

# Strengthening Value Chain in Tribal Development Fund – WADI project areas in Andhra Pradesh

A study sponsored by



Department of Economic Analysis and Research (DEAR)  
National Bank for Agriculture and Rural Development  
(NABARD)

Conducted by



Administrative Staff College of India  
Hyderabad

March 2020

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The Department of Economic Analysis and Research (DEAR), NABARD was established to provide policy and action-oriented research support through macro level data and field-based feedback on issues of relevance to NABARD, the government and the banking industry. It specializes in knowledge – driven activities relating to agriculture and rural development, as per the mandate of NABARD. The strength of the department lies in the cadre of professional economists and its ability to network and collaborate with other reputed institutions.

Vision of the DEAR is “To develop into a quality research wing of NABARD that conducts and coordinates research to generate ideas, help evolve policy inputs, evaluate policy alternatives that would help the management in realising the objectives of the organisation and produce research output that improves NABARD’s understanding of the dimensions of rural credit in particular and overall rural development in general.”

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## **ACKNOWLEDGEMENTS**

The study team from Administrative Staff College of India (ASCI) expresses its gratitude to the Department of Economic Analysis and Research (DEAR), NABARD for awarding the study to ASCI. The study team would like to place on record that the positive support received from the office of DEAR, NABARD was instrumental in conducting the study seamlessly. The study team would also like to thank the officials of Andhra Pradesh Regional Office (APRO), NABARD for their valuable guidance and insights for the study.

The study team is grateful to the District Development Managers (DDMs) of NABARD and officials from Project Implementing Agencies (PIAs) from across the districts of Andhra Pradesh for their positive and constructive backing.

Finally, the study team acknowledges with gratitude the support it received from senior management at ASCI and officials from the administration for the smooth and successful conduct of the study.

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## **ABBREVIATIONS**

APEDA	Agricultural Processed Food Export Development Authority
APMIP	Andhra Pradesh Micro Irrigation Project
APRO	Andhra Pradesh Regional Office
ASCI	Administrative Staff College of India
BoD	Board of Director
CBO	Community Based Organization
CEO	Chief Executive Officer
CGM	Chief General Manager
CMSS	Community Managed Seed Systems
CPSRD	Centre for Poverty Studies and Rural Development
CRIDA	Central Research Institute on Dryland Agriculture
DDM	District Development Manager
DEAR	Department of Economic Analysis and Research
DES	Directorate of Economics and Statistics
DGM	Deputy General Manager
FGD	Focus Group Discussion
FPO	Farmer Producer Organization
FSDD	Farm Sector Development Department
FY	Financial Year
GAP	Good Agricultural Practices
GM	General Manager
Gol	Government of India
GP	Grama Panchayat
Ha	Hectare
ICAR	Indian Council of Agricultural Research
IFP	Integrated Food Park
ITDA	Integrated Tribal Development Authority
IWMP	Integrated Watershed Management Programme
KII	Key Informant Interviews
KVK	Krishi Vigyan Kendra
MACS	Mutually Aided Cooperative Societies
MFP	Mega Food Park
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIDH	Mission for Integrated Development of Horticulture
MoFPI	Ministry of Food Processing Industries
MSME	Ministry of Micro Small and Medium Enterprises
MT	Metric Tonnes
NABARD	National Bank for Agriculture and Rural Development
NARS	National Agricultural Research System
NCCD	National Centre for Cold Chain Development
NEDCAP	Non Conventional Energy Development Corporation
NGO	Non Government Organization

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

NHB	National Horticulture Board
NICRA	National Innovations on Climate Resilient Agriculture (NICRA)
PGS	Participatory Guarantee System
PHC	Pre-Harvest Contractor
PI	Principal Investigator
PIA	Project Implementing Agency
PKVY	Paramparaghat Krishi Vikas Yojana
PMSKY	Pradhan Mantri Krishi Sinchayee Yojana
PODF	Producer Organization Development Fund
RA	Research Associate
SAU	State Agricultural University
SDG	Sustainable Development Goal
SFAC	Small Farmers Agribusiness Consortium
SMC	Soil Moisture Conservation
TDF	Tribal Development Fund
ToR	Terms of Reference
UPL	United Phosphorous Limited
VC	Village Committees
WASSN	Watershed Support Services and Activities Network
WC	Watershed Committee
WDF	Watershed Development Fund
WRD	Water Resource Development

## **EXECUTIVE SUMMARY**



The study on “**Strengthening Value Chain in Tribal Development Fund – Wadi project areas in Andhra Pradesh**” was awarded to the Administrative Staff College of India (ASCI) vide sanction Ref: DEAR/R&D/565/P-327/2019-20 dt. 25 June 2019.

Major objectives of the Study as indicated in the Terms of Reference (ToR) were

- To comprehend on the project status, social and economic changes in the project farmers in sample *Wadis* or *Maa Thota* (Orchards)
- To undertake a crop wise supply chain analysis in the selected *Wadis*
- To map crop wise key stakeholders including input suppliers, commission agents, traders, processors, exporters, farmer institutions.
- To identify critical gaps and potential opportunities for enhancement of supply chain performance
- To arrive at a strategic action plan for each *Wadi* crop wise
- To comprehend social norms of economic organizations of tribal life evolved and persisting over time across *Wadi* project farmers

According to the data provided by the Andhra Pradesh Regional Office (APRO), NABARD vide email dt. January 23, 2019; total no of projects sanctioned and completed under the “*Maa Thota*” Programme in the state of Andhra Pradesh till then were forty-two (42). The study population therefore was considered as 42. These projects had covered 28,750 acres of *Wadi* plantations, benefitting 30,546 tribal farm families.

The sampling framework was designed assuming that the subjects of evaluation belonged to a homogenous population of *Wadi* projects. Assuming a homogeneous population of tribal farmers across 42 *Wadi* projects in the State, as indicated in the TOR, 6 *Wadi* projects were studied in detail as part of the study. The no of beneficiary farmers contacted in each *Wadi* project area were approximately 50 and the total sample of farmers interviewed were 281.

Comprehending the Terms of Reference (ToR) received from APRO NABARD the study adopted a mixed methodology as follows;

- Stakeholder consultations with all project (internal) stakeholders including NABARD officials at the Regional Office and Project Implementation Agencies (PIAs) were undertaken to finalize the work plan and evaluation tools.
- Independent primary research was carried out with the sample *Wadi* project farmers using structured schedules. The survey was a quantitative research method to understand the socio-economic status of the beneficiary farmers and their expectations and feedback on the *Wadi* project implementation. Associated challenges were also captured using the survey.
- The independent survey of the farmers on social and economic changes “before” *Wadi* interventions were captured using recall method. The data captured in the “after” scenario was compared with the before scenario. The baseline scenario was understood by way of interactions with the farmers and the project implementing agencies as a structured baseline study was not available.
- Qualitative inputs from the beneficiary farmers was captured using Focus Group Discussions (FGDs)

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

- Stakeholders including Farmer Producer Organizations (FPOs), Village Committees (VCs) and Multi Aided Cooperative Societies (MACS) and key supply chain actors were interviewed through Key Informant Interviews (KIs).
- This diagnostic approach on ground; understanding the crop wise potential for area expansion, demand for various products from domestic and international markets, current marketing arrangements, trade and processing activities, value addition feasibility etc. was analysed.
- Secondary research was undertaken to triangulate the findings from primary research. Crop wise price trends for the past five years in the local markets, demand from domestic consumption and exports, efforts by key institutions in post- harvest handling and processing including Agricultural Processed Food Export Development Authority (APEDA), National Horticulture Board (NHB), Small Farmers Agri-business Consortium (SFAC), Ministry of Food Processing Industries (MoFPI) etc were derived from secondary research. Policy environment at the national and state level was studied to know a commodity's potential for absorption of next level activities of preservation and value addition towards strengthening of the value chain.
- A strategy and action plan for strengthening the value chain of Wadi crops was developed based on the results and findings obtained from the above detailed research methods.
- These plans were validated by external experts in order to submit pragmatic and doable plan of action to the Wadi project team at NABARD. The validation exercise was in the form of a consultative workshop with project implementing agencies conducted on 8<sup>th</sup> of November 2019 at ASCI and through one on one meetings with external experts.

As part of the assessment, the study team interacted with the following stakeholders.

- Primary Stakeholders / End Users– Tribal farm families
- Secondary stakeholders – Officials from Project Implementing Agencies, Members of Village Committees, Multi Aided Cooperative Societies, Farmer Producer Organizations
- Officials from APRO, NABARD

Summarizing the results and discussions;

Economic changes in the Wadi farmers was measured by the changes in the average gross income per acre. Classic “Before – After” method was used to enumerate the **“Average gross income from one acre of farm land”**. The rise in gross income per acre was estimated at **Rs. 13,400/-** across all crops and districts. This translates to **201 percent improvement in gross income per acre**.

The net financial impact of Wadi programme was evaluated using **“Partial Budgeting”** method. In the partial budgeting method, **the total net costs measured by increase in costs per acre and reduced returns per acre are deducted from the total net**

**benefits measured by increased revenue per acre and decreased costs per acre**, due to introduction of a particular farming practice. Here the farming practice is “introduction of orchard crops along with intercrops” in areas where subsistence rainfed cultivation was undertaken or where the land was left fallow. The average net benefit per acre as a result of introduction of *Wadi* method of cultivation was estimated at **Rs. 12,265/-**.

Apart from the horticultural species, border plantations accrue multiple benefits to the tribal *Wadi* farm families in the short and long term. Most of the PIAs have supplied teak plants (*Tectona grandis*) as border plants majorly with an intention of creating a long-term asset that shall earn a considerable income to the farmers in the coming twenty years. One of the major social benefit of promoting perennial fruit crops as border crops is ensuring nutritional security to the farm families through perennial fruit crops such as Custard apple or Aonla or Jamun which are otherwise not purchased for consumption by these farm families. Also, annuals such as Moringa help the families fight anaemia which is widely prevalent especially among the school children and women. Apart from these social benefits, one cannot discount the economic benefits obtained from these plantations in addition to the revenue from the horticultural plantations.

Crop wise supply chain (macro environment and cluster level dynamics) analysis was performed for four major crops including mangoes, cashew, acid lime and sapota. Accordingly, *Wadi* wise interventions categorized into short and medium term interventions is as detailed below:

## **I. Chittoor – RAAS**

Though the cluster needs to shift towards strengthening the post harvest and marketing activities, the *Wadi* cluster seems to be having other inherent issues such as per unit productivity, water availability, threat from wild animals etc.

### **A. Short Term Interventions**

- Given that the mango yields are highly subsistent due to water shortage, there is a need to strengthen the livelihood development programme by supporting rearing of small ruminants. As it is well established that small ruminants such as sheep or goat synergize well with dryland ecosystems under the Integrated Farming System Approach (CRIDA)<sup>1</sup>, the rainfed farmers in K V Palli could be rendered financial assistance for rearing small ruminants. Whereas in Pileru mandal where water availability is not an immediate concern, IFS could be promoted by supporting livestock rearing.
- It is recommended that the existing farm ponds under *Wadi* are provided with additional cost-effective lining, preferably with polyethylene. The plastic lining shall help the farmers in storing water for a longer period, most importantly, when there is a prolonged dry spell after rains. “In areas of severe drought, lining of farm pond to control seepage and percolation losses would be helpful in supplemental irrigation at crop critical stages, livestock rearing and domestic water supply. This is more relevant in case of light textured soils where the sand component is high” (NICRA).

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<sup>1</sup> <http://www.crida.in/AICRPDA/Bio-Diverse.pdf>

- Wild boar menace is highly prevalent in Peddathanda and Kothabidiki habitations of K V Palli. Farmers have been suffering due to the same and are unable to undertake inter-cultivation in their orchards. As the farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (Cactus, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*)

### B. Medium Term Interventions

- It is important to leverage upon the Chittoor district's strength in processing and value addition. Chittoor district is well known for mango pulp manufacturing contributing to around 70 percent of the country's mango pulp production and is identified as an agri export zone for Mangoes by APEDA. There is a need to focus on marketing activities in the medium term by establishing direct marketing links with the processors. The district houses one of the pioneers in Mega Food Parks (MFP); Srimi Food Park and another Integrated Food Park (IFP) is under construction<sup>2</sup>. It is essential to strengthen the functioning of existing Village Communities and handhold the FPOs in handling collective activities such as input sourcing, post-harvest handling and produce marketing.
- In addition to direct marketing, FPOs need to work with farmers and processors on standardization of produce quality of mangoes which will further lead to enhanced marketing opportunities including exports. Currently, the processing clusters are unable to operate at their fullest capacities and leverage completely on exports as they have been facing issues related to produce quality (NABARD). Currently, the district has 14 FPOs registered with Department of Horticulture (MIDH) under which 4500 ha of mango farmers are covered, translating to 5 percent of the total mango acreage in the district.

## 2. Anantapur– IA & BWS

Water availability in Wadi plantations being the most critical issue in Anantapur similar to Chittoor, it is recommended that the water conservation activities are undertaken on priority.

### A. Short Term Interventions

- Water availability being directly proportional to yields in Mango orchards, there is a need to support the existing orchards through community borewells by way of loan or a ceiling grant, as feasible. There is a need to enhance the assistance towards critical irrigation support in the existing plantations to overcome the prolonged dryspells. There is also a need to educate and build awareness among the farmers on climate resilient crop

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<sup>2</sup> <http://www.apvision.ap.gov.in/JBMV-2019/whitepapers/4.%20Agriculture%20&%20Allied%20Sectors.pdf>

cultivation technologies in Mango orchards in association with the nearest KVKs.

- Marketing of fresh mangoes need a re-orientation where the FPO needs to focus on the post-harvest and marketing activities to a greater extent. Nearest urban market of Bengaluru needs to be taken advantage of. “The International airport at Bangalore located 200 km away is easily accessible and has good connectivity, offering a potential opportunity for exports” (NABARD).

### **B. Medium Term Interventions**

- It is suggested that an integrated pack house with handling capacity of 16 MT per day with a 2 MT/ hour sorting line is established for primary processing of Mangoes. This may enable *Wadi* farmers and the FPOs to build linkages with leading fresh retail chains in the district. “Among all the 4 districts of Rayalaseema, Anantapur is fast emerging as Horticulture hub with presence of many private companies, i.e Future Group, INI Farms, Big Basket, Ninja Cart, Desai Fruits etc” (Government of Andhra Pradesh. White Paper on Agriculture. 2019).
- Given that water is a precious resource in the district, it is important to look into crop diversification as Anantapur is well known for dryland horticulture. As it may happen that the yields in Mango are not economical due to water shortage, there is a requirement to encourage alternate crops including Jamun/ Amla/ Custard Apple/ Pomegranate. New crops such as Pitaya or Dragon fruit may also be encouraged, however, requires sufficient market intelligence for a minimum of 2-3 years before expansion in a larger scale.

## **3. Vishakapatnam - Vikasa**

The cluster has almost reached its saturation in terms of production and strengthening the post-harvest and marketing activities seems a top priority leading to enhanced value proposition in terms of rise in net income from farming. Following short and medium interventions are being suggested for implementation by Vishakapatnam *Wadi* cluster.

### **A. Short Term Interventions**

- Dovetailing assistance from other complementing schemes and programmes including Agriculture, Horticulture, Andhra Pradesh Micro Irrigation Programme (APMIP), Non-Conventional Energy Development Corporation (NEDCAP) etc were not observed. Given that there is a need to optimize on the cost of production, there is a need to strengthen the convergence initiatives to the maximum extent possible. Though water is available in abundance in Dumbriguda mandal, it was observed that few Maa Thota habitations in Araku mandal had to witness dryspells frequently. There is an immediate need to leverage upon the drip irrigation assistance available from the State Government in order to encourage judicious

utilization of water. There is also a need to partner with Integrated Tribal Development Agency (ITDA) where Wadi farmers could get an opportunity to sell their produce through the ITDA retail outlets in Araku, fetching a relatively premium price compared to selling them at shandies.

- In order to bring in incremental value proposition to the farmers, there is a need to immediately organize farmers and motivate them to go for “PGS Organic Certification” under the Paramparaghat Krishi Vikas Yojana. As most of the Wadi farmers are currently utilizing organic inputs that are mostly produced in house through recycling of farm waste, the PGS certification is essential in order to enhance the competitiveness of the Araku farmers in the market in terms of price and quality. The PGS India certification also enhances the market reach by enabling the Wadi farmers to reach out to unexplored terrains including urban, health conscious consumers. Eventually, Wadi farmers also can explore opportunities internationally. “Several studies (e.g. Pinto et al 2014) show that such group certifications reduce the cost of certification and enable smallholder farmers to access international organic markets and the benefits they can bring” (Research Institute of Organic Agriculture)<sup>3</sup>.
- Though Vikasa, the PIA possesses internal resources and technical knowledge on the zero budget natural farming method of cultivation, it is important to forge association with the well-established agricultural research and education systems including the KVKs and Research Stations under the State Agricultural University.

### B. Medium Term Interventions

- There is a need to focus on post-harvest and marketing facilities locally at Araku and hence it is recommended that an Integrated Pack House is constructed through the existing FPO. This shall encourage the farmers to undertake collective marketing. FPO could identify the requisite land for the activity.
- As identified by the PIA and as felt by the study team, a solar drying facility for millets is important as the buyers do not come forward to buy the produce as the moisture content is generally high. This often results in farmers selling the produce at a compromised price. Eventually, operationalization and maintenance of solar dryers could be entrusted to the FPO.
- Building upon the “organic” advantage of mangoes and other intercrops such as millets or pepper or coffee in Araku and Dumbriguda mandals, the FPO needs to build a brand on its own.

