

Canal-irrigated Paddy Cultivation

- a partial but experiential understanding of the impact of paddy cultivation within the framework of canal irrigation in the TLBC (Tungabhadra Left Bank Canal) and the UKPRBC (Upper Krishna Project Right Bank Canal) in the Koppal and Raichur districts; and some learnings from this, with possible implications for the new National Water



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Policy.

Introduction. Canal irrigation is the backbone of Paddy production in the country. Paddy is a representation of food sovereignty that was the impact of the Green Revolution. Together, these also represent the practice of centralised planning and large interventions that were a matter of national pride, and which changed the ecological landscape of this country.

Today, paddy cultivation in canal irrigation is an intertwined representation of two anthropogenic contributors to Climate Change. Despite the reality that these two systems are intertwined, these unnaturally co-exist like the parallel lines of a railway track, with both the CADAs (Command Area Development Authorities) and the respective State Agriculture Departments, ensconced in separate bureaucratic realities.

Highlights. The HUF-SAMUHA Partnership has been operational since 2014-15 to-date. In this period, it has achieved the following:

Key and cumulative achievements of the HSP Project 2014-15 - 2018-19			
S#	Key Performance Indicators	KPI UOM	Cumulative Achievement
1	Institutions formed – JLGs, Farmer Clubs, Water Vedikes	Nos	922
2	Persons Trained	Nos	5058
3	Representatives engaged in water related issues - Demand side	Nos	164
4	Command area of the project - in Hectares (Physical area)	Hectares	9592
5	Water saved due to enhanced water use efficiency	Billion Ltrs	160.86
6	Change in agriculture production area over the base line – tail-end ha benefited in 10 villages that were monitored for 5 years –	Hectares	1,497

	based on capacity to measure, and which included non/paddy crops		
7	Increase in Annual Agriculture Production – over 5 years and 11,089 ha, resulting in an increase of 0.87 tons per ha / 0.352 tons per ac or approximately an additional bag of paddy per ac/year	Tons	9,647
8	Communities/Households benefited	Nos	5007
9	Persondays generated –tail end 1497 ha	Nos	1,45,051
10	Household Income Enhanced – 11,089 ha – Rs 30,661/ha or Rs 12,413/ac over 5 years or Rs 2483 per ac/year for Water Management	Rs in Cr	34
11	Behavioural change in water saving – individuals or households – cumulative figures	Number	4421
12	SC/ST community benefited – households	Number	1698
13	Women benefited through less exposure to hazardous synthetic pesticides	Women days	90,346

Based on these achievements, reflections on our experience over 5 years with canal-irrigated paddy cultivation in the Koppal and Raichur districts of Karnataka has led to an internal consensus that the followings actions should be taken:

1. Integrate Agronomy into the functioning of the CADAs.

- a. We believe this will allow water and cultivation to become synergistic streams, and will lead to savings in water, and increase both yield and net crop income.

- b. SAMUHA has demonstrated that the introduction of agronomic practices can save canal water to the extent of 160 billion litres / 5.68 TMC over 5 years. This savings, beginning with just 2.83 billion liters in the first year, has been assured by Deloitte and E&Y over the years.

- c. These figures, extrapolated for all the 59.57 Lakh ha of canal-irrigated paddy across all CADAs, show that we can

from: Agriculture Census 2010-11	
Water Savings in Canal Irrigated Paddy fields	ha
Total Net Irrigated Area - All Sources: ha (Table 4.8)	6,45,67,000
Total Net Irrigated Area (NIA) - Canal: ha (Table 4.8)	1,69,08,000
Total Net Irrigated Area (NIA) - Canal: % (Table 4.8)	26.19%
Gross Cropped Area - ha (Table 4.10) (Adjusted for inaccuracies in Totals)	8,39,09,000
Paddy cultivation of Irrigated Area - ha (Table 4.10)	2,95,67,000
Intensity of Cropping (adjusted from 1.3593 to account for inaccuracies in Totals)	1.2996
Extrapolation of Paddy in Gross Cropped Area to NIA - Area - ha	77,42,637
Estimated Canal-irrigated Paddy: Area - ha	59,57,869
Water savings through water management + line planting (WM+LP) - per ha/ltrs	54,34,000
Projected water savings in canal irrigated Paddy lands - ltrs/ per annum	32,375,060,539,680
1 TMC = litres	28,316,846,592
TMC water savings	1,143

achieve water savings of 32 trillion litres or 1143 TMC per year, assuming just one season, which itself is an efficiency of around 66% since Rabi savings are lower. Even at an efficiency of just 33% of this figure, to account for all inaccuracies in assumptions and data, still leaves us with a potential saving of 10.68 trillion litres / 377 TMC per annum. The figures are astounding and worth working towards.

