PoCRA - IITB MoU III

PoCRA Water Balance and Extensions

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IIT Bombay
17th Sept ‘19

Outline

A. Water Balance Research Expansion [8 Man-month]
B. IT innovation and extensions [20 Man-month]
C. Contingency Planning Framework Design and Support [11 Man-month]
D. Case studies [7 Man-month]
E. Main-streaming of inputs of technical agencies [7 Man-month]
F. Post Project Main-streaming [12 Man-month]
G. Project support [10 Man-month]
H. Strengthening of FFS for monitoring and Implementation of project activities [4 Man-month]

Water Balance Research Expansion[8+8man-month]

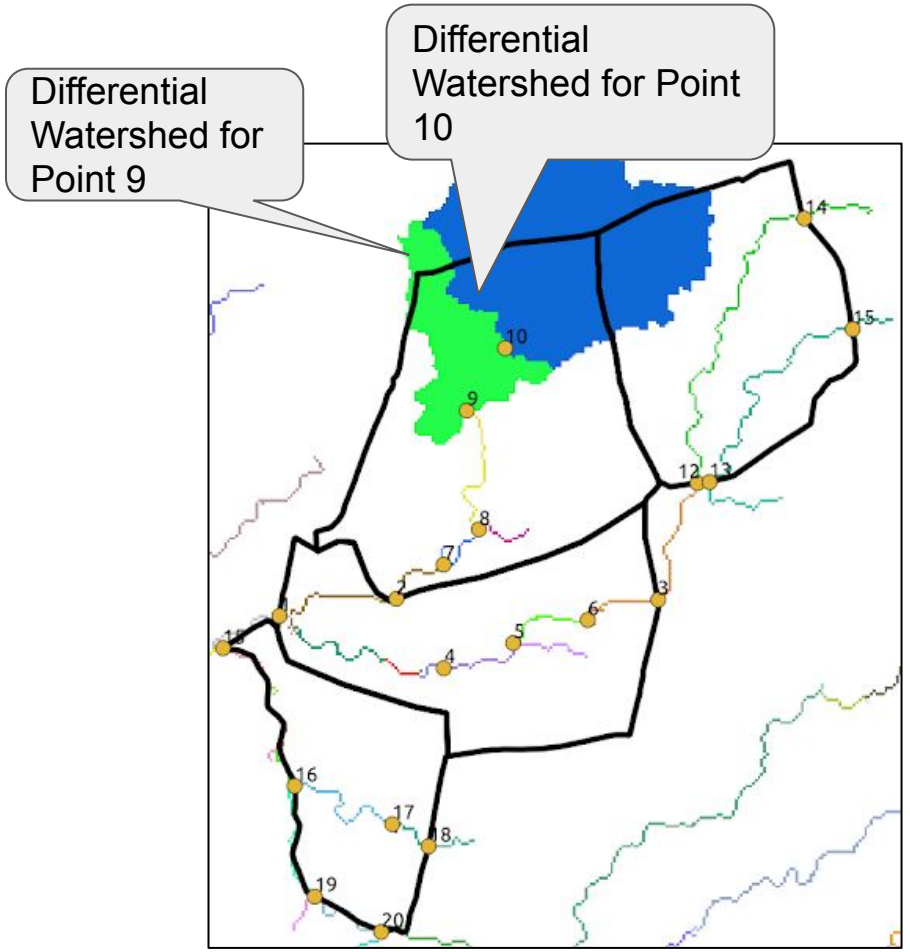
1. GIS framework for regional flows
   - To compute cross-village-boundary surface flows
   - To set up simulation of streams, CNBs and reservoirs
2. Groundwater flows and stream proximity zones
   - Resolution of farm-runoff and regional run-off
   - Improve runoff-recharge models
   - Improve intervention planning parameters, e.g., farm-ponds
3. To collaborate with GSDA on integration of models through field experiments
4. To review once again infiltration models with researchers.

All is model-based. Possible linkages with field experiments with SAU's and GSDA.

