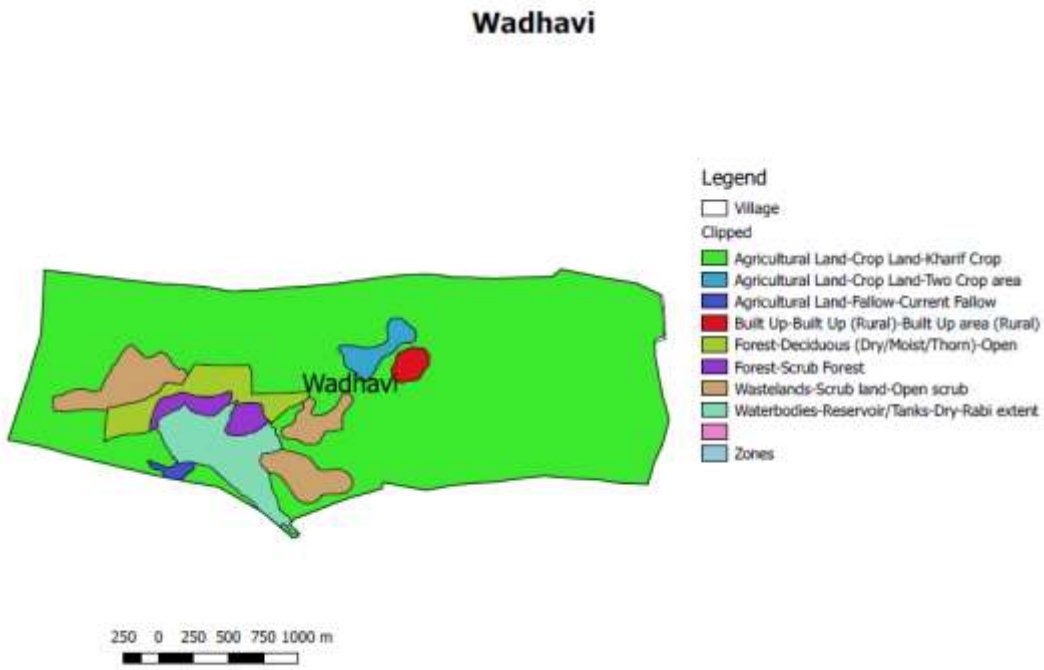
4. Poor yields. From the above table, and even assuming an error of +/- 25%, it is clear that there is major Kharif crop stress (2-3 additional waterings for soyabean and 5-6 additional waterings for Tur), and a need for extra waterings during Kharif. Our data for other locations in Sinnar and Hingoli suggests loss in yields of over 50% due to unavailability of water for Kharif protective irrigation (KPI) during critical crop stages. Our own informal interviews with farmers in Wadhvi indicated crop yields at around 50% of typical achievable yields for the area.