- d. SAMUHA believes that measurement is critical to accountability. and recommends automation for enhanced Irrigation efficiency at all levels. Such data would be best supplemented by a **National Canal Information Management System** to make this data usable for water management research, public information and risk assessments.
- e. Water savings is not the only impact. The HSP agronomic practices include Water Management + Line Planting followed by the introduction of NPM (Non-Pesticide Management) practices in paddy cultivation.
- f. These practices enhance crop incomes by around Rs 8000 per acre rounded up. Of this, roughly Rs 2000/acre is accounted by reduced costs on pest management resulting from Water Management; another Rs 2000 is accounted by the 8-10% increase in yield (roughly two bags/ac); while savings from replacing synthetic pesticides with herbal pesticides accounts for Rs 4000/acre.
 - i. Household income of Rs 34 Crores from 11,089 ha over these 5 years from just Water Management has been assured by Deloitte and E&Y.
- g. Water savings, in turn, has led to 1497 ha of tail-end lands receiving enough water for a combination of paddy and other diversified crops over these 5 years.
- h. The agronomic package has also led to an increase in agriculture production of 9647 tons or 0.84 tons per ha/year.

2. **Introduce a Modified SRI** (System of Rice Intensification) **crop production protocol** into the use of canal water to lower the risk and incidence of pest attacks and to reduce water use, and to specifically reduce tail-end deprivation and save water in general.

- a. SAMUHA's Water Management is a modified form of SRI. Canal-irrigated Farmers, unlike farmers with access to borewell water, are reluctant to adopt a Wet/Dry process, since they feel they have little control over the water flow. Instead farmers now have adopted 1-3" of water instead of the fully 5-6" of water they traditionally use.



- b. The impact of this LoWater process on pest control was attested to in the larger canal system when, in 2016-17, the low water levels in the dam led to water being released once in 10 days. This forced *Warabandi* had an interesting impact:

IMPACT OF FORCED WARABANDI APPROACH ON BPH PEST MANAGEMENT IN CONVENTIONAL PADDY IN TLBC AREA		
Particulars	Unit	Rs
Avg cost on BPH management	Rs/ac	6625
Cost during Warabandi year (2016-17)	Rs/ac	4200
Difference in cost on BPH management (+/-)	Rs/ac	2425
Total area under Paddy during Kharif 2018-19 under TLBC region of Karnataka	Ha	173,000
Assumed total savings due to reduction in pest management cost – in Crores	Rs/Cr	103.6

pest incidences and therefore expenditure on pest management, reduced across the canal system. The table assumes a savings of Rs 130 Cr from this single intervention, based on current sown acres.

3. **Allow downstream farmers to other crops as a choice** rather than plant paddy as a compulsion. There is a need for policy makers to understand the cumulative ecological modification that is introduced by paddy (thinner bunds, cutting of trees, mono cropping and water logging)



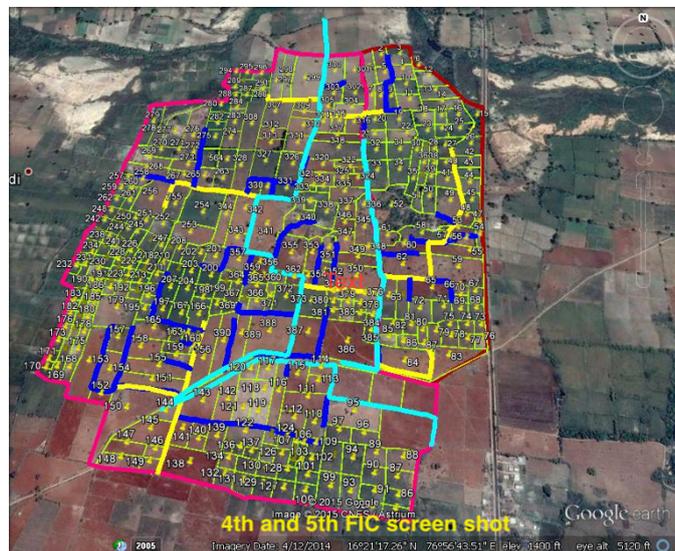
DCS crop: Sunflower - Farmer Gnanappa at Jangamarahatti

oppresses/suppresses all other crops, and the effect of this on crop choice. Without this, crop diversification will remain a phrase.