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<sup>3</sup> <https://orgprints.org/35159/7/fibl-2019-ics.pdf>

#### 4. Srikakulam

##### A. Short Term Interventions

- As indicated by the PIA, the average per acre productivity of Cashew in the Wadi cluster ranges from 0.4 to 0.6 MT/ acre which is lesser than the national average of 0.8 MT/ acre. As studies have well documented that the productivity of cashew is lesser in Andhra Pradesh as compared to states like Maharashtra (SFAC), there is a need for the Wadi farmers to engage themselves in productivity enhancement measures with the help of research institutions such as Cashew Research Station; Bapatla.
- Andhra Pradesh is well-known for cashew processing with aggregate installed processing capacity of 95 MT spread across 175 units (SFAC). As Palasa of Srikakulam is one of the leading cashew processing clusters, the FPO needs to explore the possibility of entering into direct marketing contracts with these processors. There is also a need to build awareness amongst the farmers to implement Good Agricultural Practices (GAP) or Standardized crop management measures in order to adhere to the quality requirements of the processors. PIA also had indicated that they have plans to enter into a contract with Samunnati Agro solutions Pvt Ltd and Pay Agri market Linkages for marketing initiatives in the future. The PIA also has indicated that they require one rural mart in Pathapatnam Mandal of the district where they could undertake marketing of raw and value-added cashew nuts.

##### B. Medium Term Interventions

- As the FPO has already identified land, a pack house with mechanized sorting and grading line of capacity 3 MT per hour may be considered for establishment in the medium term. This activity may also be supported with development of a private label for the Wadi produce from Srikakulam. However, establishment of a processing unit need to be well assessed for its need as the cluster already hosts a considerable capacity for processing and unable to utilize the fullest of its capacities as assessed by SFAC. The units are reportedly dependant on imported cashews.

#### 5. Nellore

##### A. Short Term Interventions

- As water is a scarce resource in the Dakkili and Venkatagiri mandals of the district, it is important to look into community water management initiatives including participatory water budgeting, maintenance of assets such as farm ponds, internal trenches or boundary trenches etc. Convergence with MGNREGS for establishment of individual farmer level



water assets such as internal trenches need to be explored in addition to community borewells on cost share basis.

- Wild animals menace is highly prevalent in the district. As the Wadi farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (Cactus, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*).
- The efforts of the FPO; Navajeevan Agri and Horticulture Rythu Producer Company Ltd in marketing acid lime and mangoes needs to continue. In order to supplement the efforts of the FPO, there is a need to establish a sorting cum grading facility of capacity 2 MT per hour. As the Department of Horticulture has already been approached, this could be a short-term intervention.

### B. Medium Term Interventions

- The FPO; Navajeevan Agri and Horticulture Rythu Producer Company Limited also has established linkages with the Non-Banking Financial Company (NBFC), Samunnati Finance who are specialized in Agri Value Chain Finance. The FPO could build on this strength and commence work on processability of Acid Lime (Balaji) and Mangoes (Totapuri) as their preparedness for execution seems relatively higher. However, processability of Balaji variety of acid lime needs to be assessed.

## 6. Prakasam

### A. Short Term Interventions

- Water is a major concern in the Giddalur mandal of Prakasam district where people have been suffering for want of drinking water for the past five years. Community water management initiatives including participatory water budgeting, maintenance of assets such as farm ponds, internal trenches or boundary trenches etc may be emphasized upon. Based on the ground water availability, community borewells could be provided through convergence with Jalasiri programme of Government of Andhra Pradesh.
- Wild animals menace is highly prevalent in the district. As the farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (Cactus, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*)
- As the PIA has not yet facilitated the formation of FPOs, there is an immediate need to focus on motivating the farmers to come together and undertake the registration process as soon as possible. They also have to



be exposed to awareness programmes on importance and functioning of FPOs, advantages of FPOs, etc as done by other PIAs.

### Conclusion and Recommendations

It can be concluded from the above results and discussions that the TDF funding towards creation of “*Maa Thota*” horticulture plantations in Andhra Pradesh had resulted in improved socio-economic benefits to the tribal farmers through creation of sustainable livelihood opportunities. As the study is meant to arrive at strategies and measures for strengthening the value chain of TDF – Wadi projects in Andhra Pradesh, following are the key recommendations submitted for consideration by NABARD.

- **Enhanced focus on water conservation - Introduction of Wadi user groups and make them self-sustainable by constituting a revolving fund**

As water is found to be highly significant in enhancing the productivity of *Maa Thota* Orchards and a scarce resource in most of the districts, Community enforced water budgeting as a tool could be introduced in Wadi clusters so that they could plan well ahead of fruiting or flowering season and therefore combat water scarcity effectively<sup>4</sup>.

It is essential that the sustainability of the Wadi programme is ensured through regular maintenance and upkeep of the assets created including the plantations, water harvesting structures, soil conservation etc. The Wadi programme can draw inspiration from the Integrated Watershed Management Programme (IWMP) of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) where the registered User Groups (UGs) are being constituted by the Watershed Committees (WCs) at the village level. These groups take up the responsibility of operations and maintenance of all assets created under the project by working in close collaboration with the Grama Panchayat (GP). The Watershed Development Fund (WDF) is managed by the Watershed Committees<sup>5</sup>.

Similarly, in order to sustain the performance of orchards and to undertake regular maintenance of water conservation assets including desiltation works, it may be important for NABARD to consider providing a nominal percentage of allocation towards a recurring grant for Water Management. The fund could be administered and managed by the Village Committees of Wadis post completion of the project and exit of the PIAs.

This fund may be utilized by the Village Committees as per the priorities of the cluster including water supply to the plantations during dry spells, undertaking maintenance works of the existing water conservation structures, building new structures etc. However, in the long run, it needs to be ensured that the VCs are well equipped in dovetailing funds from other complimentary schemes and

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<sup>4</sup> [https://www.nabard.org/demo/auth/writereaddata/File/20%20\\_WATER\\_BUDGETING.pdf](https://www.nabard.org/demo/auth/writereaddata/File/20%20_WATER_BUDGETING.pdf)

<sup>5</sup> Source: [https://dolr.gov.in/sites/default/files/Common%20Guidelines\\_2011%5B1%5D.pdf](https://dolr.gov.in/sites/default/files/Common%20Guidelines_2011%5B1%5D.pdf)

programmes such as PMKSY, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), etc.

NABARD may like to chalk out *Wadi* expansion plans considering the water availability as one of the major attributes of successful implementation and economic benefits in the long run. Alternatively, diversification into drought tolerant crops such as Amla, Jamun, Guava, Pitaya etc could be assessed.

- **Exit strategies for PIAs**

Based on the study findings, it is known that the role of *PIAs* in sustaining the project operations post completion of projects is limited to extending need based/ query based advisory support to the tribal led Institutions. However, it is felt that the *PIAs* need to be mandated to submit a detailed exit strategy as part of their funding proposal and need to be assessed on the same as and when the projects get completed. Associated financial assistance towards handholding of the farmer led institutions by the *PIAs* seems necessary.

For instance, the *PIAs* had put in efforts to motivate and organize farmers to formation of FPOs. However, as the project is now completed, it is not very clear if the farmer led institutions are well equipped to undertake operations on their own. Also, one cannot be sure if the *PIAs* would extend support given that the financial assistance from NABARD is no longer available. On the other hand, the business operations of FPOs are still at a nascent stage where they are at their early stages of undertaking collective operations.

Therefore, there needs to be a well formulated exit mechanism to be proposed by the *PIAs* along with a three (3) year handholding period post completion of the projects. This handholding period majorly shall focus on building backward and forward linkages for effective functioning of the FPOs, executing periodical trainings on business management for the Directors, Members and employees etc. This is over and above the capacity building support extended to FPOs by NABARD.

- **Convergence**

As discussed earlier in this report, convergence of NABARD's *Maa Thota* Programme with flagship programmes of the Government of India is important to enhance the cost benefit effectiveness. Some of the programmes that could be readily leveraged are Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Pradhan Mantri Fasal Bima Yojana (PMFBY), Paramparaghat Krishi Vikas Yojana (PKVY) and MGNREGS. Though the family contribution (cost share of the beneficiary) in *Wadi* programme was originally conceived to be around 20 percent, with creation of water related assets, the contribution could be as high as 60 percent as observed during the field visits. Therefore, the future projects may be advised to focus on convergence initiatives and the *PIAs* may be apprised on the need to work in tandem with the State Department of Agriculture and Horticulture.

- **Creating access to scientific knowledge**

Prima facie, though the PIAs have tried their best to deliver crop production related advisory services to the farmers, it is felt that there exists a considerable gap that needs to be fulfilled. The perceived gap is due to various reasons including but not limited to non-availability of technical personnel with the PIA, PIA relying only on internal conventional knowledge possessed by their own resources etc. Therefore, NABARD may think of enabling linkages with the agricultural research system in order to build capacities of the tribal farmers periodically on good agronomical practices and post-harvest management of the WADI crops.

Parallel advisory and information delivery platforms such as *ikisan* or *agropedia* or agri tech start-ups could be approached to design a real time agricultural information advisory system to benefit the WADI farmers. In addition to delivering region specific compendium of agricultural practices, these platforms also have been effectively addressing both the biotic and abiotic stress situations by delivering timely, scientific advisory.

Given that the tribal beneficiaries from the state of Andhra Pradesh have benefitted from the TDF – WADI assistance, it is strongly recommended that the efforts are continued. Stronger emphasis on water budgeting, community ownership on water management, sustainability planning (planning for exit of PIAs), drawing synergies from the State and Central sector schemes, and linkages with agricultural research and education system may be considered for a revisit as discussed above.

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## I. INTRODUCTION

### I.1 Background of the study

Tribal Development Fund (TDF) is one of the NABARD's sponsored schemes in the farm sector development where the tribal population are being supported through concessional rates of refinance, either in the form of a loan or a grant. In 2003-04, NABARD embarked upon "WADI" model orchards based on the successful experience of Adivasi Development Programme of Tamil Nadu and the TDF was created with an initial corpus of Rs. 50 Cr. "The cumulative sanctions under Tribal Development Fund (TDF) stood at `Rs. 2,198.16 Crore, as on 31 March 2019, covering 5.34 lakh families with 746 projects across 28 states and union territories"<sup>6</sup>. Small orchards as the core component, popularly called as "WADI", the project is being implemented for improving the livelihood of tribal population.

The goal of the project is to "Ensure a sustained and improved livelihood for the tribals"<sup>7</sup>. The objectives of the TDF being

- Provide livelihood through promotion of agri – horti – forestry
- To increase the agricultural productivity through promotion of appropriate technologies like tree-based farming, sustainable agriculture, and adopting water harvesting technologies
- To improve the socio-economic condition of women and other socially challenged sections
- To reduce migration

The TDF's implementation strategy has the following guiding principles,

- Effective utilization of available land, water and manpower resources
- Enrich fertility of soil through suitable land treatment
- Increase in agricultural production through sustainable agricultural practices and efficacy in water management techniques
- Promotion of local institutions by conducting series of trainings and seminars to tribals
- Empowerment of women in mainstream activities by creating awareness and incorporating appropriate trainings for women
- Promotion of income generation activities for landless families
- Ensure alternative income to the people through promotion of dry land horticulture and multipurpose agri forestry species

In the State of Andhra Pradesh, "Wadi" model of tribal development under TDF has so far supported 42 projects across the 12 districts (Source: DEAR, NABARD). As the "Wadi" model's core focus is to empower tribals leading to sustainable livelihood development, it is necessary to study the existing projects in the State and ensure strengthening of produce value chains of fruit crops taken up under the projects towards sustainability. To quote NABARD's website, a key concern of NABARD with respect to TDF is "sustainability of tribal livelihoods".

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<sup>6</sup> Source :<https://www.nabard.org/auth/writereaddata/File/Other%20additional%20Information.pdf>

<sup>7</sup> Source: <http://nabard.iyd.org.in/Objectives.html>

In this context, the Department of Economic Analysis and Research (DEAR) from the Andhra Pradesh Regional Office (APRO) had awarded the study on strengthening the value chain of TDF – Wadi projects to the Administrative Staff College of India vide sanction order no. 565 dt. 25 June 2019.

### **1.2 Tribal Development Fund (TDF) – Genesis and Overview**

The tribal communities are dependent mainly on agriculture, forests and livestock for their livelihood. In many parts of the country, the tribal communities reside in inaccessible areas and are still devoid of common infrastructure facilities such as road and communication, health, education and safe drinking water, which do not allow them to absorb technological and financial facilities provided by government. NABARD has been supporting tribal development through separate line of credit to agencies supporting tribal families, promotional activities, etc. However, a key concern for NABARD has been the sustainability of tribal livelihoods.

NABARD gained rich experience in this direction through implementation of Adivasi Development Programmes in Gujarat and Maharashtra. Based on the successful experience of Adivasi Development Programmes, NABARD embarked upon an ambitious program of replicating the “Wadi” model across the country. In this direction, NABARD created a Tribal Development Fund (TDF) with a corpus of Rs.50 crore, out of its profits in 2003-04. All projects under TDF are implemented by partnering with KVKs, NGOs and Corporates. The comprehensive tribal development programme, popularly called as “Wadi” model is being implemented for improving livelihood of tribals under this programme.

The objective of TDF is to promote sustainable participatory livelihood programmes (“Wadi” model and “beyond Wadi approach”) which inter alia, aim at economic uplift through sustainable agriculture, social empowerment, improvement in quality of life including health and women development, in tribal predominant areas of the country supported through Non-Government Organisations (NGOs)/ Community Based Organisations (CBOs)/ KVKs etc.

The basic elements of the wadi model supported by NABARD have been briefly described below

- Central focus is on “Wadi” (meaning a small orchard of one or two acre of two crops).
- Staggered income over long term through plantation of forest species on the boundaries
- Family based approach towards development
- Sustainability – key for success of the model
- Community ownership of project
- Measures to improve the quality of life of tribal families
- Institutional building by formation of cooperatives
- Support for processing and marketing of farm produce

TDF aims at

- Creating replicable models of integrated development of tribal families, on participatory basis, through adoption of sustainable income generating activities based on potential of the area and the tribal needs;

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

- To build and strengthen tribal institutions which would enable the communities to be partners in policy formulation, execution of programs and improve social and economic status;

TDF is used to support;

- Sustainable and participatory livelihood programmes such as tree/ orchard-based farming systems (wadi); mixed wadis (mixed farming/multi-tier farming; precision farming; natueco farming, etc.
- Traditional economic activities like collection of minor forest produce, herbal medicines, gums, natural dyes, sheep rearing, etc.;
- Livelihoods based on tribal art and craft and other non- farm based activities;
- Vertical integration through creation of processing and marketing facilities, common infrastructure, etc.
- Measures to improve quality of life such as preventive health care and sanitation;
- Women empowerment through promotion of thrift groups, drudgery reduction, income generation activities, enabling participation of women in institutions, etc.
- Special plans for landless;
- Training and capacity building of all stake holders such as farmers, PIAs, Government Departments, Corporate partners, etc. and engaging the services of resource support organizations;
- Strengthening of tribal organizations through promotion of co-operatives, project level committees, village level institutions, Producers Companies, etc.
- Potential and exploratory studies, mid- term, ex-post evaluation studies, support to events such as workshops, exhibitions, etc. for promoting tribal activities;
- Documentation through publication of literature, documentaries, video films, etc.;
- Integrated development of tribal dominated villages with focus on sustainable agriculture practices and allied activities encompassing the entire chain of interventions.
- Publicity measures.

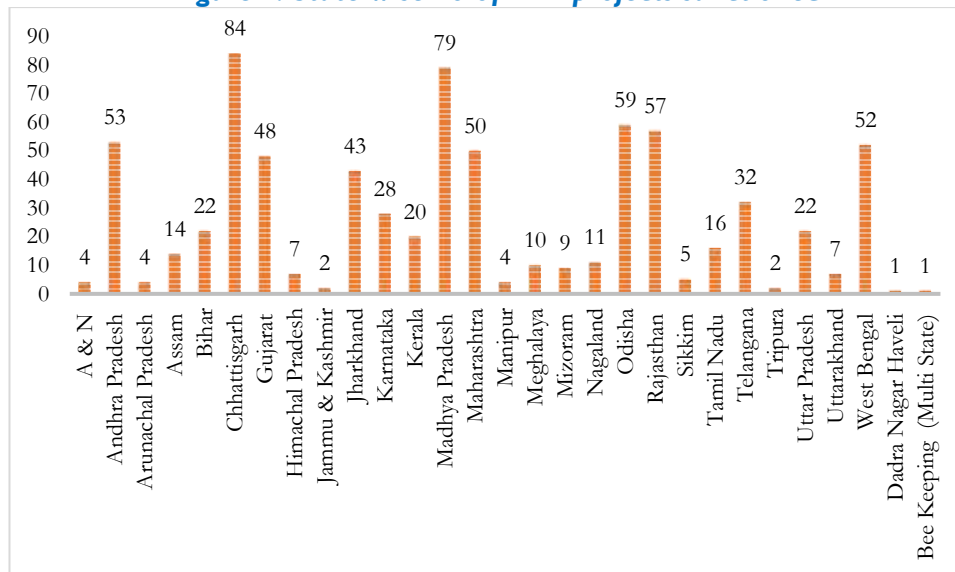
Under TDF, the fund support is need based, location specific and flexible for appropriate utilization. The funding will be done by way of grant as found appropriate. The Tribal Development Fund also envisages financial collaboration with State Governments, Corporates, NGOs, Trusts and other developmental agencies.

### **1.3 State – wise number of projects and allocation**

As can be seen from Figure 1, of the total 712 projects across the country, Chhattisgarh is the leading state implementing 83 TDF projects followed by Madhya Pradesh with 77 projects. Other major states in implementing “Wadi” Projects include Odisha, Rajasthan, Andhra Pradesh, Maharashtra and West Bengal. State wise no of families supported under TDF and the financial assistance committed under the fund are shown in Figures 2 and 3 respectively.