Output: Document and model architecture

Differential Watershed

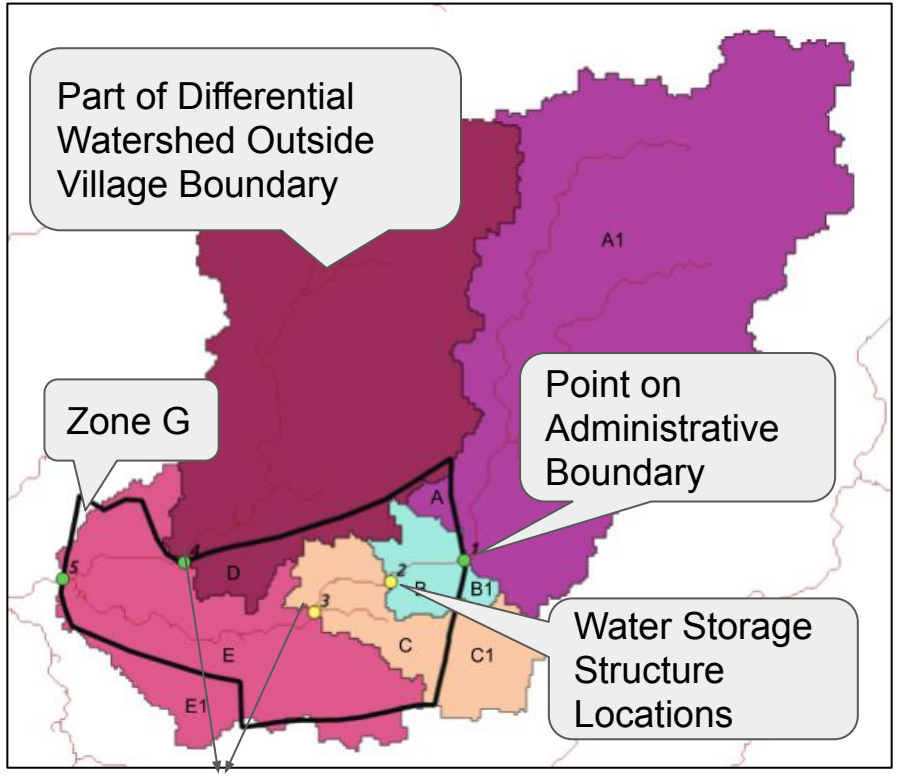
1. Watershed of a point *p* is the surface area from which runoff resulting from rainfall is collected and drained through *p.*
2. The differential watershed of a point *p* vis a vis *q,r,...* which drain into it, is that part of the watershed, which is the new water accumulating at that point, which may be the subset of the actual watershed of the point.



Differential Watershed For Point 9 and 10

Visualization of Steps - Step 6

Allocate zones to differential watershed areas.



Differential Watershed Restricted to Village Boundary

Flow of Water

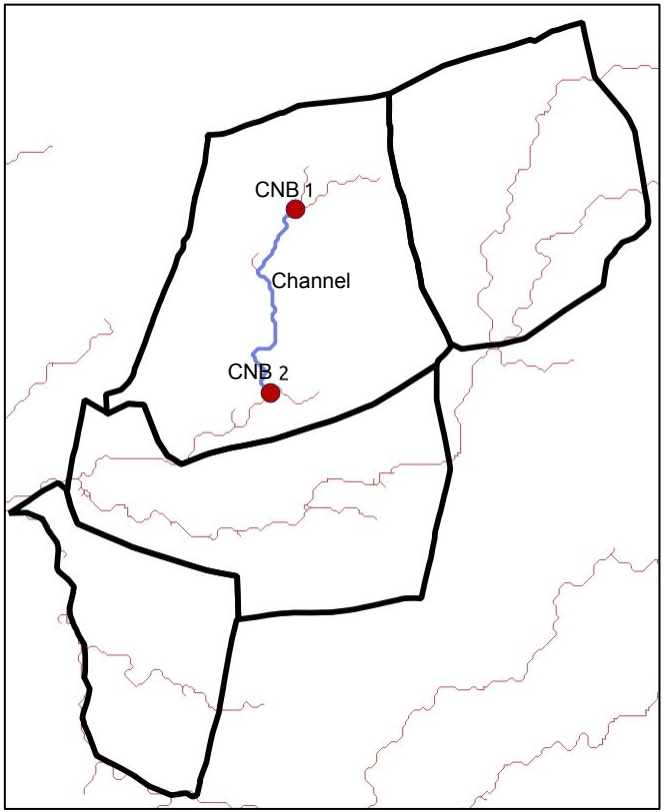
Point No.	Contributing Inner Zones	Contributing Outer Zones	Label
1	A	A1	+1
2	B	B1	0
3	C	C1	0
4	D	D1	+1
5	E	E1	-1

