Nanaji Deshmukh Krishi Sanjeevani Yojana – Water Budget

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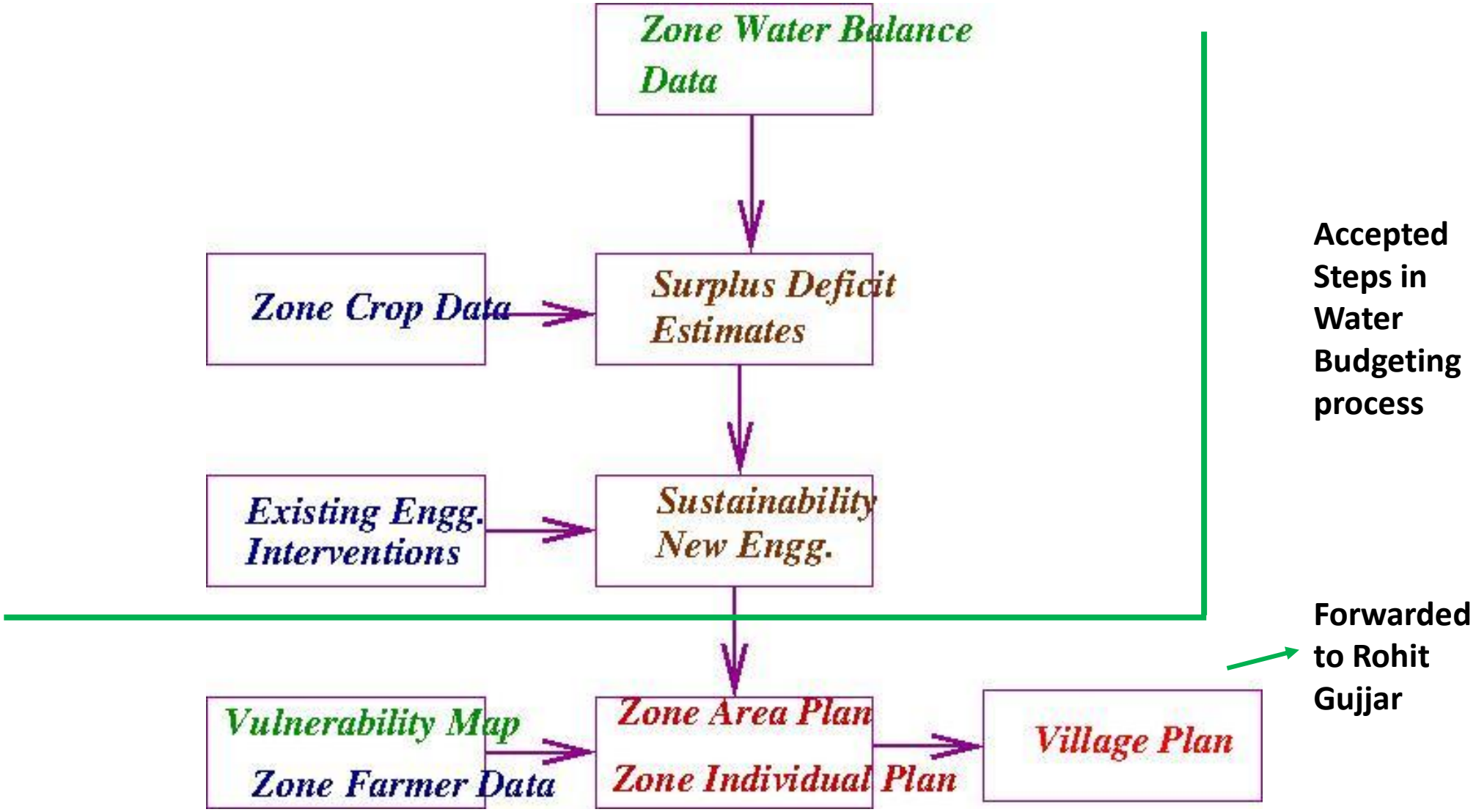
Agenda

- Review Delivery according to MOU
- Review of Existing Rollout
- To obtain key inputs for Phase III delivery
  - Zonal Vs Village level water budgeting
  - Multicrop Vs Single Crop model
- Improved Linkage of Water Budget to Planning
  - Well data
  - Farm Ponds
  - Change in Crops
  - Land use Management
  - Community Vs Individual Assets