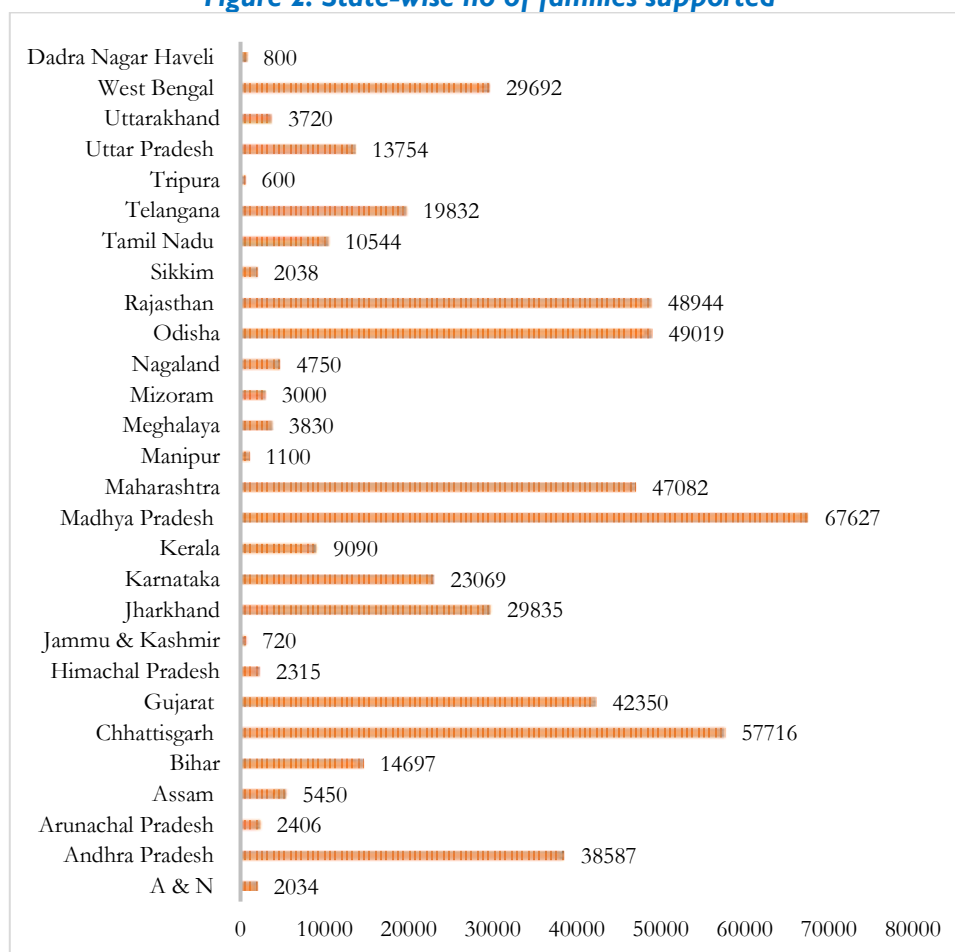
## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

**Figure 1. State-wise no of TDF projects sanctioned**



Source: TDF state-wise cumulative status of TDF projects as on 31/03/2019 available at <https://www.nabard.org/about-departments.aspx?id=5&cid=470>

**Figure 2. State-wise no of families supported**

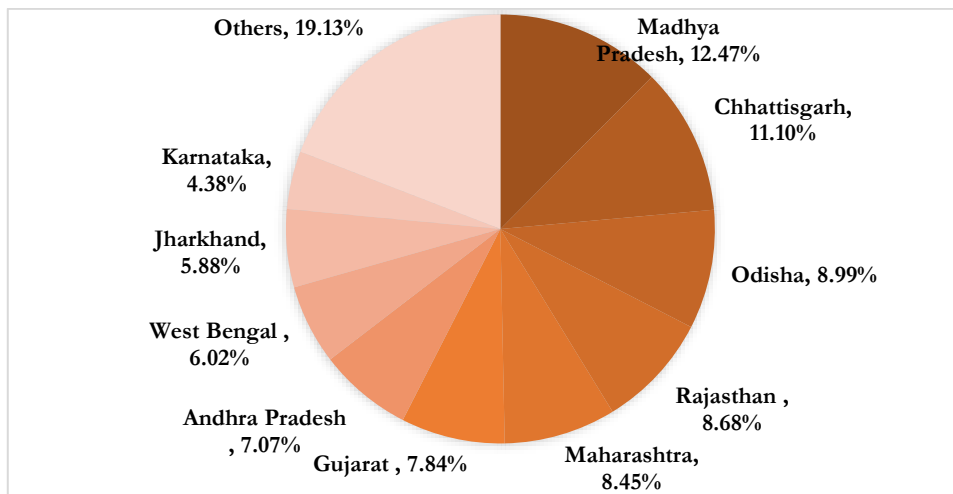


Source: TDF state-wise cumulative status of TDF projects as on 31/03/2019 available at <https://www.nabard.org/about-departments.aspx?id=5&cid=470>

### Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

Though the State of Chhattisgarh is leading in terms of no of projects implemented (Figure 1), Madhya Pradesh tops in terms of number of families benefitted from TDF projects. As shown in Figure 2, no of tribal families benefitted in the State are 67,627.

**Figure 3. State -wise financial assistance so far (percent allocation)**



**Source: TDF state-wise cumulative status of TDF projects as on 31/03/2019 available at <https://www.nabard.org/about-departments.aspx?id=5&cid=470>**

49. 68 percent of the allocation under the TDF is distributed across five states including Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan and Maharashtra (Figure 3).



## 2. THE STUDY

Study on “Strengthening Value Chain in Tribal Development Fund – *Wadi* project areas in Andhra Pradesh” was awarded to the Administrative Staff College of India (ASCI) vide sanction Ref: DEAR/R&D/565/P-327/2019-20 dt. 25 June 2019.

### 2.1 Rationale

NABARD’s investment through funds/ programmes/ schemes is strategically aligned with a number of Sustainable Development Goals (SDGs). Accordingly, the TDF assistance in agriculture sector through *Wadi* projects are especially linked to the SDG 1 and SDG 2; “No Poverty” and “Zero Hunger” respectively. While NABARD had conducted a number of impact and mid-term evaluation studies of watershed programmes as part of their farm sector development, the studies pertaining to TDF *Wadis* seem to be limited in number. Some of the studies that are documented include;

- Impact Evaluation in Maharashtra by Institute of Rural Management (IRMA), Anand
- Mid Term Evaluation of watersheds in Andhra Pradesh by Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad
- Impact Evaluation of PMs Package Programme by Indian Council of Agricultural Research (ICAR), Bellary

Given the importance of sustaining the social and economic changes that the “*Maa Thota*” programme had brought in, this study conducted by ASCI focused on strategizing the way forward for sustainability initiatives across the completed projects.

### 2.2 Objectives

Major objectives of the Study as indicated in the Terms of Reference (ToR) were

- To comprehend on the project status, social and economic changes in the project farmers in sample *Wadis* or *Maa Thota* (Orchards)
- To undertake a crop wise supply chain analysis in the selected *Wadis*
- To map crop wise key stakeholders including input suppliers, commission agents, traders, processors, exporters, farmer institutions.
- To identify critical gaps and potential opportunities for enhancement of supply chain performance
- To arrive at a strategic action plan for each *Wadi* crop wise
- To comprehend social norms of economic organizations of tribal life evolved and persisting over time across *Wadi* project farmers

### 2.3 Subjects / Population for evaluation

According to the data provided by the Andhra Pradesh Regional Office (APRO), NABARD vide email dt. January 23, 2019; total no of projects sanctioned and completed under the “*Maa Thota*” Programme in the state of Andhra Pradesh till then were forty-two (42). The study population therefore was considered as 42. These projects had covered 28,750 acres of *Wadi* plantations, benefitting 30,546 tribal farm families.

It was observed that the “*Maa Thota*” programme relied on a multi crop model where more than a single horticultural crop was promoted across all the project districts based on the agro-climate and edaphic (soil) conditions. This seemed to be a strategic measure by NABARD in order to ensure that the marketing risks are diversified; resulting in a

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

nominal gross annual income from Wadi orchards even if market price of one of the crops fall. Crops promoted in the State along with the acreage covered and no of tribal families benefitted are presented in **Table 1**.

**Table 1 Crops promoted and acreage of Maa-Thota Programme in Andhra Pradesh**

Major cropping systems	Total area (acre)	Total no. of families
Cashew & Amla	3000	3000
Mango & Amla	8250	9035
Mango & Amla / Sapota	1000	1000
Mango & Amla/ Sapota	1500	1500
Mango & Cashew	3000	3130
Mango & Guava	2000	2070
Mango & Guava / Sapota	1500	1800
Mango & Lemon	500	750
Mango & Sapota	3000	3130
Mango, Amla & Ber	1000	1000
Mango, Amla & Sweet Orange	2000	2031
Mango, Cashew & Drumstick	500	500
Mango, Cashew & Sericulture	500	500
Mango, Guava & Amla	500	600
Mango, Sapota & Drumstick	500	500
<b>Grand Total</b>	<b>28,750</b>	<b>30,546</b>

Source: APRO, NABARD

District wise acreage under the programme along with the number of tribal farm families covered is shown in **Table 2**.

**Table 2 District wise acreage under TDF Wadi in Andhra Pradesh**

District	Sum of No. of families	Sum of Area (acre)
Anantapur	500	500
Chittoor	6695	5750
Cudappah	570	500
East Godavari	1000	1000
Guntur	1031	1000
Krishna	1300	1000
Kurnool	1500	1500
Nellore	1900	1500
Prakasam	2550	2500
Srikakulam	3000	3000
Vishakapatnam	8500	8500
Vizianagaram	1000	1000
West Godavari	1000	1000
<b>Grand Total</b>	<b>30,546</b>	<b>28,750</b>

Source: APRO, NABARD

## 2.4 Stakeholders involved in implementation of TDF Maa Thota Programme

### NABARD

Tribal Development Fund (TDF) is being implemented by the Farm Sector Development Department (FSDD), the erstwhile Development Policy Department of NABARD. The objective of the Department is the implementation of multifarious farm sector initiatives aimed at;

- Conservation and management of natural resources
- Accelerating ground level credit flow by rural financial institutions
- Promoting incremental agricultural production and productivity
- Generating rural employment
- Raising the standard of living of rural poor through credit and grant

### Project Implementing Agencies

The subjects of evaluation, the Wadi projects under TDF were implemented by various Project Implementing Agencies, primarily Not for Profit Organizations. District wise no of project implementing agencies as compiled from the information shared by the APRO NABARD is shown in Table 3.

**Table 3 District wise number of Project Implementing Agencies**

District	Total
Ananatpur	1
Chittoor	8
Cuddappah	1
East Godavari	2
Guntur	1
Krishna	2
Kurnool	2
Nellore	3
Prakasam	3
Srikakulam	4
Vishakhapatnam	11
Vizianagaram	2
West Godavari	2
<b>Grand Total</b>	<b>42</b>

**Source: APRO, NABARD**

### 3. APPROACH & METHODOLOGY

#### 3.1 Approach

Comprehending the Terms of Reference (ToR) received from APRO NABARD, the study adopted a mixed methodology as follows;

- Stakeholder consultations with all project stakeholders including NABARD officials at the Regional Office and Project Implementation Agencies (PIAs) were undertaken to finalize the work plan and evaluation tools.
- Independent primary research was carried out with the sample *Wadi* project farmers using structured schedules. The survey was a quantitative research method to understand the socio-economic status of the beneficiary farmers and their expectations and feedback on the *Wadi* project implementation. Associated challenges were also captured using the survey.
- The independent survey of the farmers on social and economic changes “before” *Wadi* interventions were captured using recall method. The data captured in the “after” scenario was compared with the before scenario. The baseline scenario was understood by way of interactions with the farmers and the project implementing agencies as a structured baseline study was not available.
- Qualitative inputs from the beneficiary farmers was captured using Focus Group Discussions (FGDs)
- Other stakeholders including Farmer Producer Organizations (FPOs), Village Committees (VCs) and Multi Aided Cooperative Societies (MACS) and key supply chain actors were interviewed through Key Informant Interviews (KIs).
- This diagnostic approach on ground; understanding the crop wise potential for area expansion, demand for various products from domestic and international markets, current marketing arrangements, trade and processing activities, value addition feasibility etc. was analysed.
- Secondary research was undertaken to triangulate the findings from primary research. Crop wise price trends for the past five years in the local markets, demand from domestic consumption and exports, efforts by key institutions in post- harvest handling and processing including Agricultural Processed Food Export Development Authority (APEDA), National Horticulture Board (NHB), Small Farmers Agri-business Consortium (SFAC), Ministry of Food Processing Industries (MoFPI) etc were derived from secondary research. Policy environment at the national and state level was studied to know a commodity’s potential for absorption of next level activities of preservation and value addition towards strengthening of the value chain.
- A strategy and action plan for strengthening the value chain of *Wadi* crops was developed based on the results and findings obtained from the above detailed research methods.

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

- These plans were validated by external experts in order to submit pragmatic and doable plan of action to the Wadi project team at NABARD. The validation exercise was in the form of a consultative workshop with project implementing agencies conducted on 8<sup>th</sup> of November 2019 at ASCI and through one on one meetings with external experts.

### 3.2 Evaluation Matrix

The evaluation criteria were drawn based on the study objectives. Evaluation criteria and probable questions or indicators of data and sources of data used for the study are indicated in the **Table 4**.

**Table 4 Evaluation Matrix**

Criteria of evaluation	Probable questions/ indicators	Sources of Data
Project status, social and economic changes in the project farmers in sample Wadis	<ul style="list-style-type: none"> <li>• Status of plantations (age)</li> <li>• Changes in gross per acre income to the farmer post Wadi implementation</li> <li>• Net financial benefit to the farmer</li> <li>• Major cropping and social benefits due to creation of Wadis</li> </ul>	<ul style="list-style-type: none"> <li>• Structured beneficiary schedules – Primary survey</li> <li>• Semi Structured beneficiary schedules - Focus Group Discussions</li> </ul>
Crop wise supply chain analysis  Crop wise key stakeholders including input suppliers, commission agents, traders, processors, exporters, farmer institutions	<ul style="list-style-type: none"> <li>• Stakeholder mapping from input suppliers through processing units</li> <li>• Procurement of agricultural inputs</li> <li>• Sources and frequency of crop advisory services and knowledge</li> <li>• Marketing channels</li> </ul>	<ul style="list-style-type: none"> <li>• Structured beneficiary schedules – Primary survey</li> <li>• Semi Structured beneficiary schedules - Focus Group Discussions</li> <li>• Triangulation with secondary data</li> </ul>
Identify critical gaps and potential opportunities for enhancement of supply chain performance	<ul style="list-style-type: none"> <li>• Diagnostic perspective on the existing sources of inputs, credit, knowledge management, post-harvest and marketing support</li> <li>• Requirement of post-harvest and marketing infrastructure, existing supply and gaps thereof</li> </ul>	<ul style="list-style-type: none"> <li>• Semi Structured beneficiary schedules - Focus Group Discussions</li> <li>• Key Informant Interviews with the Implementing Agencies, Village Organizations, FPOs and MACS</li> <li>• Secondary research</li> <li>• Triangulation</li> </ul>
Social norms of economic organizations of tribal life evolved and persisting	<ul style="list-style-type: none"> <li>• Women beneficiaries in Wadi implementation and their role</li> </ul>	<ul style="list-style-type: none"> <li>• Semi Structured beneficiary schedules - Focus Group Discussions</li> </ul>

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

Criteria of evaluation	Probable questions/ indicators	Sources of Data
over time across Wadi project farmers	<ul style="list-style-type: none"> <li>Capacity building or awareness creation activities for creation of tribal farmer institutions</li> <li>No of self-sustainable tribal organizations promoted and sustained</li> <li>Sustainable livelihoods measured by creation of alternate and secondary economic sources by the Project Implementing Agencies</li> </ul>	<ul style="list-style-type: none"> <li>Key Informant Interviews with the Implementing Agencies, Village Organizations, FPOs and MACS</li> <li>Secondary research</li> <li>Triangulation</li> </ul>
Strategic action plan for each Wadi crop wise	<ul style="list-style-type: none"> <li>Strategic plans based on the existing production, post-harvest and marketing scenario of Wadi clusters</li> <li>Recommendations to NABARD based on consolidation of findings from the sample Wadis</li> </ul>	<ul style="list-style-type: none"> <li>Key Informant Interviews with the Implementing Agencies, Village Organizations, FPOs and MACS</li> <li>Data on progress of Wadis from Project Implementing Agencies</li> <li>Secondary research</li> <li>Triangulation</li> </ul>

Where feasible, the survey data was triangulated with available secondary data to arrive at the findings and recommendations.

### 3.3 Sampling Framework

The sampling framework was designed assuming that the subjects of evaluation belonged to a homogenous population of Wadi projects. Assuming a homogeneous population of tribal farmers across 42 Wadi projects in the State, as indicated in the TOR, 6 Wadi projects were studied in detail as part of the study. The no of beneficiary farmers contacted in each Wadi project area were approximately 50 and the total sample of farmers interviewed were 281.

- Zone 1 (East Godavari, Srikakulam, Visakhapatnam and Vizianagaram)
- Zone 2 (Guntur, Krishna, Prakasam and West Godavari) and
- Zone 3 (Anantapur, Chittoor, Kurnool, SPS Nellore and YSR Cudappah)

Wadis chosen for the study were completed ones enabling the study to lay emphasis on the social and economic changes that occurred as a result of the Wadi programme and those that offer scope for further strategizing the sustainability initiatives. Though “Convenient Sampling” methodology was adopted for selection of Wadis, final selection of projects was done in consultation with APRO, NABARD. District wise list of Wadi clusters visited and cluster wise number of Grama Panchayats (GPs) covered and farmer beneficiaries contacted by the study team are provided in the **Table 5 and Table 6 respectively** while **Annexure I** provides the contact details of the PIA nodal officials contacted as part of the study.