Order of Processing: 1-2-3-4-5

Stream Flow Simulation

Objective:

1. To calculate the **amount of water flowing from one point of the stream to another** having intermediate points representing water storage structures like Cement Nala Bund (CNB).
2. The aim is also to identify the **number of times those intermediate structures get filled** in the respective time period.



CNB points on Stream Network

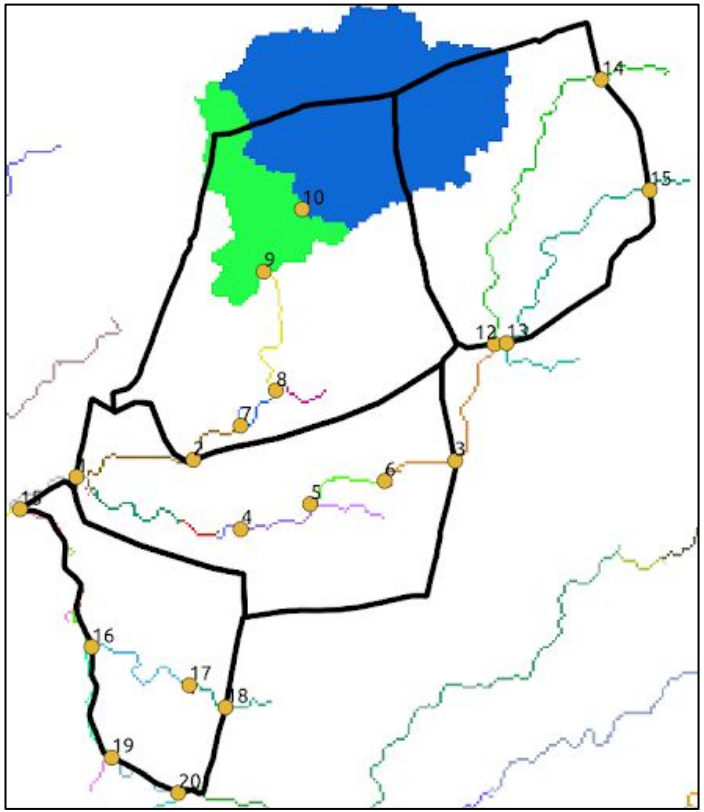
Stream Flow Simulation

Stream Parameters

- **Width, length, slope, depth, friction, Krech., alpha_bank**
- **Connectivity data, run-off area allocation**

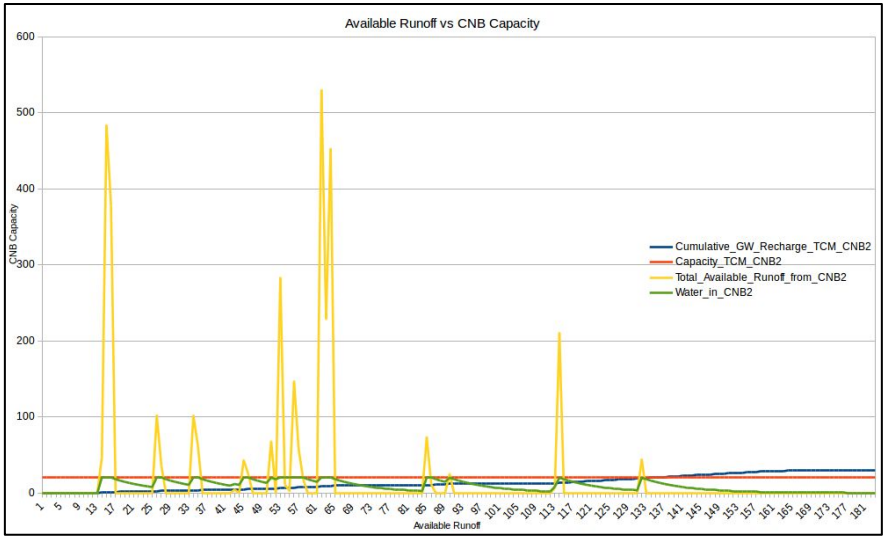
Stream water volume conservation (with transmission losses and stream banks)