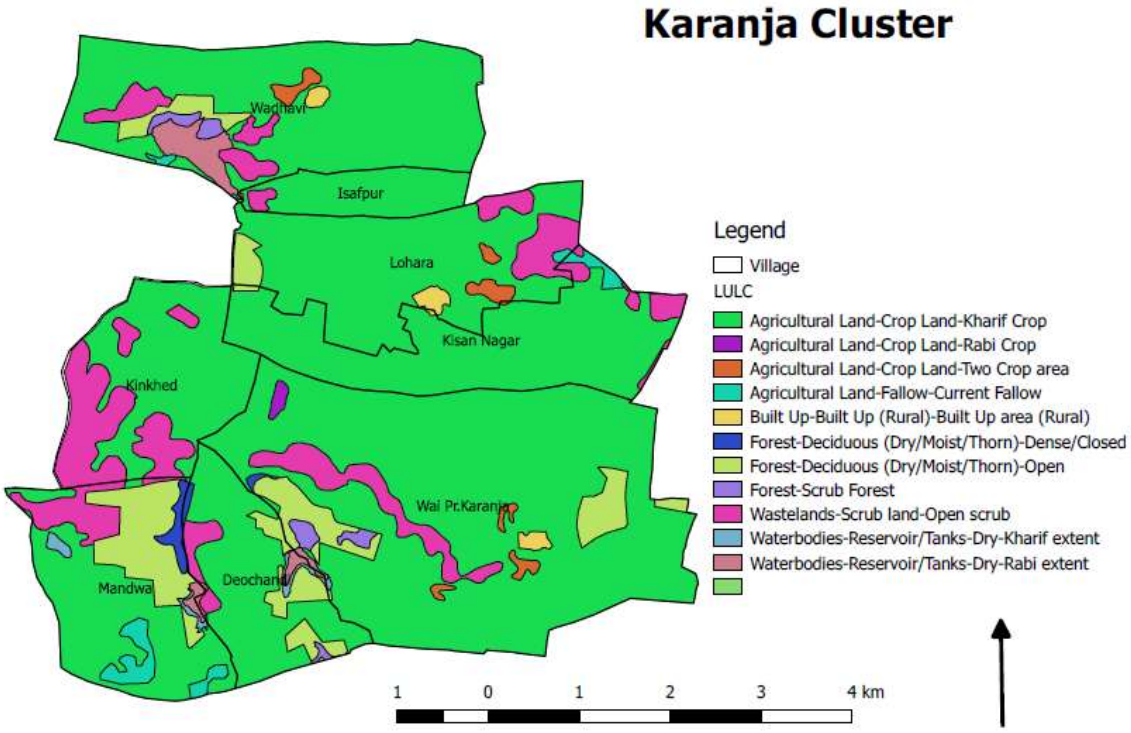
There are various factors contributing to water availability at the farm level during Kharif. These include land use and area treatments, soil type and depth, proximity to surface water sources such as percolation tanks, ponds, CNBs and availability of water in these, ground water recharge and the means to access groundwater through wells/borewells It is this data that would enable farm level intervention planning for water availability (suggesting dug wells, compartment bunding, farm ponds etc.) and cropping pattern (annual/perennial crops).

Our process has recommended such interviews across various zones in the village so that the correct diagnosis is made and an appropriate intervention suggested.

5. Better management of non-agricultural land. Non-agricultural land is an important water asset for any community for it is through better management that GW may be recharged, stream flows protected and overall moisture conditions improved. Table 2 shows the ground water recharge through treated non-agricultural land is much higher than through agricultural lands. There is substantial potential to increase this recharge through area treatment in these lands.

During our visit to Wadhavi, we found that the land use was broadly as indicated in the table. There were large stretches of highly degraded forest and non-agricultural land with negligible land management work done, resulting in low ground water recharge as well as unavailability of water for protective irrigation. This was validated through interaction with farmers.





6. Very little storage. Based on the asset survey data available to us for the following villages, we see that the water stored through existing interventions is a small part of the water needed for KPI. Define the water application index as (AET+Storage Water)/PET, i.e., the maximum possible water which may be applied to a kharif crop. As a result of low storage capacities, the water application %-age is poor with a deficit of around 35%. Thus, there is a need to examine all possible means of increasing storage in the area. This could be through area treatment, drain-line treatment and finding

locations for small storage reservoirs.

Table 3Water Application Index (NA where empty)

Village,	Rainfall (mm)	Crop	PET (mm)	Deficit (mm)	Run-off (mm)	Storage in Drain-line (mm)	Storage in Area treatment (mm)	Storage in Farm Pond	Water Application Index.
Wadhvi, Karanja	473	Soyabean	452	176	145	0.75	0.44	0.35	0.61
Wai, Karanja	473	Soyabean	452	161	110	0	0	0	0.64
Lohara, Karanja	473	Soyabean	452	162	117	3.72	0	0.31	0.65
Kinkhed, Karanja	473	Soyabean	452	163	122	7.79	4.15	0	0.66
Deochandi, Karanja	473	Soyabean	452	165	129	0	0	0	0.63
Isafpur, Karanja	473	Soyabean	452	153	130				0.66
Mandawa, Karanja	473	Soyabean	452	197	146				0.56
Kisan Nagar, Karanja	473	Soyabean	452	153	100				0.66

*the storage capacity data is based on 15–16 and 16-17 year JYS reports from TAO

7. No room for Rabi. The water budget indicates that groundwater will be available only in small amounts. Moreover, the limited number of farmers with means to access groundwater indicates that, in the current scenario, the possibility of Rabi is small. This is borne out from the LU maps as well.