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

**Table 5 District wise Wadi clusters and farmers covered**

District	No of farm families benefitted (No.s)	Target Sample as per the proposal	Wadi clusters/ mandals visited	Sample achieved (No of farmers contacted)
Anantapur	500	50	Bukkapatnam	50
Chittoor	6695	50	K V Palli Pileru	48
Nellore	1900	50	Dakkali Venkatagiri	41
Prakasam	2550	50	Giddalur	50
Srikakulam	3000	50	Hiramandalam Meliaputti Pathapatnam Saravakota	50
Vishakhapatnam	8500	50	Araku Valley Dumbriguda	42
<b>Total</b>		<b>300</b>		<b>281</b>

**Table 6 Cluster wise Grama-Panchayats and farmers covered**

District	Mandal	Sample achieved	GP	Sample achieved (No of farmers contacted)
Ananthapur	Bukkapatnam	50	Agraharam Thanda	4
			Gasikavaripalli	19
			Narasimpalli Thanda	27
Sub Total				50
Chittoor	K V Palli	32	Zillelamanda	32
	Pileru	16	Mellacheruvu	16
Sub Total				48
Nellore	Dakkili	22	Pathanalapadu	18
			Sanganapalli	4
	Venkatagiri	19	Kalapadu	10
			Palemkota	9
Sub Total				41
Prakasam	Giddalur	50	Ambavaram	2
			Diguvametta	2
			Gadikota	24
			Mundlapadu	22
Sub Total				43
Srikakulam	Hiramandalam	10	Akrapalli	10
	Meliaputti	12	Kerasingi	9
			Padda	3
	Pathapatnam	8	Rankini	8
	Saravakota	20	Chinnagujjuwada	10
			Gorribanda	10
Sub Total				50
Vishakhapatnam	Araku Valley	29	Baski	3
			Chompi	19

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

District	Mandal	Sample achieved	GP	Sample achieved (No of farmers contacted)
			Kothabhalluguda	1
			Peda Labudu	5
			Sunkarametta	1
	Dumbriguda	13	Guntagannela	13
<b>Sub Total</b>				<b>42</b>

As part of the assessment, the study team interacted with the following stakeholders.

- Primary Stakeholders / End Users– Tribal farm families
- Secondary stakeholders – Officials from Project Implementing Agencies, Members of Village Committees, Multi Aided Cooperative Societies, Farmer Producer Organizations
- Officials from APRO, NABARD

The study team interacted with approximately 50 tribal farmers per *Wadi* cluster Structured Interviews. Accordingly, based on the availability of the farmers during our field visits, the team had interacted with 281 farmers during the field visits, as part of the study. Structured Interview Schedules for interaction with the farmers were developed and tested during the pilot visit to Chittoor. In addition to the interviews, the study team made relevant observations on implementation aspects of *Wadi* projects, further assistance required across the value chain, stakeholders involved in the supply chain of *Wadi* produce, etc through semi structured tools and observational research during the physical visits to the selected *Wadi* clusters.

Selection of farmers within *Wadis* were performed with the help of Project Implementing Agencies as the project clusters are otherwise difficult to access and influence. Though this is a limitation to the study, selection of farmers for physical interviews was performed such that the plantations were at the fruit bearing stage and the farmers belonged to a diverse socio-economic background within the clusters. Prior briefing to the Project Implementing Agencies helped the study team select relevant beneficiaries for the structured interviews and FGDs.

In addition, the preliminary study findings were shared with the officials from APRO, NABARD and the PIAs vide a one-day stakeholder consultation held at ASCI on 8<sup>th</sup> of November 2019. Data and information gaps were captured during the meeting and an additional information format was circulated to PIAs on specific information on the *Wadi* supply chain.

Structured and semi structured tools used for the study along with the above indicated information format are enclosed in **Annexure 2**. Field visit photographs are enclosed in **Annexure 3**.

### 3.4 The Study Team

The study team from ASCI comprised of the following resources (**Table 7**). The team was a cross functional one, bringing in requisite expertise from applied research in agriculture and social sectors.



**Table 7 Study team and composition**

Team Member	Designation at ASCI	Role in the project
Srilekha Ravvarapu	Assistant Professor, Centre for Poverty Studies and Rural Development (CPSRD)	Principal Investigator – Overall responsible for conducting the study and deliverables  Field visits  Data analysis and report writing
Madan Mohan Thanda	Research Associate, Centre for Poverty Studies and Rural Development (CPSRD)	Mr. Madan had undertaken field visits and administered structured and semi structured schedules as part of the study
T Mounika	Academic Associate	Ms. Mounika rendered requisite support to the study, as desired by the PI and the RA.

### 3.5 Limitations of the study

The information presented in this report may be read considering the below limitations:

- Though almost all the *Wadis* were “completed” plantations, the social and economic benefits could be measured only in those plantations where the economic yields have been realized. In some cases, even if the fruiting had begun, the orchards were in their first or second year of fruiting and therefore economic yields had not been realized by the farmers.
- In case of secondary crops such as sapota, amla or moringa etc, quantification of yields and thereby the gross income from the crop was challenging as the farmers mostly used the produce for household consumption and the marketable surplus was almost nil.
- Quantification of economic changes due to establishment of horticulture plantations at the farm level were to be measured solely based on the responses of the beneficiaries. In some cases, the beneficiaries were reluctant to share data related to yields, gross returns, cost of cultivation, etc. In such cases, the field investigators had put in every effort to make the data as reliable as possible.
- Supply chain mapping at the cluster level was primarily done using the data shared by the PIAs. Delays and furnishing of inadequate information were the associated challenges.

## 4. RESULTS AND DISCUSSIONS

### 4.1 Project Status, Social and Economic Changes in the project farmers in sample Wadis

#### 4.1.1 Project Status

Status of the project was comprehended by the age of the plantations to see if the plantations have attained their economic yields yet. Average age of the orchards owned by the beneficiaries contacted is shown in the **Table 8**. 88 plantations out of 281 (31.3 percent) were 7 years; 70 were 5 years old (24.9 percent), 66 of them were 6 years old (23.4 percent), 41 were 9 years old (14.5 percent), 14 were 4 years old (5%) and rest (2%) were 8 years old. From the table, it could be inferred that over 70 percent of the plantations were above the age of 6 years, giving economic yields to the Wadi beneficiaries.

**Table 8 Average age of the sample plantations**

District	9 years	8 years	7 years	6 years	5 years	4 years	Grand Total
Anantapur			27	23			50
Chittoor		5	6	17	8	12	48
Nellore	41						41
Prakasam					48	2	50
Srikakulam			39		11		50
Vishakhapatnam			13	26	3		42
<b>Total</b>	<b>41</b>	<b>5</b>	<b>85</b>	<b>66</b>	<b>70</b>	<b>14</b>	<b>281</b>

Source : Structured beneficiary interviews

#### 4.1.2 Economic and Social Changes in Wadi beneficiary farmers

##### 4.1.2.1 Changes in gross income per acre

Economic changes due to Wadis were measured by the changes in the average gross income per acre. Classic “Before – After” method was used to enumerate the “**Average gross income from one acre of farm land**”. Gross income from farming in toto was not considered as an indicator to measure the economic change as Wadi programme was implemented in less than or equal to one acre of land. Income before establishment of Wadi was captured using recall method and the income from Wadi orchards is the average income from the orchards during the past three years.

**Table 9** provides the average gross income per acre; before and after establishment of Wadi. Major crops grown before Wadi and the gross income earned from one acre is compared with the per acre income from orchard crops supported under the Wadi programme and income from intercrops. It can be seen that the shift in income is roughly two times as compared to the earlier scenario of growing subsistence field crops.

It can be seen that the rise in gross income per acre is **Rs. 13,400/-** across all crops and districts. This translates to **201 percent improvement in gross income per acre**.

In districts such as Chittoor, the rise in income is the highest, enumerated to an extent of 378 percentage as the Wadi programme farmers belonging to “Sugali” community were earlier not involved in farming activities for a long time and were highly susceptible to anti-social activities such as human trafficking. The farm lands were used to cultivate rainfed groundnut

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or pulses with nominal or nil external inputs and most of the produce was used for household consumption. Coupled with this, availability of support infrastructure including roads, power etc was a challenge and the PIA had also undertaken efforts to build an environment that is conducive for farming by way of training and capacity building activities etc.

**Table 9 Average gross income per acre (BEFORE and AFTER)**

District	BEFORE Wadi		AFTER Wadi		Rise in gross Income per acre (Rs)	Percent Improvement
	Major Kharif Crop Grown	Average gross income per acre (Rs)	Major crop supported under Wadi and Intercrops	Average gross income per acre (Rs)		
Anantapur	Groundnut	6384.00	Mango + Groundnut	19854.00	13470.00	211%
Chittoor	Groundnut and Blackgram	5108.33	Mango, Sapota+Groundnut/pulses	24435.48	19327.15	378%
Nellore	Paddy and Blackgram	8635.37	Mango, Acid lime+ Blackgram	25450.00	16814.63	195%
Prakasam	Redgram	4310.00	Mango, Sapota+ Redgram	10937.50	6627.50	154%
Srikakulam	Maize and Redgram	10293.00	Cashew+Redgram/ Maize/Millets	22491.40	12198.40	119%
Visakhapatnam	Jowar and Little Millet	5302.38	Mango, Sapota, Acid lime+ Millets	19264.47	13962.09	263%
<b>Average</b>		<b>6659.43</b>		<b>20059.19</b>	<b>13399.76</b>	<b>201%</b>

**Source : Structured beneficiary interviews – Wadi farmers**

### 4.1.2.2 Net financial impact

It is significant to assess the net benefit in addition to the gross income earned by the farmers from Wadi orchards in order to assess its suitability for large scale implementation and positive economic impact. In view of the above, the study also enumerated the costs incurred per acre, before and after Wadi intervention.

Economic change due to Wadi, implying the net financial impact of Wadi programme was evaluated using **Partial Budgeting** method. In the partial budgeting method, **the total net costs measured by increase in costs per acre and reduced returns per acre are deducted from the total net benefits measured by increased revenue per acre and decreased costs per acre**, due to introduction of a particular farming practice. Here the farming practice is “introduction of orchard crops along with intercrops” in areas where subsistence rainfed cultivation was undertaken or where the land was left fallow. Accordingly, the district wise net benefit per acre or net loss per acre as a result of introducing Wadi orchards, estimated from the responses of the beneficiary farmers using the partial budget analysis is shown in the **Table 10**.

Table 10 Net Financial Impact

District	Major Kharif Crops Grown BEFORE Wadi	Major crops supported under Wadi and Intercrops	Average of Net Benefit
Anantapur	Groundnut	Mango + Groundnut	17390.00
Chittoor	Groundnut and Blackgram	Mango, Sapota+Groundnut/pulses	6402.08
Nellore	Paddy and Blackgram	Mango, Acid lime+ Blackgram	18748.78
Prakasam	Redgram	Mango, Sapota+ Redgram	7750.00
Srikakulam	Maize and Redgram	Cashew+Redgram/Maize/Millet	11783.40
Visakhapatnam	Jowar and Little Millet	Mango, Sapota, Acid lime+ Millets	12482.14
Average			12264.84

Source : Structured beneficiary interviews – Wadi farmers

It can be seen from the Table 10 that the average net benefit per acre as a result of introduction of Wadi method of cultivation is **Rs. 12,265/-**. Highest net benefit is seen in case of Nellore district where the average net benefit is Rs. 18,748/- as reported by 41 beneficiaries followed by Anantapur with Rs. 17,390/- as the net benefit as enumerated from 50 beneficiaries.

#### 4.1.2.3 Border Plantations

Apart from the horticultural crops and intercrops cultivated in Wadi orchards, NABARD had encouraged the PIAs to supply border plantations to the beneficiaries. Accordingly, it was observed that the following types of plantations were grown as border crops in Maa Thota orchards. Border plantations in Wadi programme constituted three major categories;

- Hardy annual crops and perennial fruit crops
- Forestry species
- Fibre crops

In addition to border crops serving as live fences providing protection from the intrusions by animals and trespassers, they also are economically beneficial to Wadi farmers in many ways.

#### Hardy annuals and perennial fruit crops

Among the hardy annual crops, the PIAs have supplied saplings of Moringa (*Moringa oleifera*) and curry leaves (*Murraya koenigii*) where the farmers could use them for household consumption. The perennial fruit crops majorly included custard apple, jamun and aonla. These species are generally hardy and majorly used for consumption purposes. Though there is no direct economic benefit that could be derived out of these border plantations, Wadi farmers agree that they are useful for household consumption for they are nutritionally intense in nature. As most of the farmers do not purchase fruits from the market for family consumption, the perennial fruit crops provide a nutritional diversity to these families.

Some of the Wadi clusters such as Srikakulam had promoted cultivation of common broom or scotch broom (*Cytisus scoparius*) which is a perennial leguminous shrub and farmers could earn around Rs. 30,000 per acre according to the PIA.

#### Forestry species

Most of the PIAs have supplied teak plants (*Tectona grandis*) as border plants majorly with an intention of creating a long-term asset that shall earn a considerable income to the farmers in

the coming twenty years. The number of saplings supplied to *Wadis* range from 40 to 200 per acre depending on the assessment of the PIA and willingness of the beneficiary farmers. Though the survival rates are nominal in nature, even if 50 percent of the plants were retained, farmers can expect to earn not less than Rs. 50,000 per teak tree after twenty years of its plantation, according to the PIAs. In districts such as Srikakulam, almost all the beneficiaries had cut 100 teak trees per acre after five years and sold them at a price of Rs. 8000 to Rs. 10000 per log. They also have availed loans to an extent of Rs. 200,000/- pledging their teak trees.

In districts such as Chittoor, in addition to teak, Red Sandalwood (*Pterocarpus santalinus*) trees were supplied. As known, the crop is highly valuable in nature and over a period of twenty years, it can fetch Rs. 5 lakhs to Rs. 10 lakhs per tree depending on its growth.

In addition to teak and red sandalwood, some PIAs had even encouraged silver oak (*Grevillea robusta*) as border plantations majorly for shade.

### **Fibre crops**

Major fibre crop promoted as border plants in *Maa Thota* orchards is Agave. Fibre crops are reportedly fetching Rs. 2,000 to Rs. 3,000 per acre per annum, as indicated by the beneficiary farmers.

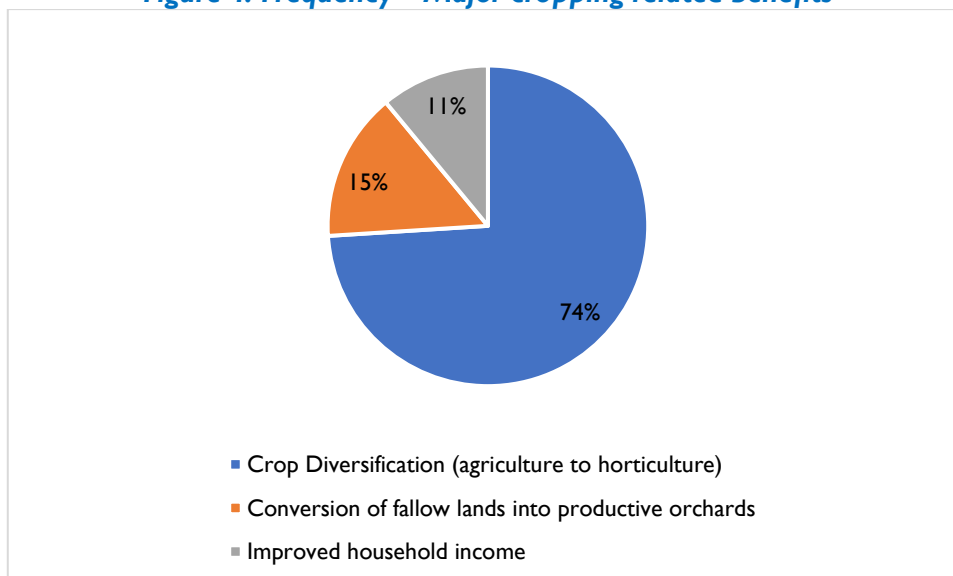
According to the PIAs, the number of border plantations supplied to a beneficiary depends on various factors including availability of considerable land, willingness of the beneficiaries, suitability of a particular species to be grown in the *Wadi* etc. Therefore, based on the above inputs obtained by the study team, one could infer that the border plantations accrue multiple benefits to the tribal *Wadi* farm families in the short and long term. One of the major social benefit of promoting border plantations is ensuring nutritional security to the farm families through perennial fruit crops such as Custard apple or Aonla or Jamun which are otherwise not purchased for consumption by these farm families. Also, annuals such as Moringa may help the families fight anaemia which is widely prevalent especially among the school children and women. Apart from these social benefits, one cannot discount the economic benefits obtained from these plantations in addition to the revenue from the horticultural plantations.

#### **4.1.2.4 Cropping related benefits as perceived by the project farmers**

The beneficiaries had to indicate the major cropping related benefits due to the introduction of *Wadi* method of cultivation. The respondents were to choose from the following benefits that were reported to have been realized during the study team's pilot study in Chittoor.

- Crop diversification (agriculture to horticulture)
- Conversion from non-commercial to commercial cropping
- Conversion of fallow land into orchard
- Improved household income and
- Effective drought management through dry land horticulture

Figure 4. Frequency – Major cropping related benefits



Source : Structured beneficiary interviews- Wadi farmers

Accordingly, 74 percent of the respondents indicated Crop Diversification as the major benefit; 15 percent felt that conversion of fallow lands into productive orchards as the predominant benefit while 11 percent felt that their household income had improved due to introduction of Wadi method of cultivation (**Figure 4**).

#### 4.1.2.5 Social benefits as perceived by the project farmers

The beneficiaries had to indicate major social benefits due to the introduction of Wadi method of cultivation. The respondents were to choose from the following benefits that were reported to have been realized during the study team's pilot study in Chittoor.

- Rise in honour and respect in the society
- Improved availability of food and adequate nutrition
- Improved relations with the family members
- Improved access to health and educational needs
- Local livelihood opportunity and hence reduced migration
- Participation in the local community institutions and activities

From the primary data it is found that 85 percent of the respondents indicated that their honour and respect in the society had improved due to their participation in the Wadi programme while the rest (15 percent of the respondents) felt that Wadis have provided local livelihood opportunities to their families, resulting in reduced emigration.