Vnew=Vold - Vout + Vin - tloss + Vbank

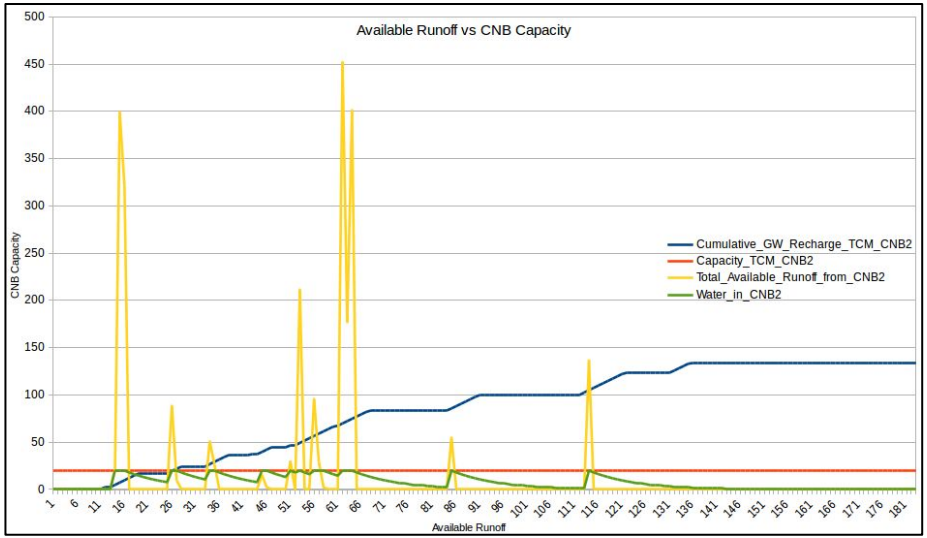


Differential Watersheds

CNB Capacity vs Runoff Results for CNB2



Clayey Soil Result



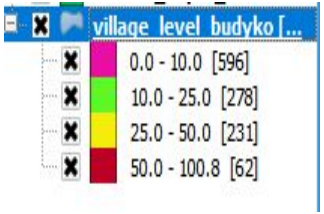
Gravelly Soil Result

IT innovation and extensions [20 Man-month]