Basic Outline of Process



Deliverables

Phase I

1. Water Balance Model Framework and Report
2. Excel Based Water Balance Point Model

Phase II

1. QGIS plugin for water balance computation
2. Water Budget format for Microplanning process
3. Water Budget Format for PoCRA Microplanning App

Phase III

1. To support Planning Framework based on water budget as chosen by PMU/Yashada

Review of Field Visit

1. Importance of Land Use in Planning
2. Better Management of Non-Agricultural Lands
3. Yield Watering Relation
4. Small Storage

Review of Planning Process

1. Zonal Planning Approach
2. Planning Perspective based on Water Budget

Land use and its impact on Water Balance

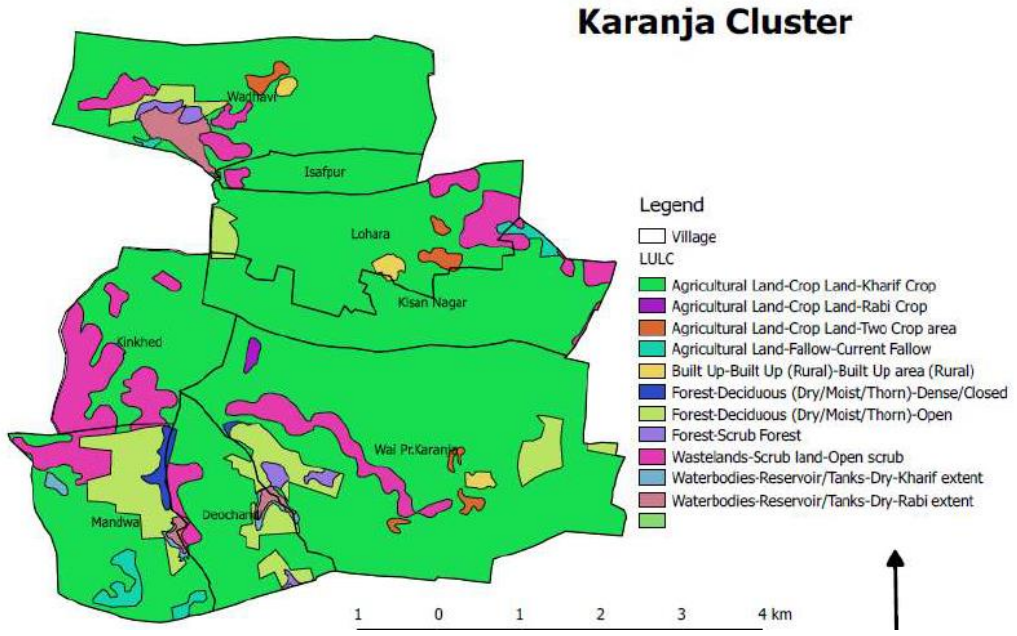
Village, Taluka	Year	Crop/LU	Rainfall (mm)	Runoff in Monsoon (mm)	Soil Moisture Crop end (mm)	GW Recharge in Monsoon (mm)	AET Crop End (mm)	PET Crop End (mm)	Crop duration Deficit(PET-AET) (mm)
Wadhvi, Karanja	2016	soyabean	929	459	59	41	358	463	105
		scrub open	929	506	1	37	385	544	159
		scrub forest	929	412	1	100	415	670	255
		deciduous open	929	464	1	46	418	670	253
		overall	929	459	54	43	361	463	114

- Higher amount of GW recharge from Non Agri forest lands
- Higher runoff from fallow or scrub open land
- Their impact on overall water balance
- Necessity for better land management practices

Continued: Land use and its impact on Water Balance

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	NA	297	216	81	216	5
Isafpur, Karanja	NA	129	116	13	116	6
Mandawa, Karanja	NA	416	279	137	269	6
Kisan Nagar, Karanja	NA	NA	NA	NA	NA	NA