## 4.2 Crop wise supply chain analysis

For the crop wise supply chain analysis, based on the major Wadi crops grown in the clusters chosen for study, the report has laid emphasis on crops such as **Mango, Cashew, Sapota and Acid lime**. This was unanimously agreed by the APRO, NABARD and Project Implementing Agencies. Accordingly, the crop and market dynamics of the above four crops are discussed at macro (state/ district) level using secondary data sources and triangulated with the information gathered from PIAs at the micro (cluster) level.

### 4.2.1 Macro – economic scenario

#### 4.2.1.1 Mango

As known, Mango is one of the prominent fruit crops grown in the State of Andhra Pradesh. The State ranks first in production of mangoes in the country and second in productivity only next to Uttar Pradesh. The Ministry of Food Processing Industries (MoFPI), Government of India has identified Andhra Pradesh as one of the potential destinations for processing of mangoes including mango jelly, pulp, jam, jellies, pickles etc. According to the data published by the Directorate of Economics and Statistics (DES), Government of Andhra Pradesh vide Statistical Abstract 2018, Mango acreage in the state as in 2017-18 was 2.9 lakh ha, occupying 45 percent of the total fruit crop acreage roughly. Acreage and production of Mangoes in the State of Andhra Pradesh during 2014-15 and 2017-18 is shown in the Table 11.

**Table 11 District wise acreage and production of Mangoes**

(Acres in ha and Production in MT)

District	2014-15		2015-16		2016-17		2017-18
	Area	Production	Area	Production	Area	Production	Area
Ananthapur	11278	70939	9088	21757	13847	49683	20346
Chittoor	64633	462384	67423	415123	72959	605268	77660
East Godavari	15820	191027	15864	144362	15472	155494	15104
Guntur	789	6592	777	6166	729	5739	916
Krishna	58445	663468	60209	664707	61271	533670	54463
Kurnool	3446	21675	3256	16329	3152	23766	2662
Prakasam	6529	54550	8059	63956	8195	64511	7747
S.P.S. Nellore	9206	81823	9192	61770	9937	83888	9934
Srikakulam	8258	57731	8709	51252	8276	53074	8249
Visakhapatnam	13528	37229	14411	126067	12817	110021	13615
Vizianagaram	38767	131536	43540	143595	43503	196112	44636
West Godavari	7614	104022	6688	66947	6465	109427	6071
Y.S.R Cudappah	21244	77817	21202	53153	25378	104227	28977
<b>Total</b>	<b>259557</b>	<b>1960793</b>	<b>268418</b>	<b>1835184</b>	<b>282001</b>	<b>2094880</b>	<b>290380</b>

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh

As shown in the Table 11, there has been a steady rise in Mango acreage during the recent past, to an extent of 11.8 percentage. On analysing the prices of Mango during the period, it can be seen from Table 12 that the average wholesale monthly prices of the commodity had increased significantly to an extent of over 87.2 percentage, across districts and varieties.

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**Table 12 Average wholesale monthly prices of Mangoes in major markets of Andhra Pradesh during 2014 and 2017**

<b>District / Variety</b>	<b>Average of Monthly prices in 2014 (Rs/Q)</b>	<b>Average of Monthly prices in 2015 (Rs/Q)</b>	<b>Average of Monthly prices in 2016 (Rs/Q)</b>	<b>Average of Monthly prices in 2017 (Rs/ Q)</b>
Chittoor (Alphonso)			1900.00	
Chittoor (Badami)	1405.99	2100.00	2660.61	1441.53
Chittoor (Malgoa)	5200.00			
Chittoor (other)	1031.61	2038.15	9442.08	7361.95
Chittoor (Totapuri)	1743.13	1494.26	1493.13	1334.43
Chittoor (Neelam)	954.79	898.47	1434.66	1174.57
Cudappah (Badami)				1045.11
Cudappah (Kesar)				1014.84
Cudappah (Neelam)				1175.29
Cudappah (other)				966.56
Cudappah (Totapuri)				6287.90
East Godavari (Keshar)		338.92	3097.68	4750.45
East Godavari (other)	823.60	1135.50	5768.26	6800.11
East Godavari (Rasapuri)	473.95			3572.84
Krishna (Other)	1400.00	675.00	850.00	
Krishna (Surkha)			1350.00	
Krishna (Totapuri)		881.32	1190.20	5075.08
Kurnool (other)		150.00		
Nellore (other)	373.05	416.65		
Srikakulam (Kesar)				1252.63
Srikakulam (Malgoa)		1700.00		
Srikakulam (Neelam)		1500.00		
Srikakulam (other)		1782.87	1550.00	1475.00
Srikakulam (Rasapuri)	1500.00			
Vijayanagaram (Keshar)			1000.00	
Vijayanagaram (Neelum)				1412.50
Vijayanagaram (other)	1238.74	831.11	1263.03	569.94
Vishakapatnam (other)			1400.00	
<b>Average</b>	<b>1467.71</b>	<b>1138.73</b>	<b>2457.12</b>	<b>2747.69</b>

Source : [http://agmarknet.gov.in/PriceTrends/SA\\_Pri\\_MonthD.aspx](http://agmarknet.gov.in/PriceTrends/SA_Pri_MonthD.aspx)

Along with the positive price trend, it can be seen from Agricultural Processed Food Export Development Authority (APEDA) Agri Exchange data that during the year 2018-2019, the exports of fresh mangoes from India almost doubled to 73,000 MT as compared to FY 2017-2018. Also, the fresh pulp exports increased from 87,076 MT during 2017-18 to 1.49 lakh MT in 2018-19.

Therefore, it could be inferred that Mangoes were ideal to be promoted as primary crops for Wadi plantations and continue to possess potential for further area expansion.



#### 4.2.1.2 Cashew

Andhra Pradesh is the second largest state in raw cashew production next to Maharashtra. According to the State DES data, the crop is grown in an acreage of 1.15 lakh ha (2017-18). Productivity of cashew in the state is lower (0.5 MT/ha) as compared to other leading states such as Maharashtra (1.2 MT/ ha) and Kerala (0.8 MT/ha). This is majorly due to ageing orchards that need to be replaced with newer ones. Average age of the orchards in the state is around 50 years<sup>8</sup>. Farmers' share in per kg price of cashew is estimated to be 80.9 percent<sup>9</sup> which makes cashew farming a lucrative opportunity to the farmers.

District wise acreage and production of cashew in Andhra Pradesh during 2014-15 and 2017-18 is shown in Table 13. It can be seen that there is a marginal rise in acreage during the period alongside significant rise in production.

**Table 13 District wise acreage and production of Cashew**  
(Acres in ha and Production in MT)

District	2014-15		2015-16		2016-17		2017-18
	Area	Production	Area	Production	Area	Production	Area
Ananthapur	19	7	19	7	19	8	41
Chittoor	86	30	86	32	86	37	80
East Godavari	29608	15159	29713	9984	29985	13943	28453
Guntur	152	53	152	57	116	50	121
Krishna	115	40	115	43	115	50	77
Kurnool							
Prakasam	958	335	922	343	919	397	195
S.P.S. Nellore	211	74	169	63	169	73	154
Srikakulam	22111	8623	23561	7775	23823	8648	24032
Visakhapatnam	29367	5638	30319	9005	28596	11667	29770
Vizianagaram	13642	3438	9743	2066	16488	4386	17302
West Godavari	17678	6435	15016	11457	11572	9026	15045
Y.S.R Cudappah	6	2	8	3	6	3	7
<b>Total</b>	<b>113953</b>	<b>39834</b>	<b>109823</b>	<b>40835</b>	<b>111894</b>	<b>48288</b>	<b>115277</b>

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh

The average wholesale monthly prices of cashewnuts have been on a rise during the past four years. The price information in local major markets including Srikakulam, Vijayanagaram, Vishakapatnam, East Godavari and Prakasam were reviewed for the purpose. Table 14 shows the prices of cashew across major markets of Andhra Pradesh during 2014 and 2017.

<sup>8</sup> <https://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/cashew-processing-units-feel-the-crunch/article24346623.ece>

<sup>9</sup> Source : Small Farmers Agribusiness Consortium, <http://sfaciindia.com/UploadFile/Statistics/Status%20of%20Cashew%20Processing%20Industry%20in%20India-new.pdf>

**Table 14 Average wholesale monthly prices of Cashew in major markets of Andhra Pradesh during 2014 and 2017**

District	Average of Monthly prices in 2014 (Rs/Q)	Average of Monthly prices in 2015 (Rs/Q)	Average of Monthly prices in 2016 (Rs/Q)	Average of Monthly prices in 2017 (Rs/ Q)
East Godavari	9000.00			
Prakasam	8392.55	10418.41	24447.33	44813.96
Srikakulam	6750.00	8694.11	8842.66	12250.00
Vijayanagaram	7083.73	8475.27	8798.36	12091.17
Vishakapatnam	7211.21	8087.67	9841.98	11911.47
<b>Average</b>	<b>7687.50</b>	<b>8918.86</b>	<b>12982.58</b>	<b>20266.65</b>

Source : [http://agmarknet.gov.in/PriceTrends/SA\\_Pri\\_MonthD.aspx](http://agmarknet.gov.in/PriceTrends/SA_Pri_MonthD.aspx)

At an aggregate level, the country's annual production is around 7.7 lakh MT and the installed processing capacities is around 16.43 lakh MT. The processing capacities are almost double the annual production. Therefore, there is an induced demand from the processing industry for cashew production and area expansion. Also, the exports of cashew kernels and roasted cashew nuts from India during 2014-15 and 2017-18 were on a rise (indiastat).

As known, North Coastal region of the state comprising of districts such as Srikakulam, Vijayanagaram, Vishakapatnam and Godavari districts of Andhra Pradesh are renowned clusters for cashew processing activities, apart from production. The aggregate installed cashew processing capacity in the cluster is 1 lakh MT spread across 175 units (SFAC), capable to absorb the entire state's production. Therefore, it can be inferred that the industry driven commodity shall continue to have demand and therefore offers good marketing and value addition potential to the farmers.

Given the above, one could infer that *Maa Thota's* choice of Cashew in Srikakulam district is ideal and may continue to be promoted in North Coastal Zone of the state and prioritized over mango in areas where water availability is a concern.

#### 4.2.1.3 Sapota

Andhra Pradesh is the fourth largest sapota growing state in terms of acreage accounting for 7.63 percent of the country's acreage and fifth in production contributing to 8.57 percent of the country's outturn<sup>10</sup>. District wise acreage and production during 2014 and 2017 is shown in the **Table 15**.

**Table 15 District wise acreage of Sapota**  
(Acres in ha)

District / Year	2014-15	2015-16	2016-17	2017-18
Vizianagaram	131	196	213	139
Visakhapatnam	85	82	82	86
East Godavari	244	251	233	210
West Godavari	500	466	473	314

<sup>10</sup> Shwetha, M.K. and Naik, Balachandra, K. (2017). Value addition and supply forecast of sapota fruit in India. Internal. J. Com & Bus. Manage, 10(1) :8-14

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District / Year	2014-15	2015-16	2016-17	2017-18
Srikakulam	23	27	15	17
Krishna	541	532	539	535
Guntur	1386	1302	1,281	1063
Prakasam	2391	2313	2,210	2147
S.P.S. Nellore	384	391	335	325
Y.S.R Cudappah	434	449	511	525
Kurnool	306	296	308	324
Ananthapur	2151	2425	2,481	2166
Chittoor	209	217	202	227
<b>Total</b>	<b>8785</b>	<b>8947</b>	<b>8883</b>	<b>8078</b>

**Source: Directorate of Economics and Statistics, Government of Andhra Pradesh**

It has been documented that the post harvest losses in Sapota is to a tune of 25-40 percent given that the fruit is highly perishable and is also sensitive to cold storage (National Horticulture Board). It is also known that the fruit is consumed indigenously and exports constitute only a minor fraction of the production (less than 0.3 percent). Low volume of exports is also due to non-ideal post-harvest practices, transport procedures, lack of proper storage facilities and outdated handling practices.

Ministry of Food Processing Industries (MoFPI), GoI in its report on Vision 2015: Strategy and Action Plan for Food Processing Industries in India had indicated that in case of Sapota, the focus should be on cultivation of uniform size, firm fruits which have longer shelf life<sup>11</sup>.

According to NHB, though commercial processing is negligible due to the sensitivity of the fruit to heat (change in flavour and colour of the pulp), it is essential to focus on value added products sooner than later so that the farmers get an assured price for their produce all the time. Creation of value addition, preservation infrastructure including refrigerated transport, rapid transit, grading, processing and packaging is essential in order to give a filip to Sapota processing industry as indicated by NHB<sup>12</sup>.

Therefore, the existing Wadis may have to focus on grading and packing and improving post-harvest practices in order to realize higher prices in domestic markets and work towards processing and value addition in the long run.

### 4.2.1.4 Acid lime

Andhra Pradesh is the leading state in production of acid lime contributing to 23.13 percentage of the country's production. Acid lime acreage in the State is to a tune of 34, 135 ha (2017 – 18). The crop is majorly grown in Nellore district of the state with an acreage of 16,993 ha, accounting for 50 percent of the state's acreage. Other major districts growing acid lime include West Godavari and Prakasam. District wise acreage of acid lime in the state during 2014 and 2017 is shown in the Table 16. It can be seen from the table that the crop acreage had increased from 30,239 ha in 2014-15 to 34, 135 ha in 2017-18.

<sup>11</sup> [https://mofpi.nic.in/sites/default/files/volume2.pdf\\_0.pdf](https://mofpi.nic.in/sites/default/files/volume2.pdf_0.pdf)

<sup>12</sup> [http://nhb.gov.in/report\\_files/sapota/SAPOTA.htm](http://nhb.gov.in/report_files/sapota/SAPOTA.htm)

**Table 16 District wise acreage of Acid Lime**  
(Acres in ha)

District/ Year	2014-15	2015-16	2016-17	2017-18
Ananthapur	467	391	724	632
Chittoor	62	61	78	89
East Godavari	1249	1157	1,247	1143
Guntur	2288	2137	2,497	2610
Krishna	703	607	709	657
Kurnool	164	246	289	318
Prakasam	1971	2472	3,103	3064
S.P.S. Nellore	16878	14147	16,935	16993
Srikakulam	16	14	12	4
Visakhapatnam	6	11	12	10
Vizianagaram	34	18	25	10
West Godavari	4246	3879	5,131	6067
Y.S.R Cudappah	2155	1855	2,220	2538
<b>Total</b>	<b>30239</b>	<b>26995</b>	<b>32982</b>	<b>34135</b>

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh

As far as the prices of Acid lime in major markets of Andhra Pradesh are concerned (Table 17), it can be seen that the change in prices is considerably uptrend during the 2014 – 2018 period. As far as the country scenario is concerned, India is the largest producer of acid lime in the world, accounting for 20 percent of the global production and 0.39 percent of the global trade (Draft APEDA export policy, 2017). Exports of fresh and dried lemon from India have declined during 2016 – 17, however have stabilized in 2017 – 2018.

**Table 17 Average wholesale monthly prices of Acid lime in major markets of Andhra Pradesh during 2014 and 2018**

District	Average Monthly Price in 2014 (Rs/Q)	Average Monthly Price in 2015 (Rs/Q)	Average Monthly Price in 2016 (Rs/Q)	Average Monthly Price in 2017 (Rs/Q)	Average Monthly Price in 2018 (Rs/Q)
Cuddapah		325		923.88	
Guntur		654.93	3128.05	1910.53	4404.78
Nellore	809.73	628.85	1164.54	815.09	3584.41
Prakasam		2700			
West Godavari		2677.3	311.49	2403.94	1628.74
<b>Average</b>	<b>809.73</b>	<b>6986.07</b>	<b>4604.08</b>	<b>6053.44</b>	<b>9617.93</b>

Source : [http://agmarknet.gov.in/PriceTrends/SA\\_Pri\\_MonthD.aspx](http://agmarknet.gov.in/PriceTrends/SA_Pri_MonthD.aspx)

As part of the state Government's plans to enhance the acreage under horticulture plantations to one crore acres (Budget Speech, 2018-19)<sup>13</sup>; acid lime has been identified as one of the potential crops to address drought and prolonged dryspells in districts such as Nellore and Cudappah. Annual Action Plan (2018-19) of State Horticulture Mission also endorses the same by focusing on area expansion of acid lime in Andhra Pradesh.

<sup>13</sup> [http://www.apagrisnet.gov.in/2018/Budget%20speech%20english\\_Assembly\\_07.pdf](http://www.apagrisnet.gov.in/2018/Budget%20speech%20english_Assembly_07.pdf)

Therefore, acid lime could be promoted in Nellore and adjoining districts such as Prakasam and Cudappah where Sweet lime (Mosambi) cultivation is not feasible due to constrained water resources.

### 4.2.2 Cluster/ Wadi level dynamics

#### 4.2.2.1 Stakeholder mapping – Pre-Production and Production

As far as the *Wadi* farmers are concerned, it was observed that the major stakeholders in pre- production and production stages are the Project Implementing Agencies (PIAs) themselves as they supply the planting material and inputs (fertilizers, pesticides) to the farmers. Most of the PIAs are currently undertaking collective procurement of agricultural inputs and in turn supplying to the *Wadi* farmers.