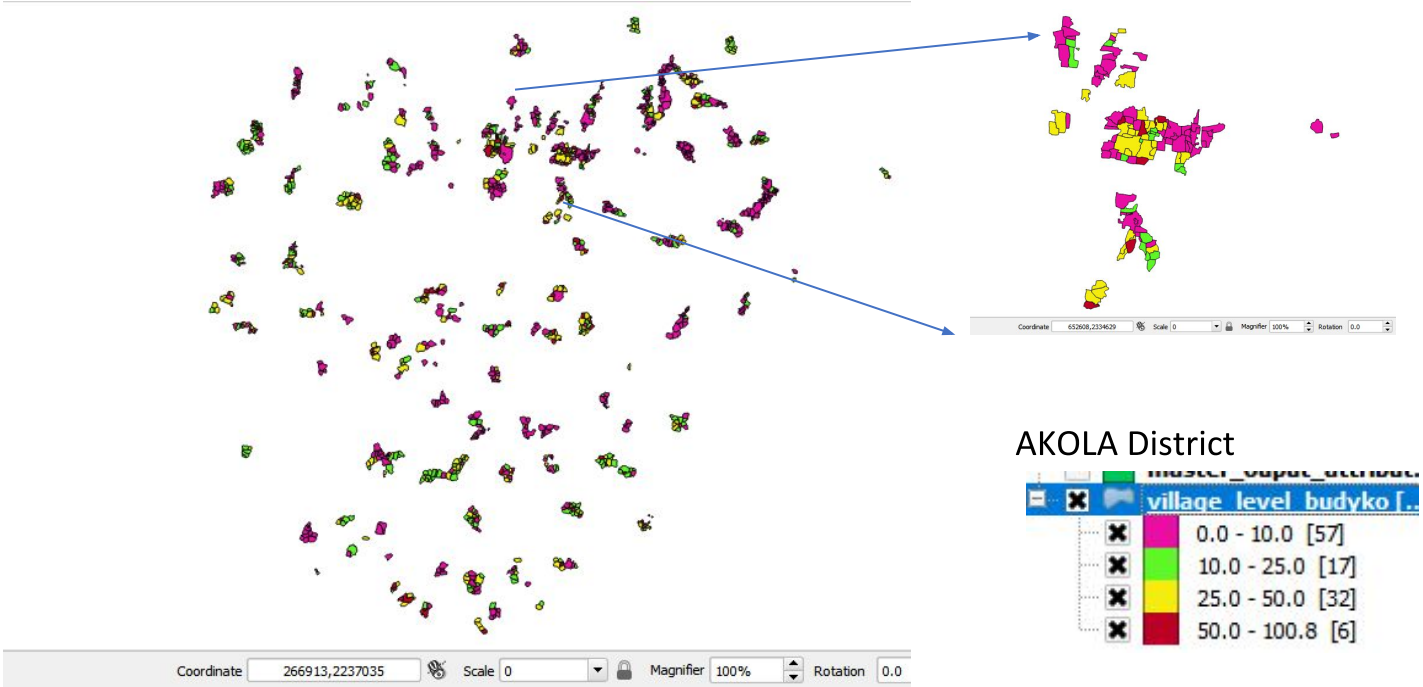
1. Design of project-based indicators and expansion of dashboard on existing attributes
2. Web-access and publishing to functionaries at various levels(district, taluka, etc.). User(Role)-based access permissions
3. Design and Integration with other project activities like FFS, MLP, Contingency plans.
4. Stabilization and mainstreaming of dashboard
5. Village Dashboard
6. Farm-level applet extensions - integration of FFS, farm-level budget and other apps