Source: TAO reports and JYS 15-16 and 16-17 data



Yield – Watering – Storage Capacity

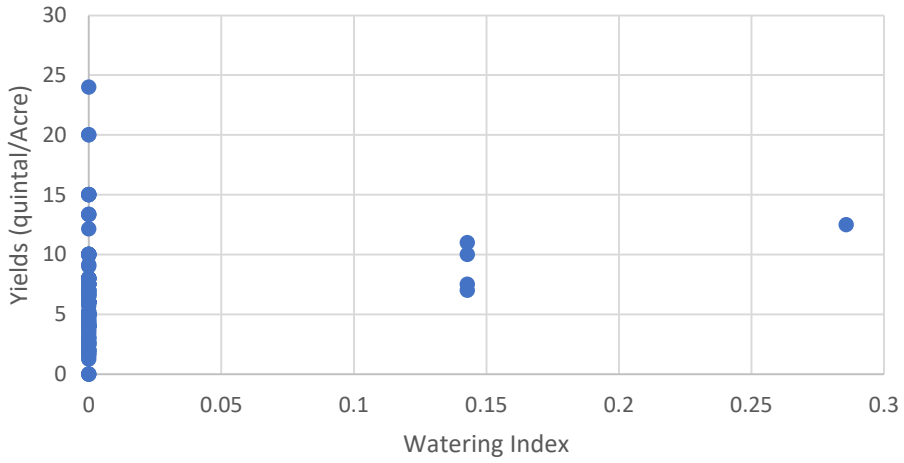
- Kharip Crop Stress – 2-3 additional waterings needed
- Small storage capacity
- Around 65% water application Index
- Loss in yields

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	NA	NA	NA	0.66
Mandawa, Karanja	473	Soyabean	452	197	146	NA	NA	NA	0.56
Kisan Nagar, Karanja	473	Soyabean	452	153	100	NA	NA	NA	0.66

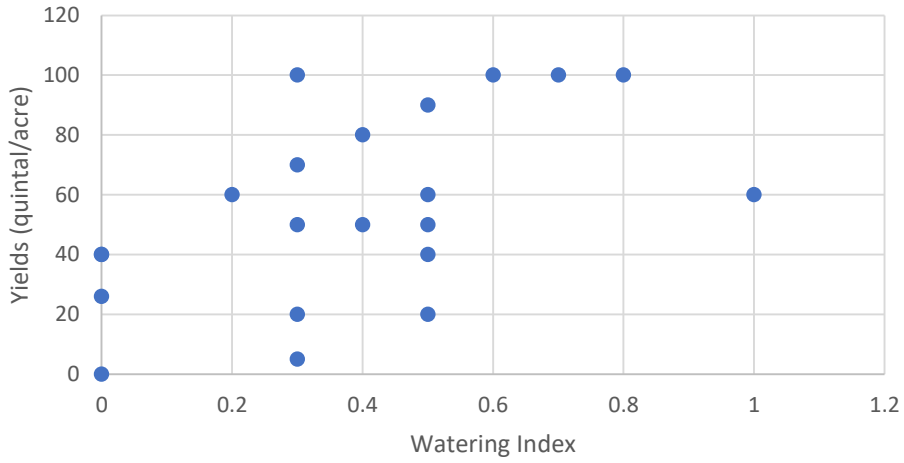
Source: JYS 15-16 and 16-17 reports and water balance model