Some of the good practices that were undertaken by the PIAs in procurement of inputs include the following;

- Almost all the PIAs were supplying quality planting material in the form of grafts to the farmers. As known, grafts being the most effective propagation methods in almost all horticultural crops, the PIAs made sure that the grafts are supplied from popular nurseries in and around the project area. It was also observed in some cases such as BREDS in Srikakulam, farmers were trained to perform grafting in order to revive the dried and dead plants as a measure of gap filling. The farmers were not waiting for the PIAs till the new grafts for gap filling were supplied.
- In case of Anantapur, the PIA has been supplying groundnut seed to the *Wadi* farmers under the Community Managed Seed Systems (CMSS) with technical support from Watershed Support Services and Activities Network (WASSN). The farmer organizations promoted by the PIA are undertaking the seed procurement, processing and supply in association with the State Department of Agriculture in Anantapur. Through effective localization of seed chain, the initiative has been successful with supply of around 2000 bags of seed (of 30 kg each) to the farmers during the past three years.
- The PIA in Vishakapatnam district is encouraging usage of Panchakavya and neem cake for plant protection in place of inorganic fertilizers. The farmers are being trained to produce their own inputs using the locally available resources.
- In order to withstand drought during dry spells, the PIA in Chittoor is supplying farmers with a product named “Zeba” which is a patented soil and water enhancement technology by United Phosphorous Limited (UPL). These are foamy granules that release the right amount of moisture in response to plant root suction thus ensuring water availability throughout the period while the irrigation is not provided. The granules’ water holding capacity is roughly 400 times its own weight in water. Given that the *Wadi* clusters in Chittoor are dry spell prone, the farmers are being supplied with these granules and educated for effective usage.

Though the efforts by the PIAs in supplying agricultural inputs have been considerable, except for a few cases, procurement initiatives by the tribal farmer led Institutions such as Village Committees (VCs) or the Farmer Producer Organizations (FPOs) were not found to be substantial in nature.

#### 4.2.2.2 Source and frequency of crop advisory services and knowledge

On the crop advisory and knowledge services, it was found that the Project Implementing Agencies (PIAs) were the major source of information to the farmers. While some of the PIAs are well connected to the State Department of Horticulture/ Agriculture, Krishi Vigyan Kendras (KVKs) and State Agricultural Universities (SAUs), few have not established linkages yet. For instance, RASS, the Project Implementing Agency (PIA) from Chittoor, as part of knowledge dissemination initiative has established a KVK with assistance from the Indian Council of Agricultural Research (ICAR). The KVK draws technical inputs from the Agricultural University, Tirupati. The programme also has been taking support from the Kaligiri KVK which is nearby.

However, the above is the case with only one of the six PIAs that were studied and based on the qualitative inputs from the field, the study team is given to understand that the convergence with technical institutions as listed above is at its infancy.

Farmers were to respond on the periodicity of delivery of technical advisory services by the PIAs during the flowering or fruiting season and the lean season.

During the flowering/ fruiting season, 83 percent of the respondents indicated that the periodicity of delivering advisory services is once a week while the rest (17 percent) mentioned that there is nil support from the PIAs in delivering technical advisory and scientific knowledge (Table 18).

The farmers also were to indicate if they received any advisory services during the non-flowering or non-fruiting period. While 20 percent of them indicated that they did not receive any technical advice on crop management during non-flowering season, 41.67 percent indicated that the technical teams from PIAs visited them once a month and 38.6 percent of the respondents mentioned that they had an opportunity to interact with PIA teams once a fortnight (Table 18).

**Table 18 Periodicity of delivery of crop advisory services**

Periodicity of advisory	Advisory during fruiting/ flowering season (N = 281)			Advisory during lean period (N = 281)		
	No advisory	Once a week	Once a fortnight	No advisory	Once a fortnight	Once a month
Frequency	17%	83%		20%	38.6%	41.67%

**Source: Structured beneficiary interviews**

From the Table 18, it could be inferred that the periodicity of delivery of crop advisory services is satisfactory. However, the technical sanctity of these advisories are to be established.

#### 4.2.2.3 Post-Harvest, Storage and Handling

The PIAs were to indicate the cluster level availability (existing supply) of post-harvest, storage and preservation infrastructure with respect to major crops including Mango, Cashew, Sapota and Acid lime. They were also asked to identify the infrastructure requirements in order to enhance the marketability of the produce of the Wadi farmers. **Table 19** provides the consolidated information on the existing supply and infrastructure requirements as indicated by the PIAs.

**Table 19 Status of Post-Harvest Infrastructure at the cluster level**

S.No.	District	Name of the PIA	Major crop	Wadi acreage (acres)	Production volume (MT) at cluster level	Existing post harvest and handling infrastructure	Requirement identified by PIA
1	Chittoor	RASS, Chittoor	Mango	1000	750 MT	3 pack houses established in the Wadi cluster	Collection Point Weigh bridge with 30 MT capacity
			Sapota		150 MT	NIL	
2	Visakhapatnam	VIKASA, Visakhapatnam	Mango	1000	350 MT	NIL	Cold storage/ ripening chamber at Araku where the produce is sold in weekly shandies
3	Anantapur	IAABWS, Anantapur	Mango	500	1800 MT	NIL	Weighing scales, Trays and Transportation
4	Nellore	NAVAJEEVAN, Nellore	Acid lime	500	1250 MT	NIL	Pack house of 10 MT is required
			Mango		950 MT		
5	Prakasam	PRERANA, Prakasam	Mango	500		NIL	
6	Srikakulam	BREDS, Srikakulam	Cashew Mango	1000	120 MT	NIL	2 pack houses of 10 MT per day

**Source: Project Implementing Agencies**

According to the information provided by PIAs (Table 19), existing supply of post-harvest and handling infrastructure is nominal except for the cluster in Chittoor where 3 mango pack houses are operational in the Wadi cluster. It is also evident from the table that most of the PIAs have identified the infrastructure requirements of the major Wadi crops and all of them have shown their readiness in undertaking these projects either by identifying or procuring land for the same and by approaching Department of Horticulture for implementation.

Triangulating the data provided by the PIAs with the below secondary data, it could be inferred that there is a clear need for enhancing the post-harvest and handling infrastructure of horticulture crops in general and the clusters studied in particular.

- The state of Andhra Pradesh has a cold storage capacity of 16 lakh MT whereas the capacity requirement is estimated to be 23.24 lakh MT by the National Centre for Cold Chain Development (2015).
- For export requirements, Mangoes are kept in pre-cooling chambers for 48 hours and later in cold storages at 12°C till shipment. Maximum period of storage in this case is only 5 days. Pack sizes for export purposes range from 3- 10 kgs<sup>14</sup>.

<sup>14</sup> <https://agmarknet.gov.in/Others/preface-mango.pdf>



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- Lack of cold storage and preservation facilities are leading to damage of a huge quantity of fruit. Small scale units using mango as raw material (like fruit juices, jelly, marmalade, squash, etc) may be encouraged around the areas of concentration of Mango growers for processing various items like fruit juices, jelly, marmalade, fruit concentrate etc. (2015. Andhra Pradesh State Profile. MSME Development Institute).
- According to the data from APEDA, there are only five recognized pack houses in the state, two in Chittoor district, one in West Godavari district and the other one in Vijayanagaram. These pack houses cater to fruits and vegetables such as Mangoes, Okra, Chillies, and other fruits and vegetables. According to APEDA's action plan, it is envisaged that no of pack houses for fruits and vegetables is doubled during 2017-2020.
- Ripening chambers often used to ripen climacteric fruits such as Mangoes are one of the crucial cold chain components. These chambers are usually placed at the distribution end of the supply chain so that post ripening, the produce need not travel long before reaching the markets and hence the associated losses could be minimized. According to the data from NCCD, the state of Andhra Pradesh possesses ripening chambers of capacity 10,044 MT while the additional requirement is estimated at 4070 MT<sup>1516</sup>.
- “Besides cold stores, a good distribution system is required to address the missing/weak links in terms of other cold-chain infrastructure components at farm level like modern pack-houses and transportation through reefer vehicles, so as to integrate the cold-chain, to expand reach to markets and thereby minimise the loss to perishable products. A higher requirement in terms of modern pack-houses, refrigerated transport units and ripening chambers is evidenced in this study” (All India Cold Chain Infrastructure Capacity (Assessment of Status and Gaps)
- Though the farmers do not face any evident issues in marketing cashew due to the constant demand from processing units, mechanized sorting and grading units coupled with vaccum packing is the current requirement in the cluster as identified by the MSME. The operations are currently manual (SFAC).
- Sorting and grading facilities are important for Sapota as identified by NHB. For removing the latex oozing from the stalk, the fruits need to be washed immediately after the harvest, dried in shade and graded according to their size.
- Post-harvest losses in acid lime in Andhra Pradesh is found to be 4 percent (Indian Institute of Horticultural Research) which is found to be lesser as compared to states like Maharashtra. In Nellore region, the crop is harvested four times a year. Treating the fruits with 4 percent wax emulsion followed by pre packing in 200-gauge polythene bags with 1 percent ventilation improves the shelf life for more than 10 days (NHB).
- Cleaning, sorting and grading are found to be the most important post-harvest practices when it comes to acid lime (NHB)

<sup>15</sup> [https://nccd.gov.in/PDF/CCSG\\_Final%20Report\\_Web.pdf](https://nccd.gov.in/PDF/CCSG_Final%20Report_Web.pdf)

<sup>16</sup> <https://www.sathguru.com/news/wp-content/uploads/2017/05/Cold-Chain-Report.pdf>



Given the above facts; it seems essential that post-harvest infrastructure including pack houses, pre cooling facilities, sorting and grading facilities and ripening chambers is strengthened in the *Wadi* clusters.

### 4.2.3 Marketing channel

#### 4.2.3.1 Mangoes

As observed from the field, the supply chain of Mango in *Wadi* clusters is a traditional one; **Farmer - Pre- Harvest Contractors (PHCs) – Market/ Processor – Retailer – Consumer**. The PHCs visit the orchards during the flowering stages and fix up a farm gate price based on “approximation” principle. Farm gate prices of mango are not known to the beneficiary farmers as the PHCs fix prices on per acre basis. It was observed that *Wadi* farmers were not taking up direct marketing of Mangoes by themselves, except in Araku and Dumbriguda mandals of Visakhapatnam where the farmers were selling their produce in weekly shandies of Araku.

From the primary data enumerated from the *Wadi* beneficiary farmers, it could be interpreted that 62 percent of the respondent farmers rely on PHCs for selling mangoes while 30 percent of them sell them in the local markets or shandies and 8 percent indicated that their plantations are yet to attain economic yields and therefore they are yet to make any effort on effective marketing of the produce (**Table 20**).

**Table 20 Marketing Channel – Mango**

Buyer/ Market	No of beneficiary farmers using the marketing channel	Percentage of the total respondents
Pre-Harvest Contractor / Dealer	119	57%
Mandis/ Shandies	69	33%
Not yet commenced commercial sale	20	10%
<b>Total</b>	<b>208</b>	<b>100%</b>

**Source: Structured Beneficiary Interviews- Wadi farmers**

It could therefore be interpreted that the *Wadi* farmers are highly dependent on the Pre-Harvest Contractors (PHCs) who fix up prices during the flowering stages of the crop and pay a consolidated amount per acre once the harvest is completed. It was also observed that this traditional channel is hard to be substituted given that the ease of obtaining credit from PHCs and convenience in marketing seem irreplaceable.

Despite the scenario, the Project Implementing Agencies (PIAs) have facilitated formation of Farmer Producer Organizations (FPOs) in the *Wadi* clusters in order to enhance the marketing effectiveness of the *Wadi* produce. It has been observed that the FPOs were formed in 4 out of 6 *Wadi* clusters studied and the fifth one in Chittoor is under process (**Table 12**).

It can be seen from the Table 21 that in Nellore, over 1500 MT of Mango was marketed through the FPO, Navajeevan Agri and Horticulture Rythu Producer Company Ltd and the incremental profit per MT of produce was as high as Rs. 10,000/- as informed by the PIA. Though other FPOs are at a nascent stage of collective marketing; the PIA in Vishakhapatnam district had leveraged upon the pesticide free produce that is being grown by the *Wadi* project

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farmers and had undertaken marketing efforts in intercrops such as Finger Millet, Little Millet and Turmeric and entered into a contract with Safe Harvest, an organization that procures pesticide free food from FPOs and markets under the “Zero” logo that signifies that the produce is pesticide, herbicide and GM free. It can be seen from the Table 21 that the incremental profit to the farmer in marketing finger millet and little millet in this case were found to be Rs. 1000 per MT whereas the benefit in Turmeric was Rs. 3000 per MT.

**Table 21 Current Marketing Efforts of Mangoes in Wadi Clusters**

District	Name of the PIA	FPO formed (Yes/ No)	Wadi acreage (acres)	Production volume (MT) at cluster level	Marketing efforts undertaken	Incremental Profit (Rs per MT)
Chittoor	RASS, Chittoor	Under process	1000	750	Not initiated	
Visakhapatnam	VIKASA, Visakhapatnam	Yes	1000	350	Initiated efforts for marketing the intercrops such as Finger Millet, Little Millet and Turmeric	Finger Millet and Little Millet- Rs. 1000 and in Turmeric - Rs. 3000 per MT
Anantapur	IAABWS, Anantapur	Yes	500		Initiated efforts for marketing intercrops such as groundnut and millets	Groundnut – Rs. 2000/MT and millets – Rs. 1600 / MT
Nellore	NAVAJEEVAN, Nellore	Yes	500	950	Undertaken marketing of 1500 MT Mango through the FPO; Navajeevan Agri & Horticulture Rythu Producer Company Ltd	10000
Prakasam	PRERANA, Prakasam	No	500		Not initiated	
Srikakulam	BREDS, Srikakulam	Yes	1000	120	Not initiated	

**Source: Project Implementing Agencies**

### 4.2.3.2 Cashew

Cashew is traditionally marketed through the traders or buyers who visit the habitations in the cluster. Typical marketing channel is **Wadi Farmer – Trader – Processing Unit**. Farmers are habituated to marketing the produce through this channel as there is a strong dependency of cashew farmers on the local traders for farm and non-farm credit needs. As can be seen from the **Table 22**, 84 percent of the respondents indicated that they depend on the intermediaries for marketing their produce. Unlike Mango where approximate prices are fixed

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during the flowering stages, cashew is sold after completion of harvest in the form of whole cashew kernels.

**Table 22 Marketing Channel – Cashew**

Buyer/ Market	No of beneficiary farmers using the marketing channel	Percentage of the total respondents
Market	8	16%
Intermediaries or Dealers	42	84%
<b>Total</b>	<b>50</b>	<b>100%</b>

*Source: Structured Beneficiary Interviews- Wadi farmers*

The PIA in Srikakulam indicated that they had recently facilitated the registration of 3 FPOs in the Wadi cluster and the marketing efforts are yet to commence (**Table 23**).

**Table 23 Current marketing efforts of cashew in Srikakulam Wadi cluster**

District	Name of the PIA	FPO formed (Yes/ No)	Wadi acreage (acres)	Production volume (MT) at cluster level	Marketing efforts undertaken	Incremental Profit (Rs per MT)
Srikakulam	BREDS, Srikakulam	Yes	1000	1040	Not initiated	NA

*Source: Project Implementing Agencies*

### 4.2.3.3 Sapota

As far as the Sapota marketing is concerned, as the number of trees in one-acre Wadi is limited to 20 percent roughly, the farmers have been selling the produce in local markets and shandies. Many of them therefore have not been having sufficient marketable surplus in order to sell the produce in local markets.

### 4.2.3.4 Acid lime

Under the Wadi programme, acid lime was predominantly promoted in Nellore district of Andhra Pradesh. According to the study team's observations, it can be seen that the major marketing channel is that the farmers in Nellore district take the produce to Gudur market yard in the district and sell them through commission agents. Gudur and Podalakur are the two major markets in Nellore district that primarily redistribute the produce to Karnataka, Kerala and Delhi and also to other parts of the country.

**Table 24** shows that 71 percent of the respondents agreed that they market their produce in Gudur market while 29 percent of them mentioned that they depend on the village level traders. The same was endorsed by the PIA, Navajeevan where they indicated that almost 5000 MT of produce from the Wadi farmers is being sent to the Gudur market yard through their FPO, Navajeevan Agri and Horticulture Rythu Producer Company Ltd (**Table 24**).

**Table 24 Marketing Channel – Acid Lime**

Buyer/ Market	No of beneficiary farmers using the marketing channel	Percentage of the total respondents
Market	29	71%
Traders or buyers	12	29%
<b>Total</b>	<b>41</b>	<b>100%</b>

Source: Structured Beneficiary Interviews- Wadi farmers

**Table 25 Current marketing efforts of acid lime in Nellore Wadi cluster**

District	Name of the PIA	FPO formed (Yes/ No)	Wadi acreage (acres)	Production volume (MT) at cluster level	Marketing efforts undertaken	Incremental Profit (Rs per MT)
Nellore	Navajeevan, Nellore	Yes	500	1250 MT	Yes, 5000 MT marketed so far through the FPO, Navajeevan Agri and Horticulture Rythu Producer Company Ltd	10,000

Source: Project Implementing Agencies

### 4.3 Critical gaps and potential opportunities for enhancement of supply chain performance

The critical gaps and potential opportunities for enhancement of supply chain performance were derived from the above macro and micro level diagnosis of the crop supply chain in the earlier sections. The diagnostic perspective is summarized below and the Wadi wise requirements of post-harvest and marketing infrastructure are identified as below.

#### 4.3.1. Diagnostic perspective on the existing sources of inputs, knowledge management, post- harvest and marketing support

##### A. Farm Inputs

As observed from the diagnostic study, collective procurement of farm inputs by the farmer organizations is yet to take shape and at the same time essential when the projects are completed and the support of the PIAs may not be as noteworthy as it used to be. This is vital across all Wadi crops and districts in order to optimize the costs and pass on the benefits of collective procurement/ bargaining to the farmer members. “Small Producers do not have the volume individually (both inputs and produce) to get the benefit of economies of scale” (NABARD)<sup>17</sup>. Though some of the FPOs of these Wadis have availed

<sup>17</sup> Source :

<https://www.nabard.org/demo/auth/writereaddata/File/FARMER%20PRODUCER%20ORGANISATIONS.pdf>

assistance from NABARD through the Producer Organization Development Fund (PODF), mainstreaming collective operations is currently underway.