Output: Software architecture and support

Project-based indicators: storage capacity actual – project area



Feature count is there in square bracket – total 1167 villages



AKOLA District

Village Dashboard

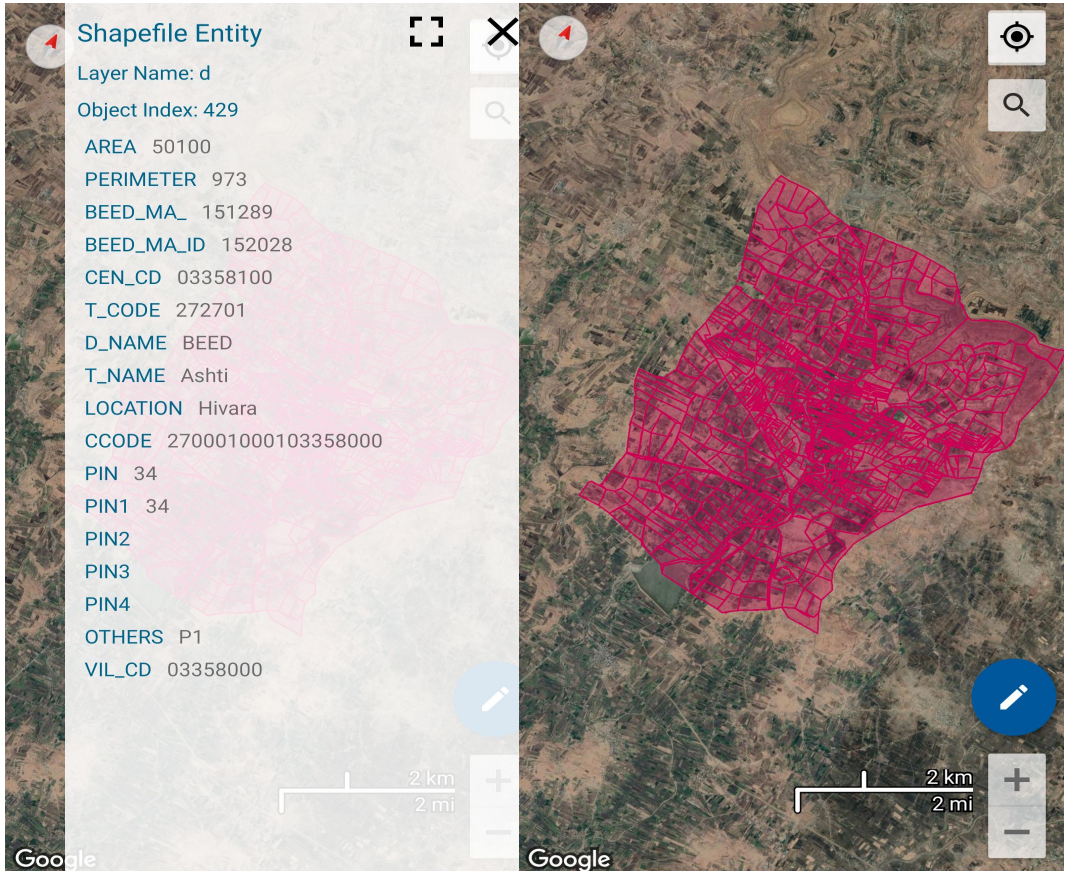
Motivation:

- Provide integrated interface to krishi sahayak, taluka and district level officers, project staff
- Data gathering and analytics e.g., cropping pattern, seed variety vs. yields, well levels
- Weather data, prices, infrastructure
- Contingency plan implementation

Technical Matters

- GIS, postgress on smartphone
- Integration with PMU

Output: Software Architecture and prototype



Contingency Planning Framework Design and Support [11 Man-month]

1. Development of SATA (Scale-Analysis-Trigger-Action) framework for contingency planning
2. Integrated implementation plan for SREP, C-DAP and Contingency planning for climate resilience.
3. Interface with CRIDA, Manage and SAUs to provide contingency planning support.
4. Rabi contingency planning

Output: Framework Document

Trigger-Action Framework

Trigger	Action	Scale
Dry Spell	Advisory, Irrigation provisioning	Circle and farmer level
Delayed Monsoon	Short duration crops	Circle
Unfavourable price	Storage, analysis	Village, taluka

1. What is delayed monsoon? Who reports it?
2. Is there a list of short duration rice varieties at the cluster level?
3. Are there seeds available at Mahabeej or the market?
4. Is there a feedback system on seed varieties and yield?

Trigger-Action Framework

Trigger	Action	Scale
Dry Spell	Advisory, Irrigation provisioning	Circle and farmer level
Delayed Monsoon	Short duration crops	Circle
Unfavourable price	Storage, analysis	Village, taluka

Measurement, Preparedness, Research backing.

1. Codification of contingency plan - integrating SREPs
2. Highlighting space for analysis and research - linkages
3. Preparing data formats and integration
4. Rabi contingency planning - Farmer narratives and contingency tabulation