- a. Canal irrigation is often understood and taken advantage by irrigated farmers from other regions. These flood into a new command area since they understand the implications of irrigated agriculture as a business, better than the original farmers who are caught making the transition from a dryland culture to an irrigated culture, and who struggle to transition from subsistence living to understanding irrigated agriculture is actually a sophisticated business, driven by the availability and cost of credit.
- b. The TLBC was first taken advantage by Andhra farmers from the Godavari basin who introduced, first sugar cane and then, because of the absence of assured irrigation across the year, paddy. The UKP towards Jewargi in the Kulaburagi district, on the other hand, was settled by Andhra farmers from Guntur and Kadapa who chose to continue their practice of growing cotton and chillies.
- c. Choice of crops defines the ecological health of a command area.

- d. Ideally, present-day canal systems are designed to provide protective irrigation or to grow irrigated dry crops. Unfortunately, 'origin'al intent, market factors and poor enforcement dictate the final crop choice.
 - e. While, ideally, paddy cultivation should be discouraged, the pernicious effect of paddy cultivation on downstream farmers needs to be understood. Downstream farmers are forced to adopt paddy because of poor drainage and poor maintenance of land channels within a FIC. This leads to water flowing from one land to the land below, and forces downstream farmers to adopt paddy as a defensive response.
 - i. This is best attested by the experience of the SAMUHA farm, where irrigated dry crops were chosen when canal water was first released in the Devadurga taluk. Not only did we have to abandon these, we also lost all the trees we had planted over the years to water logging.
 - f. How then should the downstream farmer be protected? The simple answer would be enforcement. Unfortunately, this is, often, influenced by politics and weak governance. A possible answer is
 - i. **greater awareness** for them to understand their 'water' rights better, and a
 - ii. **formal recognition of the tail-end farmers** for inclusion in all water decisions, whether by CADA or their WUAs.
4. **Recognise the FIC (Field Irrigation Channel, the last unit in the canal system and the interface between CADA and Farmers) as the building block for O&M, water savings and crop diversification.**

- a. Presently, irrigation practices recognise the Water Users Association, often at the Lateral level, as the representative body of farmers. This is still too far from the actual field.
- b. The FIC, as the 'last mile' should be recognised as the basic building block. The absence of O&M at this level in maintaining drainage channels as well as the land channels that supply each farmer's lands, often means that an engineered supply of water is now replaced by a chaotic dependence on gravitational flow as each downstream farmer is dependent on the farmer above releasing his waters to flow to the lands below. Unfortunately, this also means that pests and other contaminants also flow into the other lands.



- c. **Metered release of water at the FIC** will allow each farmer to understand crop water budgeting. It will also allow the FIC as a group to understand crops in terms of their net profits, rather than the present practice of preferring paddy because of its higher crop credit and sale value because of its MSP.
 - d. Already, individual farmers in the SAMUHA operational area, who have some control over water from the lands above them have started to explore crop diversification with better economic returns than paddy.
5. **Imbed crop extension through Farmer Field Schools (FFS')** into the roles and responsibilities of WUAs (Water Users Associations), and shift the focus from yield to sustainability and increased net profits from crops

a. Presently, SAMUHA FFS' are imbedded into the Village Farmer Clubs. SAMUHA adopted these because the Farmer Clubs, a NABARD initiative, facilitate members to access bank credit.



b. The expansion of WUA roles and responsibilities by CADA to include

crop extension will integrate and allow this practice to be customized to the needs of canal-irrigated farmers.

c. CADA-appointed promoters and trainers should pilot and then broadbase the concept and practice of FFS'. This will shift the current presentation of crop advisories from information to a more organic framework that will allow each farmer to customize his learnings from the shared experiences of other farmers during the FFS to his specific land requirements. FFS' enable the shift of top-down information to a more participative knowledge building.