Sinnar - Yields

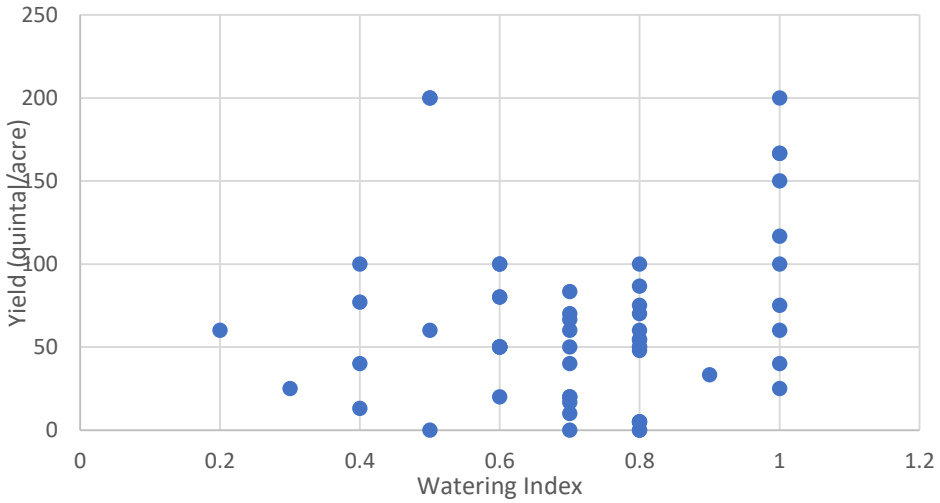
Kharip Bajra



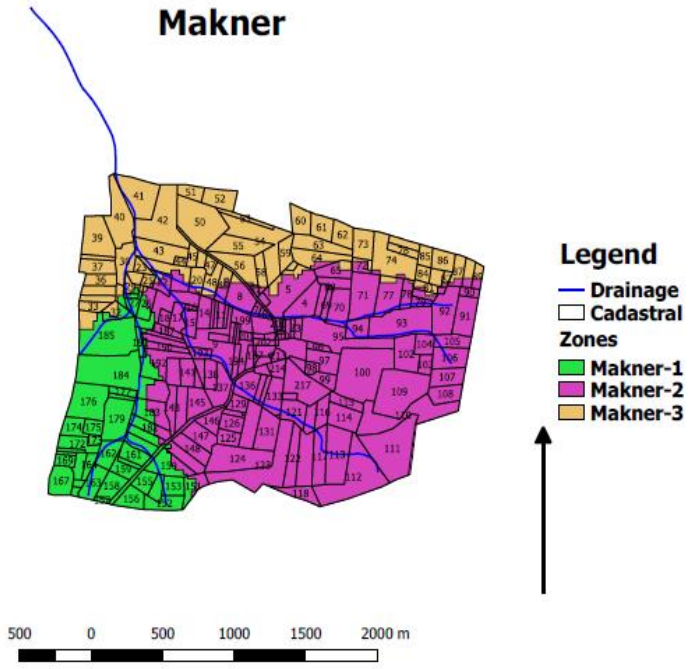
Kharip Onion



Rabi Onion



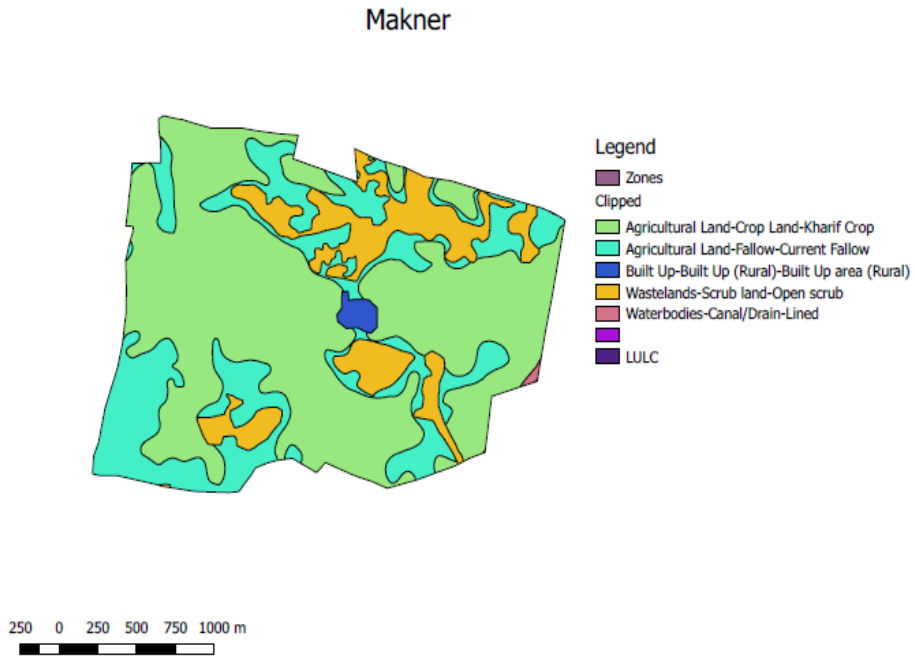
Need for Zonal Planning



- Considerable Variations in water balance seen between zones
- Variations in Water Balance seen between crops
- Necessary to ensure zonal water security

Village Zones	Crop	Rainfall (mm)	Runoff (mm)	Ground Water (mm)	Soil Moisture (mm)	PET (mm)	AET (mm)	Deficit (mm)
Makner-1	Soyabean	823	393	28	107	453	293	160
Makner-2		823	361	39	113	453	308	145
Makner-3		823	385	26	113	453	297	157
Makner-1	Bajra	823	507	17	138	292	162	130
Makner-2		823	482	12	162	292	166	127
Makner-3		823	425	11	230	292	157	134
Makner-1	Tur	823	401	6	18	626	398	228
Makner-2		823	372	12	28	626	411	215
Makner-3		823	392	7	18	626	407	219