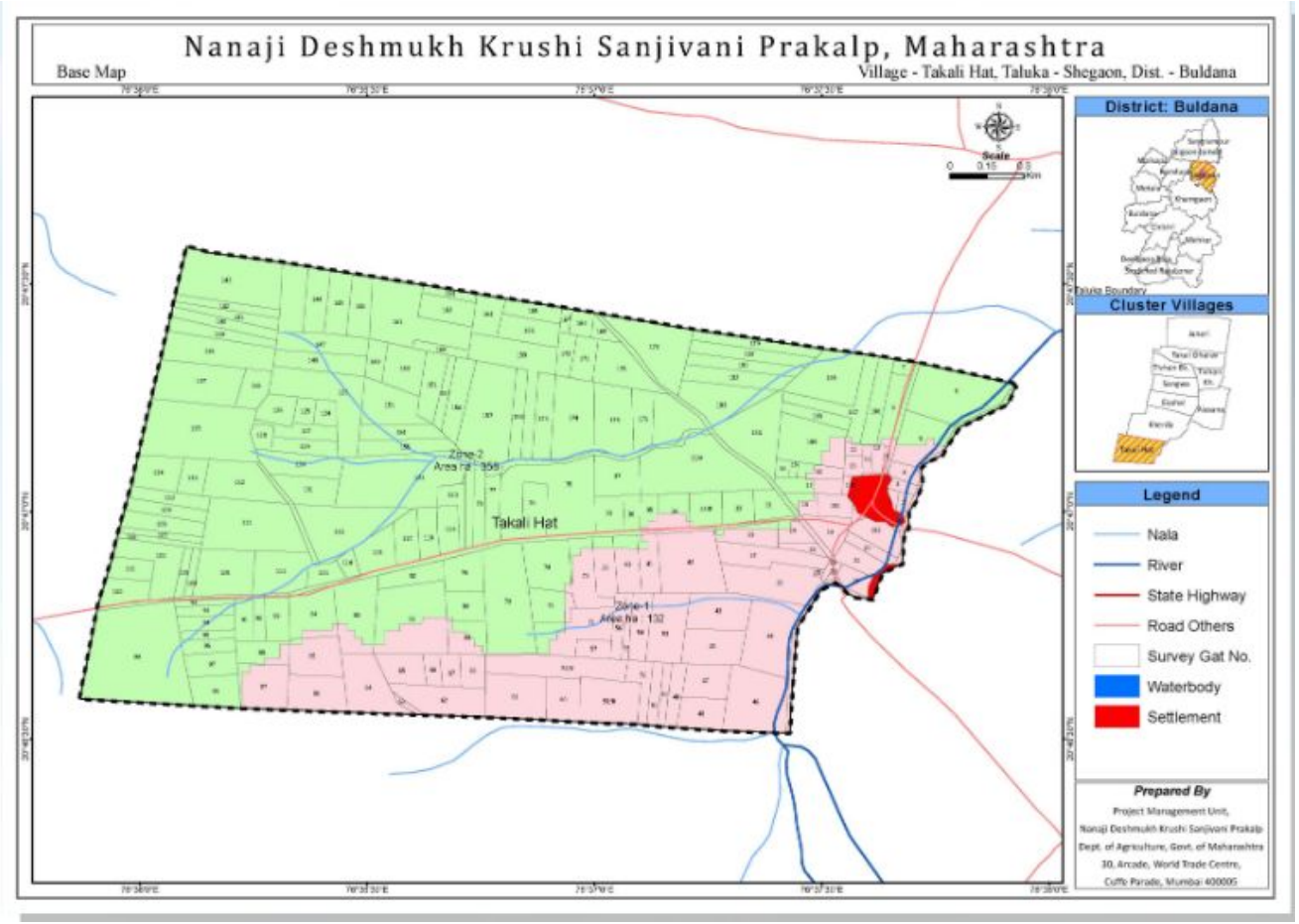
Case studies [7 Man-month]

1. Review of remote sensing based water balance and crop identification, area sown etc
2. Educational activities like village map reading, simple tabular water budgets, measurements, school painting.
    a. Designing supplementary activities for water budget comprehension in collaboration with Jal Saksharata
    b. Preparing supplementary manuals for activities and evaluation of students in school
    c. The activities will be such as - preparing water budget for their home, farm
    d. Installing rain-gauge and taking readings
3. Study on water balance in command areas in 2 clusters and extension
    a. Rotation schedule - incoming water from canal - incorporating net inflow/outflow
    b. Variations in cropping pattern, gw availability near canal lines

Output: Case Study Documents and Manuals

Educational activities - village map reading

1. Understanding directions on map
2. Locating streams/nala in village
3. Their farms
4. Non ag land
5. Marking waste/ fallow land
6. Marking location of interventions
7. Locating good/bad soil type zones
8. Locating good/poor GW recharge zones
9. Understanding variations in cropping and seasonal water availability in different zones - wrt water budget