Water being a crucial input in horticulture farming, especially Mangoes, it was observed that the prolonged dry spells not only have an impact on the yields, also had resulted in established plantations succumb to drought. On assessing the financial assistance for establishing the horticulture plantations, it was observed that the support for water conservation ranged from 15 to 22 percent of the total allocation under Horticulture Soil Moisture Conservation (SMC) and Water Resource Development (WRD) across the Wadi clusters studied and the average assistance per acre for water conservation is found to be Rs. 6,015/-. It can be seen from the Table 26 that the Anantapur district had the highest allocation for water conservation (22 percent) whereas the drought prone district such as Chittoor and Prakasam had allocated relatively budgets that are lesser than the average allocation across clusters. A participatory water budgeting exercise prior to the implementation may help PIAs identify water needs more effectively and plan accordingly.

**Table 26 Allocation towards SMC and WRD**

<b>District</b>	<b>Percent allocation towards water conservation under Horticulture SMC and WRD</b>	<b>Per acre assistance for water conservation (Rs/ acre)</b>
Anantapur	22%	9,790
Chittoor	15%	4,933
Visakhapatnam	13%	4,282
Nellore	19%	5,998
Srikakulam	18%	5,884
Prakasam	15%	5,202
<b>Average</b>	<b>17%</b>	<b>6014.83</b>

**Source : Project Implementing Agencies (PIAs)**

As informed by the PIAs, the extent of coverage of Wadi plantations with drip irrigation is roughly 40 percent across clusters. It is highly essential that the coverage is enhanced significantly given that the Andhra Pradesh Micro Irrigation Project (APMIP) under the Per Drop More Crop Initiative of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) is providing 90 to 100 percent assistance to the small and marginal farmers belonging to SC / ST category<sup>18</sup> (APMIP. Subsidy pattern for the year 2017-18).

## **B. Knowledge Management**

Though, the periodicity of delivering crop advisory is found satisfactory from the responses of the beneficiary farmers (section 4.2.2.2), delivery of scientific advisory and dissemination of latest technologies is not known. According to the PIAs, they possess in house resources and domain experts who could deliver advisory services to the farmers. However, it is felt that there is a need for institutionalized linkages with the National Agricultural Research System (NARS) and State Agricultural Universities (SAUs) who possess the first hand knowledge on scientifically validated and latest technologies in horticultural production and post-harvest management.

<sup>18</sup> Source :

<https://horticulturedept.ap.gov.in/Horticulture/UserInterface/Portal/Documents/MIP/Subsidypattern2017-2018.pdf>

### C. Post-harvest and marketing support

Apart from the post-harvest and marketing infrastructure gaps identified in section 4.2.2.3 and 4.2.3, it is to be emphasized that the *Wadi* clusters need re-orientation from “Production Centric” interventions to “Market Centric” interventions. The market centricity shall be brought in by improving the post-harvest handling and identifying newer market linkages. Such a support from existing FPOs is critical and following are few of the areas (list may not be exhaustive) where the Directors and Members of FPOs need to focus upon;

- **Sorting and Grading activities** – As discussed earlier, sorting and grading form the primary and immediate requisite for all the *Wadi* crops studied including mangoes, cashew, sapota and acid lime. Therefore, capacity building activities to the members and directors of the FPOs on importance of sorting and grading activities including participation in buyer-seller meets may result in improved focus on such activities.
- **PGS Certification to enhance marketability of organic produce** - In few of the existing *Wadi* clusters such as Vishakapatnam, farmers are unaware of the premium that could be charged for the organic mangoes and sapotas they are cultivating. There is an immediate need to mobilize these farmers and register them under the Participatory Guarantee System (PGS) certification of Paramparaghat Krishi Vikas Yojana (PKVY) in order to leverage upon the benefits of their hill grown organic produce. FPOs need to be made aware of the market premium that is chargeable for such produce and immediately get these farms under the fold of PGS certification<sup>19</sup>.
- **Export oriented production** – As indicated earlier, it is important that the farmers reorient themselves to the needs of the markets. For instance, exporting table purpose mangoes to different countries have varied post-harvest treatments and packaging requirements. USA needs irradiation with a minimum absorbed dosage of 400 Grays at the approved and certified irradiation treatment facility using Cobalt 60 while Japan needs vacuum heat treatment. As most of the *Wadis* are growing table varieties, there is a need to educate the FPO members and directors on export oriented production to maximize the *Wadi* orchards’ revenue generating potential.

#### 4.3.2 Requirement of post-harvest and marketing infrastructure, existing supply and gaps thereof

Discussions in the sections 4.2.2.3 and 4.2.3 are summarized as below (Table 27) where the post harvest and marketing requirements of *Wadi* clusters have been identified preliminarily. The readiness or preparedness of the *Wadis* in terms of availability of land etc are also provided in the Table 27. However, all the facilities need a detailed technical and financial viability analysis based on the quantity, flow of produce, marketing opportunities etc.

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<sup>19</sup> <https://pgsindia-ncof.gov.in/pkvy/index.aspx>

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

**Table 27 Post Harvest and Marketing Infrastructure Requirements**

District	Crop	Production at cluster level (MT)	Value addition potential/ Processability	Facilities that could be considered for establishment (Estimated)	Preparedness of the FPOs
Chittoor	Mango	200 MT (Baneshan) 550 MT (Totapuri)	High in case of Totapuri	As the PIA has initiated efforts for establishment of rural mart in Tirupati, a ripening chamber of 10 MT per day capacity could be considered  Collection Point Weigh bridge with 30 MT capacity	Land is not yet identified
	Sapota	150 MT (Kalapatti)	Low		
Ananthapur	Mango	1800 MT (Neelum and Mallika)	Low	PIA has identified grading and packing as the requirement.  It is suggested that an integrated pack house with handling capacity of 16 MT per day with a 2 MT/ hour sorting line is established	Land identified as indicated by the PIA
	Sapota	1000 MT (Cricket Ball)	Low		
Vishakapatnam	Mango	350 MT (Kesar and Suvarnaksha)	Kesar possesses processability	Staging cold room of capacity 30 MT holding size near Araku weekly shandy  Retail market at Araku	Land is not yet identified
	Sapota	270 MT (Kalapatti)	Low	A sorting and grading facility of 2 MT per hour which could be used for other crops too	
Nellore	Acid Lime	1250 MT (Balaji)	Not documented	Sorting and grading facility of capacity 2 MT per hour	Department of Horticulture has been approached
	Mango	950 MT (Banganapalli, Banglora and Neelam)	High in case of Banglora (Totapuri)		

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

District	Crop	Production at cluster level (MT)	Value addition potential/ Processability	Facilities that could be considered for establishment (Estimated)	Preparedness of the FPOs
					Land availability not clear
Prakasam	Mango	1000 MT (Banganapalli)	Low	A pack house of handling capacity 16 MT is recommended	Not known
	Sapota	500 MT (Collector)	Low		
Srikakulam	Cashew	840 MT (Venugurla) 200 MT (BPT 6,8&9)	Processable	Pack house with mechanized sorting and grading line of capacity 3 MT per hour may be considered for establishment by the FPO	Land is identified
	Mango	108 MT Banglora 72 MT Banganapalli	High in case of Banglora (Totapuri)	As the volume is lower, may be a staging cold room would be suitable	

**Source : Assessment by the ASCI study team**

FPOs may avail financial assistance (grant) under the Pradhan Mantri Krishi Sampada Yojana administered by the MoFPI for creation of the above listed primary processing facilities and also dovetail funds from National Horticulture Board (NHB) or Mission for Integrated Development of Horticulture (MIDH) suitably. Adequate support and handholding of these FPOs in project report preparation and liaison is highly essential to take things to the next level in post-harvest management and value addition.

#### **4.4 Social norms of economic organizations of tribal life evolved and persisting over time across Wadi project farmers**

Social norms of economic organizations of tribal life were assessed by the number of women beneficiaries in Wadi implementation and their role, No of self-sustainable tribal organizations promoted and sustained by the beneficiary farmers, Capacity building initiatives by the PIAs, Sustainable alternate and secondary economic sources created by the PIAs and change stories captured using Most Significant Change Method.

##### **4.4.1 Women beneficiaries in Wadi implementation and their role**

Among the 281 respondents interviewed, 228 (81.1 percent) were male and 53 (18.86 percent) were female (Table 28). District wise distribution of male and female respondents is also shown in the Table 28.

**Table 28 Gender distribution – respondents**

District	Female	Male	Total No of respondents
Anantapur	0%	100%	50
Chittoor	19%	81%	48
Nellore	29%	71%	41



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District	Female	Male	Total No of respondents
Prakasam	22%	78%	50
Srikakulam	30%	70%	50
Visakhapatnam	14%	86%	42
<b>Total</b>	<b>19%</b>	<b>81%</b>	<b>281</b>

**Source : Structured Beneficiary Interviews**

While it could be seen that the tribal women actively participate in farming and other livelihood generation activities, “female ownership of land as an asset” was not observed in any of the Wadi clusters. However, it was observed that the women in the Wadi households and those who are landless were involved in various farm and non-farm livelihood activities by the PIAs.

Apart from the women farmers, the study also assessed the women members in farmer led Institutions and women in leadership positions. Table 29 summarizes the involvement of women in farmer led Institutions.

**Table 29 Wadi wise involvement of women in farmer led Institutions**

S.No.	District	PIA	Percent women farmer members in FPOs	Percent women Directors in FPOs
1	Chittoor	RASS, Chittoor	50 percent	None
2	Visakhapatnam	VIKASA, Vishakapatnam	30 percent	5 percent (1/20)
3	Anantapur	IAABWS, Anantapur	30 percent	36 percent (4/11)
4	Srikakulam	BREDS, Srikakulam	30 percent (120/400)	40 percent (4 / 10)

**Source : PIAs**

### 4.4.2 No of self-sustainable tribal organizations promoted and sustained

Self-sustainable tribal led organizations include Village Committees (VCs), Mutually Aided Cooperative Societies (MACS) and Farmer Producer Organizations (FPOs). These organizations are administered and managed by the tribal farmers themselves where the intention is to realize the benefits of collective decision making and execution and pass on the benefits to the farmer members. Accordingly, the study had observed that most of the Wadis are completed projects and the PIAs have initiated efforts in promoting the above tribal farmer led Institutions. District/ Wadi wise existence of these farmer led Institutions is shown in the Table 30.

**Table 30 Wadi wise existence of farmer led Institutions**

S.No.	District	PIA	MACS	FPO	VC
1	Chittoor	RASS, Chittoor	No	Registration under process	Yes
2	Visakhapatnam	VIKASA, Vishakapatnam	Yes	Yes	Yes
3	Anantapur	IAABWS, Anantapur	Yes	Yes	Yes
4	Nellore	NAVAJEEVAN, Nellore	Yes	Yes	Yes

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S.No.	District	PIA	MACS	FPO	VC
5	Srikakulam	BREDS, Srikakulam	Yes (only in saravakota Mandal )	New registration	Yes
6	Prakasam	PRERANA, Prakasam	No	No	Yes

**Source : PIAs**

Though the mere existence and number of Institutions does not lead to inferences, the section 4.2 and 4.3 indicated the current operations of these farmer led Institutions and the areas where their operations need to be strengthened.

### 4.4.3 Capacity building or awareness creation activities for creation / strengthening of tribal farmer institutions

Though the PIAs have promoted and established farmer led institutions, their collective operations are at nascent stages as discussed in the earlier sections. Therefore, the PIAs had to indicate the capacity building and training activities undertaken for creation or strengthening of these Institutions. Table 31 summarizes these efforts and indicates that the PIAs have been facilitating considerable number of capacity building activities in this direction.

**Table 31 Number and nature of capacity building activities for strengthening farmer led Institutions**

District	PIA	FPOs benefitted	Number of Directors/ Members benefitted from the trainings so far	Training topics	Training Institution
Chittoor	RASS	<ul style="list-style-type: none"> <li>FPO yet to be formed. Tribal community “Banjaras” benefitted</li> </ul>	51	<ul style="list-style-type: none"> <li>Concept of FPOs</li> <li>AP MACS Act</li> </ul>	RASS (Internal)
Vishakapatnam	Vikasa	<ul style="list-style-type: none"> <li>FPO name not mentioned</li> </ul>	All Board Members and CEOs of the FPOs	<ul style="list-style-type: none"> <li>Basic concept of FPOs- Working together vs individual action</li> <li>Specific and shared responsibilities of BoD and CEO</li> <li>Planning for short term strategies to mitigate the market risks</li> <li>Statutory compliances</li> </ul>	Vikasa (Internal) along with Gramodaya trust
Anantapur	IA&BWS	<ul style="list-style-type: none"> <li>Maathota Mahasangam FPO</li> </ul>	3	<ul style="list-style-type: none"> <li>FPO Objects ,Membership mobilization, difference between</li> </ul>	APMAS

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District	PIA	FPOs benefitted	Number of Directors/ Members benefitted from the trainings so far	Training topics	Training Institution
		<ul style="list-style-type: none"> <li>Maathota Mahasangam</li> <li>Kisan FPO</li> </ul>		<ul style="list-style-type: none"> <li>Society and Company Act</li> <li>Business Plan Preparation</li> </ul>	
Srikakulam	BREDS	<ul style="list-style-type: none"> <li>Green blend Farmers Producer Company Limited</li> <li>Farm bowls Farmer Producer Company Limited</li> <li>Siridhanyalu Farmer Producer Company Limited</li> <li>Banana FPO</li> </ul>	21 Board of Directors trained so far	<ul style="list-style-type: none"> <li>Mobilization and raising share capital</li> <li>Book keeping</li> <li>Critical Rating Index</li> <li>Pre &amp; Post registration practices</li> <li>Responsibilities of BoDs, role of CEOs</li> <li>Introduction of Business Development Plan</li> </ul>	NIRD PR
Nellore	Navajeevan	Navajeevan Agri & Horticulture Rythu Producer Company Ltd	5 Board Directors trained so far	<ul style="list-style-type: none"> <li>Importance of FPO</li> <li>Strengthening of FPO</li> <li>Market linkages</li> <li>Value addition</li> <li>Good practices and new methods in cultivation</li> <li>Accounts maintenance</li> </ul>	NABARD and Navajeevan

**Source : PIAs**

It can be seen from the table 31 that the Directors and Members of the tribal farmer led Institutions are being exposed to sufficient number of capacity building activities either through their Internal resources or in partnership with identified nodal Institutions of repute including National Institute of Rural Development & Panchayati Raj (NIRD PR) and Andhra Pradesh Mahila Abhivruddhi Society (APMAS).

### 4.4.4 Sustainable livelihoods measured by creation of alternate and secondary economic sources by the Project Implementing Agencies

As the core principle of *Wadi* programme is to create sustainable livelihoods both from farm and non-farm sources, the PIAs were requested to provide the details of alternate and secondary sources of income created through the *Wadi* project. Women

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Self Help Groups (SHGs) were promoted as part of the Wadi projects and the summary of activities of these SHGs are provided in the Table 32.

It can be seen from the Table 32 that the average turnover of SHGs in these Wadi clusters range from Rs.115,000/- to Rs. 608,259/-. And, it is also gathered from the PIAs that the improvement in household income of these families range from 25 percent to 35 percent. Most of the PIAs have been dovetailing assistance from Livelihood and Enterprise Development Programmes (LEDPs) and Micro Enterprise Development Programmes (MEDPs) of NABARD.

**Table 32 Farm and Non-Farm Livelihood activities promoted in Wadis**

District	PIA	Number of SHGs formed as part of Wadi programme	Major revenue generating activity	Average turnover of these groups last FY (Rs)	Improvement in household income of these families over years (in %)
Chittoor	RASS	28 SHGs	Animal Husbandry and Vegetable Cultivation	608,259	27%
Anantapur	IA & BWS	2 SHGs	Small ruminants and vegetable cultivation	115,000	25%
Nellore	Navajeevan	30 SHGs	Thrift and Small Savings only		
Prakasam	Prerana	2 SHGs	Milch animals and Bamboo crafts	255,000	32.5%
Srikakulam	BREDS	5 SHGs	Adda leaf plate making unit, Chilli and Turmeric powdering unit, Mushroom unit, Permanent Pandals and Protected cultivation	144,040	35%

**Source: PIAs**

### 4.5 Strategic Action Plan for each Wadi crop wise

#### 4.5.1 Strategic plans based on the existing production, post-harvest and marketing scenario of Wadi clusters and macro environment of the cluster

The action plans for Wadis are organized into short term and medium-term interventions, emerging from the above results and discussions. These interventions are suggested keeping in view that all the Wadis are completed and PIAs would be exiting shortly given that the basic ground rule is to make the clusters self – sustainable in the long run. The recommendations are however supported by citations from similar studies conducted in the past.

#### 4.5.1.1 Chittoor – RAAS

Though the cluster needs to shift towards strengthening the post-harvest and marketing activities, the *Wadi* cluster seems to be having other inherent issues such as per unit productivity, water availability, threat from wild animals etc.

##### A. Short Term Interventions

- Given that the mango yields are highly subsistent due to water shortage, there is a need to strengthen the livelihood development programme by supporting rearing of small ruminants. As it is well established that small ruminants such as sheep or goat synergize well with dryland ecosystems under the Integrated Farming System Approach (CRIDA)<sup>20</sup>, the rainfed farmers in K V Palli could be rendered financial assistance for rearing small ruminants. Whereas in Pileru mandal where water availability is not an immediate concern, IFS could be promoted by supporting livestock rearing.
- It is recommended that the existing farm ponds under *Wadi* are provided with additional cost-effective lining, preferably with polyethylene. The plastic lining shall help the farmers in storing water for a longer period, most importantly, when there is a prolonged dry spell after rains. “In areas of severe drought, lining of farm pond to control seepage and percolation losses would be helpful in supplemental irrigation at crop critical stages, livestock rearing and domestic water supply. This is more relevant in case of light textured soils where the sand component is high” (NICRA).
- Wild boar menace is highly prevalent in Peddathanda and Kothabidiki habitations of K V Palli. Farmers have been suffering due to the same and are unable to undertake inter-cultivation in their orchards. As the farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (Cactus, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*)

##### B. Medium Term Interventions

- It is important to leverage upon the Chittoor district’s strength in processing and value addition. Chittoor district is well known for mango pulp manufacturing contributing to around 70 percent of the country’s mango pulp production and is identified as an agri export zone for Mangoes by APEDA. There is a need to focus on marketing activities in the medium term by establishing direct marketing links with the processors. The district houses one of the pioneers in Mega Food Parks (MFP); Srimi Food Park and another Integrated Food Park (IFP) is under construction<sup>21</sup>. It is essential to strengthen the functioning of existing Village

<sup>20</sup> <http://www.crida.in/AICRPDA/Bio-Diverse.pdf>

<sup>21</sup> <http://www.apvision.ap.gov.in/JBMV-2019/whitepapers/4.%20Agriculture%20&%20Allied%20Sectors.pdf>

Communities and handhold the FPOs in handling collective activities such as input sourcing, post-harvest handling and produce marketing.