Cropping Pattern in Makner



- Storage Capacity and its relation to cropping pattern
- Need for improving storage capacity by planning for activities considering LU in the zone

Cropping Pattern	Makner 1	Makner 2	Makner 3
Kharif	Area in Hectare	Area in Hectare	Area in Hectare
Soyabean	28	110	15
Jowar		45	60
Total Kharif Area (ha)	28	155	75
Long Kharif			
Tur	15	20	15
Cotton	12	65	10
Total long kharif area (ha)	27	85	25
Rabi			
Gram	14	16	0
Wheat	3	7	0
Maize		12	15
Total Rabi Area(ha)	17	35	15
Total Zonal Area (ha)	88	295	129
Kharip cropped %	62%	81%	77%
Rabi cropped %	19%	12%	11.60%
Storage Capacity (TCM)	40	177	72

Linkage of Water Budget to Planning

Zonal Water Budget		Makner 1 - TCM	Makner 2 - TCM	Makner 3 - TCM	Village - TCM
Demand	Total Water Requirement(K+A+LK)	317.4	1339.1	510.6	2295.7
	Kharif protective irrigation req. (deficit)	121.4	474.3	182.7	834.0
	Rabi + Summer Total Water Requirement	48.5	119.5	60.0	228.0
	Rabi + Summer Additional water Requirement (deficit)	21.2	13.6	16.7	51.1
Supply	Water Available from Runoff (80%)	171.8	688.3	308.4	1215.0
	Water Available from Soil Moisture	18.3	51.2	24.6	94.1
	Water Available from GW	9.1	54.7	18.7	82.8
Existing Storage	Total Runoff Storage Capacity	41.0	176.9	71.9	289.8
Additional Storage	Water Available for New Structures	130.8	511.4	236.5	925.2

Target 1: Kharif Protective Irrigation Demand: 834 TCM

Target 2: Rabi + Summer Deficit: 51.1 TCM

Water available for new structures: 952.2 TCM

Planning of New Structures – Village Level

Target 1: Kharif Protective Irrigation Demand: 834 TCM

Target 2: Rabi + Summer Deficit: 51.1 TCM

Water available for new structures: 952.2 TCM

Water and soil conservation structure demands and storage capacity

Demands	No./Ha
Fruit Trees	4
MNB	1
CNB	5
Community FP	4
Wells	30
Well Recharge	5

Structures storage capacity	No./Ha	Storage Capacity/unit	Total Storage Capacity (TCM)
MNB	1	5	5
CNB	5	8.3	41.5
Community FP	4	30	120
Total capacity		43.3	166.5

Storage Capacity through new structures: 166.5 TCM

Water Requirement for Fruit Trees: 4 ha *1600 mm/100 = 64 TCM

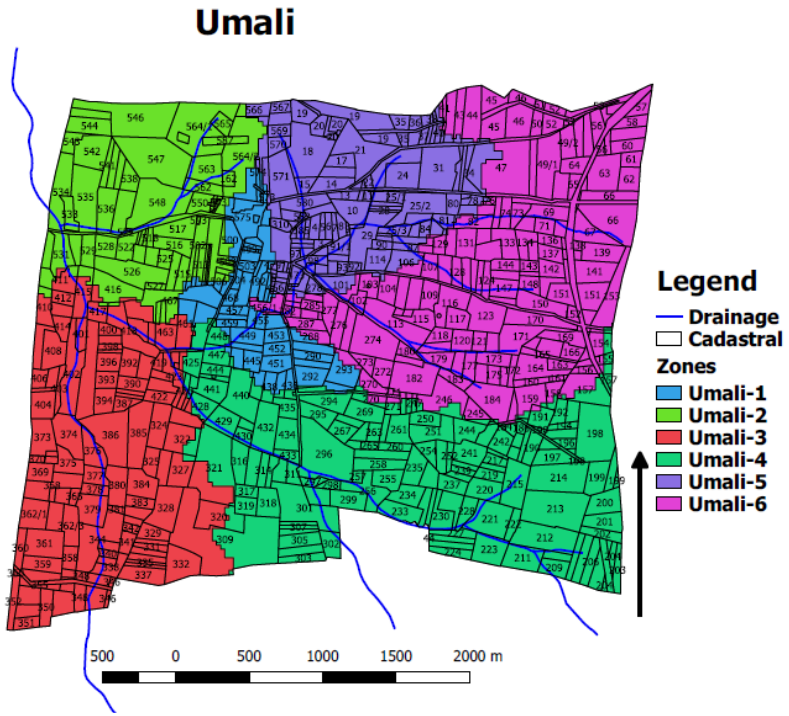
Plan Check

Target 1+Target 2+ Water requirement for Fruit trees – Storage Capacity through new structures