Main-streaming of inputs of technical agencies [7 Man-month]

1. NBSSLUP Soil - engagement - integration with our data.
   - Resourcing and integrating as shape-files
   - Updating for other attributes such as soil carbon
   - Validation and analysis

2. Analysis of GSDA plans, recharge priority map, stream proximity, its incorporation in PoCRA
   - Incorporation into planning framework, e.g., wells, farm-ponds
   - Validation and analysis

Output: Technical research and integrated outputs

Post Project Main-streaming [12 Man-month]

1. Preparation and vetting of training material for selected topics such as water budget, use of dashboard and apps, response to contingencies.
2. Training exercise for Agri. officers, VCRMC, agriculture students (RAWE Fieldwork)
3. Translation of existing water budget model to simplified, easy-to-compute and reasonably accurate water budget at village level, by developing thumb rules
4. Community comprehension of Water Balance
5. Research documentation, consolidation, dissemination and publishing.

Output: Documents, models and capacity building

Thumb Rules

- development of simple spreadsheet models with a few key parameters
  - Few parameters
  - Few laws: mass balance, supply-demand-deficit, land-use
- research work for thumb rules - statistical analysis and models of rainfall-runoff-GW relationships for various scenarios for different typologies of villages
- extension - interaction with farmers, VCRMC and local agri. officers for its implementation, use and actionability at village level
- can be also used in other government programs like JSA for computation of water budget.

Community Comprehension

1. Framework for facilitating community mobilization and increasing comprehension of local biophysical reality, individual strategies and linking it with common outcomes.
2. Enable collective actions (such as cropping pattern, sharing of wells, community lifts etc.), regulation and reduce competitive extraction.
3. Based on the water budget and above thumb rules.
4. Framing of current collective models such as Hiware Bazar, Kadwanchi etc. and other processes followed in pani-foundation villages etc.

Schedule of meetings, agenda and material.

Project support [10 Man-month]

1. IT and other support

- Dashboard, Plugin,
- Farm-level App - features for computation of crop contingencies, water productivity, economic productivity,etc.

2. Analytical Support

- Analysis of FFS, beneficiary and village tracking, other project data and analytical support based on this.
- Enable decision-making and feed into outcomes

Output: Document and capacity building

Strengthening of FFS for monitoring and Implementation of project activities [4 Man-month]

- Study of different inputs gathered during FFS,
- Periodic analysis of FFS data,
- Strengthening of crop growth model,
- Contingency planning, and extension using FFS data.

Output: Document and support

Overall Tentative Budget - MoU III

Sr. No	Name of Personnel	Unit Rate (Rs. per month)	Number of Man - Months	Total (lakh)
1	Prof. Milind Sohoni	30000	50	20
2	Parth Gupta	80000	12	9.6
3	Shubhada Sali	70000	12	8.4
4	Rahul Gokhale (external consultant, Full-time)	120000	12	14.4
5	Hemant	120000	12	14.4
6	Vidyadhar	50000	12	6
7	IT	70000	12	8.4
Total				81.2
Head		Unit Rate (per month)	Number of Months	Total (lakh)
Human Resources				81.2
Research Dissemination				4
Travel + Logistics: Funding for Experiments, workshop instruments contingency				10
Total				95.2
After 20% IIT Overheads				114.24
Final Total				114.24

Revised Overall Tentative Budget - MoU III

Sr. No	Name of Personnel	Unit Rate (Rs. per month)	Number of Man - Months	Total (lakh)
1	Prof. Milind Sohoni	30000	50	20
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5	Hemant	120000	12	14.4
6	Vidyadhar	50000	12	6
7	IT	70000	12	8.4
8	IT+Technical	100000	12	12
Total				93.2
Head		Unit Rate (per month)	Number of Months	Total (lakh)
Human Resources				93.2
Research Dissemination				4
Travel + Logistics: Funding for Experiments, workshop instruments contingency				10
Total				107.2
After 20% IIT Overheads				128.64
Final Total				128.64

Thank You !