II. Planning Perspective.

8. Overall Strategy. From the above analysis, it seems that the first step in any strategy for the revival of these areas would be to focus first on Kharif protective irrigation (KPI) and overall moisture conditions. This will mean:

(i) improving forest and non-agricultural lands through afforestation and watershed activities. This will improve their contribution to the overall water availability.
(ii) ensuring substantial area and drain-line treatment as well as small reservoirs so that overall storage reaches an intermediate target of 60-70mm.
(iii) revival and improvement in existing surface water bodies. De-silting and making this available to farmers with poor soils.
(iii) improving access to surface water bodies or impounded water for KPI through community wells and pumps.

9. Wells. There appears to be a general paucity of wells in the area. This needs to be verified. This

may be due to the existing poor groundwater recharge so that these wells have poor yields. The well-data format was to help a better understanding of the situation. A careful analysis of this data would lead to a better understanding of the problem and to decide if wells would indeed be useful intervention in the area.

10. Farmponds. Lined farmponds with inlet-outlet would be useful to store run-off for Kharif protective irrigation and rabi. Unlined farm-ponds at the individual would not be useful, since for the current crops, the farmer would be unable to afford the lining. Unlined farm-ponds at the collective level will contribute to recharge. At 2 TCM per farmpond, and given the enormous run-off, there is room for lined as well as unlined farm-ponds.

11. Current Plans and supporting data. As we understand, the current planning process for the clusters of Karanja and Malkapur is now complete and the plan proposals have been prepared and will go for technical vetting. The proposal consists of the following documents/maps:

(i) Maps

1. Area under Kharif Crop
2. Area under Rabi Crop
3. Locations of some individual assets (such as wells) and area treatment
4. Locations of existing interventions
5. Proposed locations of new community interventions

(ii) Tables

1. Individual and Community intervention-wise village demand in numbers (without location of actual interventions)
2. List of Individual beneficiaries with demand and gat no.

Based on our perceptions, some areas which need improvement are as follows.

1. The applet has generally not been used and the data has been entered off-line and is generally patchy.
2. There is poor coverage of the village in terms of individual farmers, their cropping data and yields, assets, access to water etc. As a result, it will be difficult to coordinate or match a benefit package for farmers with their actual needs. For example, fruit trees should be given to farmers who have year-round access to water, or such access should be a part of the package.
3. Vulnerability maps have not been used to identify stressed farmers or to verify stress.
4. The water budget is either not attempted or not computed correctly and thus its recommendations are not available nor followed. TCM amounts of zone-wise run-offs etc., have not been used to understand the local situation and the numerical possibilities for interventions such as CNBs or farm-ponds.
5. The well survey is extremely patchy. The available data does not support meaningful groundwater analysis. The award of wells cannot be done based on clear information on where and to what extent it is available.

12. Observations and Suggestions.

1. Points 1-10 indicates that a natural-resource or watershed approach needs to be followed and that the water balance provides important inputs for the same.
2. The above understanding needs to be reinforced within the resource persons or our tools need to be adapted further to achieve this understanding.
3. A zonal resource management approach should be followed. This has been outlined in another document[A].

4. The water budget should be used more rigorously. *A new zonal/village level planning section has been added which allows the users to enter some of the desired interventions and see its impact on the water budget* [B].

[A] Zonal Planning Framework, PoCRA Cell, IIT Bombay, 20th January, 2018.

[B] Revised Water Budget incorporating intervention budgets. PoCRA Cell, IIT Bombay, 20th January, 2018.