= 834 +51.1+ 64 – 166.5

= 782.6 : Deficit (structures will get filled but new capacity will not be able to meet target 1 and target 2 demands

Need for Zonal Planning



- Considerable Variations in water balance seen between zones
- Necessary to ensure zonal water security

Village Zones	Crop	Rainfall (mm)	Runoff (mm)	Ground Water (mm)	Soil Moisture (mm)	PET (mm)	AET (mm)	Deficit (mm)
Umali-1	Soyabean	823	388	32	107	454	296	158
Umali-2		823	431	22	83	454	287	166
Umali-3		823	340	41	123	454	319	134
Umali-4		823	361	32	124	454	306	148
Umali-5		823	403	31	103	454	286	168
Umali-6		823	386	32	111	454	295	159
Umali-1	Tur	823	395	9	20	626	399	227
Umali-2		823	393	7	20	626	402	224
Umali-3		823	428	9	3	626	382	244
Umali-4		823	372	7	25	626	418	207
Umali-5		823	409	7	18	626	389	237
Umali-6		823	440	18	15	626	350	208

Cropping Pattern in Umali

Cropping Pattern	Umali-1	Umali-2	Umali-3	Umali-4	Umali-5	Umali-6
Kharif	**Area in Hectare**	**Area in Hectare**	**Area in Hectare**	**Area in Hectare**	**Area in Hectare**	**Area in Hectare**
Soyabean	65	87	57	180	49	111
Jowar	0	4.8	0	22.2	8.5	5.2
Udid	0	4.4	2.2	2	1.8	2
Moong	1	2.4	0.2	3	2.8	4.6
Total Kharif Area (ha)	66	98.6	59.4	207.2	62.1	122.8
Long Kharif						
Cotton	26	35	82	60	26	46
Tur	16	18	14	30	11	20
Total long kharif area (ha)	42	53	96	90	37	66
Rabi						
Gram	16	4	0	8	11	23
Wheat	2.4	2.4	0	1	1.4	2.4
Maize	1	0.8	0	4.5	1.1	6
Onion	0.8	0	0	1.8	1.4	0
Total Rabi Area(ha)	20.2	7.2	0	15.3	14.9	31.4
Total Zonal Area (ha)	68	167	250	322	159	327
Kharip cropped %	159%	91%	62%	92%	62%	58%
Rabi cropped %	30%	4%	0%	5%	9%	10%
Storeage Capacity (TCM)	**0**	**0**	**0**	**0**	**0**	**0**

Current Process and Planning Perspective

- Observations in Current process
  - Gaps in Zonal data collection process –well survey, zonal cropped area and zonal storage capacity data generally patchy
  - Poor coverage of individual farmers cropping data, assets, access to water – difficulty in providing guidance on matching benefit packages with farmers actual needs
  - Unavailable inputs such as Crop sowing data, existing interventions data before the process for provision of supply tables
  - Issues in zonal budget computation due to data unavailability

- Zonal Planning Approach
  - Accurate cropping pattern and storage capacity data collection at zone level necessary for its linkage to planning
  - Data collection of individual farmers demanding individual assets necessary for decision making on individual assets (data required -their cropping pattern, yield, watering, access to water and other assets)
  - Well survey of atleast 5 -7 wells in the zone
  - Computation of zonal water budget and Linking it to zonal planning

Planning perspective and Further Improvements

- Planning Perspective

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.

- Decisions to be made
  - Zonal data collection and water budgeting for zonal planning
  - Using Multicrop model for refinement in water budget
  - Data collection of individual farmers demanding individual assets - for guidance on individual assets
  - Meeting with GSDA and Agricultural University for critical inputs towards phase III delivery
  - Manuals from MRSAC for soil, LULC, GW maps