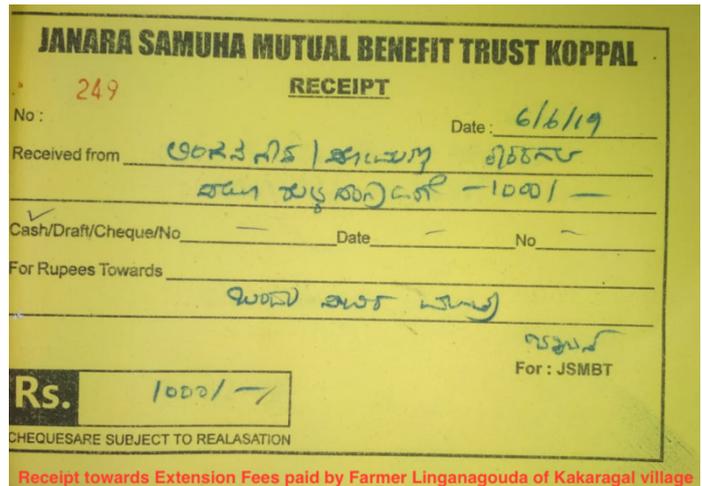
6. **Identify and support Master Farmers** in each FIC/group as the point of water and agronomy integration

a. Currently, MFs are appointed by the Farmers Club and supported by SAMUHA at a village level.

b. The appointment of Master Farmers for each FIC by their respective WUAs, will allow these MFs, selected for community acceptance, to become practice leaders.

c. The common theme from CADA to WUAs to FICs to FFS' to MFs is the integration of water and crop cultivation as two sides of a coin.

7. **Encourage water and crop support as a paid service** that encompasses water and crop extension, facilitation of Kisan Credit and crop insurance, quality and timely crop inputs, and market interface by allowing WUAs to enter into contractual relationships with qualified Domain Experts/Agencies/NGOs at the Lateral, Distributary or Main Canal levels.



a. Presently, SAMUHA works with producer groups. Extension fees are collected from farmers through the Janara Samuha Mutual Benefit Trust, a Community-based Organisation.

Inputs supply	2,78,532
Crop Extension	37,99,533
Farmgate Procurement	9,42,310
Total over 5 years	50,20,375

b. Farmers pay Rs 1000 for the first two acres, and the Rs 250 for each additional acre, in two installments. In bad years the balance 50% is often forfeit.

c. JSMBT has collected Rs 50.2 Lakhs to-date from inputs supply, crop extension and farmgate procurement, just from its NPM farmers. The scope of extending inputs supplies to its WM+LP farmers has yet to be explored fully.

8. **Facilitate the establishment of Water or Jal Vedikes** at the Distributary level as cross-WUA/FIC platforms that allows all stakeholders (CADA, WUAs, FIC Farmer Representatives and Gram Panchayat representatives from the respective villages intersected by the Canal system) to meet periodically during the crop season to highlight and resolve farmer and village issues (crop, drinking water and livestock). This will also serve as the platform for accessing MGNREGA resources for resolving individual and community issues at the Gram Panchayat level.



a. Presently, SAMUHA has organised 3 Water Vedikes, one each in its 3 paddy clusters. These serve as effective interfaces between the two CADAs and the 82 Village Farmer Clubs.

9. **Recognise canalsheds**, like watersheds and springsheds, with the Main, Distributary and Lateral canals as the appropriate hydrological boundaries for the planning and management of an integrated rain, surface and groundwater framework for water conservation and management

- a. This is a new understanding and has arisen from the last Water Practitioners Network meeting where SAMUHA was first exposed to the concept and practice of Springsheds.
- b. SAMUHA now recognises that canalsheds provide the logical hydrological boundaries for a framework to integrate rain, surface and groundwater.

10. A Review of PIM

- a. In the light of all the current experiences of demand side management, in SAMUHA and elsewhere, a review of PIM policy and best practice is recommended.

11. The CADA as a business entity

- a. SAMUHA established in two command areas the willingness of farmers to pay if the service is beneficial, consistent and qualitative.
- b. Presently, the CADA is by definition a top-down structure, a service provider which is struggling to meet its original mandate in a world and environment that has changed, and continues to change, and in which the original understanding of water, agriculture, users are all in transition.
- c. **In conclusion**, and thinking totally out-of-the-box, is it possible for the CADA to transition into a business entity with a board elected by WUA members?



Farmer Field School: Field observations