- In addition to direct marketing, FPOs need to work with farmers and processors on standardization of produce quality of mangoes which will further lead to enhanced marketing opportunities including exports. Currently, the processing clusters are unable to operate at their fullest capacities and leverage completely on exports as they have been facing issues related to produce quality (NABARD). Currently, the district has 14 FPOs registered with Department of Horticulture (MIDH) under which 4500 ha of mango farmers are covered, translating to 5 percent of the total mango acreage in the district.

### 4.5.1.2 Anantapur– IA & BWS

Water availability in *Wadi* plantations being the most critical issue in Anantapur similar to Chittoor, it is recommended that the water conservation activities are undertaken on priority.

#### A. Short Term Interventions

- Water availability being directly proportional to yields in Mango orchards, there is a need to support the existing orchards through community borewells by way of loan or a ceiling grant, as feasible. There is a need to enhance the assistance towards critical irrigation support in the existing plantations to overcome the prolonged dryspells. There is also a need to educate and build awareness among the farmers on climate resilient crop cultivation technologies in Mango orchards in association with the nearest KVKs.
- Marketing of fresh mangoes need a re-orientation where the FPO needs to focus on the post-harvest and marketing activities to a greater extent. Nearest urban market of Bengaluru needs to be taken advantage of. “The International airport at Bangalore located 200 km away is easily accessible and has good connectivity, offering a potential opportunity for exports” (NABARD).

#### B. Medium Term Interventions

- It is suggested that an integrated pack house with handling capacity of 16 MT per day with a 2 MT/ hour sorting line is established for primary processing of Mangoes. This may enable *Wadi* farmers and the FPOs to build linkages with leading fresh retail chains in the district. “Among all the 4 districts of Rayalaseema, Anantapur is fast emerging as Horticulture hub with presence of many private companies, i.e Future Group, INI Farms, Big Basket, Ninja Cart, Desai Fruits etc” (Government of Andhra Pradesh. White Paper on Agriculture. 2019).

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- Given that water is a precious resource in the district, it is important to look into crop diversification as Anantapur is well known for dryland horticulture. As it may happen that the yields in Mango are not economical due to water shortage, there is a requirement to encourage alternate crops including Jamun/ Amla/ Custard Apple/ Pomegranate. New crops such as Pitaya or Dragon fruit may also be encouraged, however, requires sufficient market intelligence for a minimum of 2-3 years before expansion in a larger scale.

### 4.5.1.3 Vishakapatnam - Vikasa

The cluster has almost reached its saturation in terms of production and strengthening the post-harvest and marketing activities seems a top priority leading to enhanced value proposition in terms of rise in net income from farming. Following short and medium interventions are being suggested for implementation by Vishakapatnam Wadi cluster.

#### A. Short Term Interventions

- Dovetailing assistance from other complementing schemes and programmes including Agriculture, Horticulture, Andhra Pradesh Micro Irrigation Programme (APMIP), Non-Conventional Energy Development Corporation (NEDCAP) etc were not observed. Given that there is a need to optimize on the cost of production, there is a need to strengthen the convergence initiatives to the maximum extent possible. Though water is available in abundance in Dumbriguda mandal, it was observed that few Maa Thota habitations in Araku mandal had to witness dryspells frequently. There is an immediate need to leverage upon the drip irrigation assistance available from the State Government in order to encourage judicious utilization of water. There is also a need to partner with Integrated Tribal Development Agency (ITDA) where Wadi farmers could get an opportunity to sell their produce through the ITDA retail outlets in Araku, fetching a relatively premium price compared to selling them at shandies.
- In order to bring in incremental value proposition to the farmers, there is a need to immediately organize farmers and motivate them to go for “PGS Organic Certification” under the Paramparaghat Krishi Vikas Yojana. As most of the Wadi farmers are currently utilizing organic inputs that are mostly produced in house through recycling of farm waste, the PGS certification is essential in order to enhance the competitiveness of the Araku farmers in the market in terms of price and quality. The PGS India certification also enhances the market reach by enabling the Wadi farmers to reach out to unexplored terrains including urban, health conscious consumers. Eventually, Wadi farmers also can explore opportunities internationally. “Several studies (e.g. Pinto et al 2014) show that such group certifications reduce the cost of certification and enable smallholder farmers to

access international organic markets and the benefits they can bring” (Research Institute of Organic Agriculture)<sup>22</sup>.

- Though Vikasa, the PIA possesses internal resources and technical knowledge on the zero budget natural farming method of cultivation, it is important to forge association with the well-established agricultural research and education systems including the KVKs and Research Stations under the State Agricultural University.

### B. Medium Term Interventions

- There is a need to focus on post-harvest and marketing facilities locally at Araku and hence it is recommended that an Integrated Pack House is constructed through the existing FPO. This shall encourage the farmers to undertake collective marketing. FPO could identify the requisite land for the activity.
- As identified by the PIA and as felt by the study team, a solar drying facility for millets is important as the buyers do not come forward to buy the produce as the moisture content is generally high. This often results in farmers selling the produce at a compromised price. Eventually, operationalization and maintenance of solar dryers could be entrusted to the FPO.
- Building upon the “organic” advantage of mangoes and other intercrops such as millets or pepper or coffee in Araku and Dumbriguda mandals, the FPO needs to build a brand on its own.

#### 4.5.1.4 Srikakulam

##### A. Short Term Interventions

- As indicated by the PIA, the average per acre productivity of Cashew in the Wadi cluster ranges from 0.4 to 0.6 MT/ acre which is lesser than the national average of 0.8 MT/ acre. As studies have well documented that the productivity of cashew is lesser in Andhra Pradesh as compared to states like Maharashtra (SFAC), there is a need for the Wadi farmers to engage themselves in productivity enhancement measures with the help of research institutions such as Cashew Research Station; Bapatla.
- Andhra Pradesh is well-known for cashew processing with aggregate installed processing capacity of 95 MT spread across 175 units (SFAC). As Palasa of Srikakulam is one of the leading cashew processing clusters, the FPO needs to explore the possibility of entering into direct marketing contracts with these processors. There is also a need to build awareness amongst the farmers to implement Good Agricultural Practices (GAP) or Standardized crop management measures in order to adhere to the quality requirements of the processors. PIA also had indicated that they have plans to enter into a contract with Samunnati

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<sup>22</sup> <https://orgprints.org/35159/7/fibl-2019-ics.pdf>



Agro solutions Pvt Ltd and Pay Agri market Linkages for marketing initiatives in the future. The PIA also has indicated that they require one rural mart in Pathapatnam Mandal of the district where they could undertake marketing of raw and value-added cashew nuts.

### B. Medium Term Interventions

- As the FPO has already identified land, a pack house with mechanized sorting and grading line of capacity 3 MT per hour may be considered for establishment in the medium term. This activity may also be supported with development of a private label for the *Wadi* produce from Srikakulam. However, establishment of a processing unit need to be well assessed for its need as the cluster already hosts a considerable capacity for processing and unable to utilize the fullest of its capacities as assessed by SFAC. The units are reportedly dependant on imported cashews.

#### 4.5.1.5 Nellore

### A. Short Term Interventions

- As water is a scarce resource in the Dakkili and Venkatagiri mandals of the district, it is important to look into community water management initiatives including participatory water budgeting, maintenance of assets such as farm ponds, internal trenches or boundary trenches etc. Convergence with MGNREGS for establishment of individual farmer level water assets such as internal trenches need to be explored in addition to community borewells on cost share basis.
- Wild animals menace is highly prevalent in the district. As the *Wadi* farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (*Cactus*, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*).
- The efforts of the FPO; Navajeevan Agri and Horticulture Rythu Producer Company Ltd in marketing acid lime and mangoes needs to continue. In order to supplement the efforts of the FPO, there is a need to establish a sorting cum grading facility of capacity 2 MT per hour. As the Department of Horticulture has already been approached, this could be a short-term intervention.

### B. Medium Term Interventions

- The FPO; Navajeevan Agri and Horticulture Rythu Producer Company Limited also has established linkages with the Non-Banking Financial Company (NBFC), Samunnati Finance who are specialized in Agri Value Chain Finance. The FPO could build on this strength and commence work on processability of Acid Lime (Balaji) and Mangoes (Totapuri) as their preparedness for execution seems relatively higher. However, processability of Balaji variety of acid lime needs to be assessed.

#### 4.5.1.6 Prakasam

##### A. Short Term Interventions

- Water is a major concern in the Giddalur mandal of Prakasam district where people have been suffering for want of drinking water for the past five years. Community water management initiatives including participatory water budgeting, maintenance of assets such as farm ponds, internal trenches or boundary trenches etc may be emphasized upon. Based on the ground water availability, community borewells could be provided through convergence with Jalasiri programme of Government of Andhra Pradesh.
- Wild animals menace is highly prevalent in the district. As the farmers are resource poor, it may be evaluated if a forty percent assistance could be provided towards establishing barbed wire fencing or alternatively a two-layer live fencing as recommended by CRIDA could be implemented. Outer Layer (Cactus, *Agave sisalana*) and Inner Layer (*C. carundus*, *Leucaena*, *Gliricidia*, *Sesbania sesban*).
- As the PIA has not yet facilitated the formation of FPOs, there is an immediate need to focus on motivating the farmers to come together and undertake the registration process as soon as possible. They also have to be exposed to awareness programmes on importance and functioning of FPOs, advantages of FPOs, etc as done by other PIAs.

## 5. CONCLUSIONS AND RECOMMENDATIONS

It can be concluded from the above results and discussions that the TDF funding towards creation of “*Maa Thota*” horticulture plantations in Andhra Pradesh had resulted in improved socio-economic benefits to the tribal farmers through creation of sustainable livelihood opportunities. As the study is meant to arrive at strategies and measures for strengthening the value chain of TDF – Wadi projects in Andhra Pradesh, following are the key recommendations submitted for consideration by NABARD.

- **Enhanced focus on water conservation - Introduction of Wadi user groups and make them self-sustainable by constituting a revolving fund**

As water is found to be highly significant in enhancing the productivity of *Maa Thota* Orchards and a scarce resource in most of the districts, Community enforced water budgeting as a tool could be introduced in *Wadi* clusters so that they could plan well ahead of fruiting or flowering season and therefore combat water scarcity effectively<sup>23</sup>.

It is essential that the sustainability of the *Wadi* programme is ensured through regular maintenance and upkeep of the assets created including the plantations, water harvesting structures, soil conservation etc. The *Wadi* programme can draw inspiration from the Integrated Watershed Management Programme (IWMP) of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) where the registered User Groups (UGs) are being constituted by the Watershed Committees (WCs) at the village level. These groups take up the responsibility of operations and maintenance of all assets created under the project by working in close collaboration with the Grama Panchayat (GP). The Watershed Development Fund (WDF) is managed by the Watershed Committees<sup>24</sup>.

Similarly, in order to sustain the performance of orchards and to undertake regular maintenance of water conservation assets including desiltation works, it may be important for NABARD to consider providing a nominal percentage of allocation towards a recurring grant for Water Management. The fund could be administered and managed by the Village Committees of *Wadis* post completion of the project and exit of the PIAs.

This fund may be utilized by the Village Committees as per the priorities of the cluster including water supply to the plantations during dry spells, undertaking maintenance works of the existing water conservation structures, building new structures etc. However, in the long run, it needs to be ensured that the VCs are well equipped in dovetailing funds from other complimentary schemes and programmes such as PMKSY, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), etc.

NABARD may like to chalk out *Wadi* expansion plans considering the water availability as one of the major attributes of successful implementation and

<sup>23</sup> [https://www.nabard.org/demo/auth/writereaddata/File/20%20WATER\\_BUDGETING.pdf](https://www.nabard.org/demo/auth/writereaddata/File/20%20WATER_BUDGETING.pdf)

<sup>24</sup> Source: [https://dolr.gov.in/sites/default/files/Common%20Guidelines\\_2011%5B1%5D.pdf](https://dolr.gov.in/sites/default/files/Common%20Guidelines_2011%5B1%5D.pdf)

economic benefits in the long run. Alternatively, diversification into drought tolerant crops such as Amla, Jamun, Guava, Pitaya etc could be assessed.

- **Exit strategies for PIAs**

Based on the study findings, it is known that the role of *PIAs* in sustaining the project operations post completion of projects is limited to extending need based/ query based advisory support to the tribal led Institutions. However, it is felt that the *PIAs* need to be mandated to submit a detailed exit strategy as part of their funding proposal and need to be assessed on the same as and when the projects get completed. Associated financial assistance towards handholding of the farmer led institutions by the *PIAs* seems necessary.

For instance, the *PIAs* had put in efforts to motivate and organize farmers to formation of FPOs. However, as the project is now completed, it is not very clear if the farmer led institutions are well equipped to undertake operations on their own. Also, one cannot be sure if the *PIAs* would extend support given that the financial assistance from NABARD is no longer available. On the other hand, the business operations of FPOs are still at a nascent stage where they are at their early stages of undertaking collective operations.

Therefore, there needs to be a well formulated exit mechanism to be proposed by the *PIAs* along with a three (3) year handholding period post completion of the projects. This handholding period majorly shall focus on building backward and forward linkages for effective functioning of the FPOs, executing periodical trainings on business management for the Directors, Members and employees etc. This is over and above the capacity building support extended to FPOs by NABARD.

- **Convergence**

As discussed earlier in this report, convergence of NABARD's *Maa Thota* Programme with flagship programmes of the Government of India is important to enhance the cost benefit effectiveness. Some of the programmes that could be readily leveraged are Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Pradhan Mantri Fasal Bima Yojana (PMFBY), Paramparaghat Krishi Vikas Yojana (PKVY) and MGNGRES. Though the family contribution (cost share of the beneficiary) in *Wadi* programme was originally conceived to be around 20 percent, with creation of water related assets, the contribution could be as high as 60 percent as observed during the field visits. Therefore, the future projects may be advised to focus on convergence initiatives and the *PIAs* may be apprised on the need to work in tandem with the State Department of Agriculture and Horticulture.

- **Creating access to scientific knowledge**

Prima facie, though the *PIAs* have tried their best to deliver crop production related advisory services to the farmers, it is felt that there exists a considerable gap that needs to be fulfilled. The perceived gap is due to various reasons including but not limited to non-availability of technical personnel with

## Strengthening the value chain of TDF – Wadi projects in Andhra Pradesh

the PIA, PIA relying only on internal conventional knowledge possessed by their own resources etc. Therefore, NABARD may think of enabling linkages with the agricultural research system in order to build capacities of the tribal farmers periodically on good agronomical practices and post-harvest management of the WADI crops.

Parallel advisory and information delivery platforms such as *ikisan* or *agropedia* or agri tech start-ups could be approached to design a real time agricultural information advisory system to benefit the WADI farmers. In addition to delivering region specific compendium of agricultural practices, these platforms also have been effectively addressing both the biotic and abiotic stress situations by delivering timely, scientific advisory.

Given that the tribal beneficiaries from the state of Andhra Pradesh have benefitted from the TDF – WADI assistance, it is strongly recommended that the efforts are continued. Stronger emphasis on water budgeting, community ownership on water management, sustainability planning (planning for exit of PIAs), drawing synergies from the State and Central sector schemes, and linkages with agricultural research and education system may be considered for a revisit as discussed above.

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**Annexure I List of nodal officials of PIA contacted as part of the study**

S.No	District	PIA/NGO	Nodal person	Designation	Contact Details
1	Chittoor	Rashtriya Seva Samithi (RASS)	1.M.Mohan	Project Manager	9440424234 rassorg@gmail.com
			2. A.Nagaraj	Co-ordinator	8897031369
2	Visakhapatnam	VIKASA	1.Dr.Kiran	Excecutive Director	9490213293, 9866118877, <a href="mailto:s.kiran@vikasaindia.in">s.kiran@vikasaindia.in</a> , <a href="mailto:vikasamail@vikasaindia.in">vikasamail@vikasaindia.in</a>
			2.P. Srinivas	Co-ordinator	7659056465
3	Anantapur	International Animal and Birds Welfare Society (IA&BWS)	1.Janardhan	Project Manager	8500076798, <a href="mailto:iaabws@gmail.com">iaabws@gmail.com</a>
			2.P.Rameeza	Co-ordinator	9676510305
			3.Ramesh	Co-ordinator	9493862935
4	Nellore	Navajeevan	1.K.Sahadevaiah	CEO	9440430178 <a href="mailto:navajeevannlr@gmail.com">navajeevannlr@gmail.com</a>
			2. Vnay Kumar	Co-ordinator	9676410159
5	Srikakulam	Bapuji Rural Enlightenment and Development Society(BREDS)	1. V.Sambamurthy	Secretary and Project Director	8985159011 bredsorg@yahoo.co.in
			2.B.Ananda Rao	Project Co-ordinator	9441160939
6	Prakasam	PRERANA	1.T.Suresh	Project Co-ordinator	8074954571 <a href="mailto:preranadevelopment@yahoo.com">preranadevelopment@yahoo.com</a>
			2.A .Haribau	Project Co-ordinator	8688300319

***Annexure 2 Schedules and Tools used for the study***

Unique Code : .....

**STRUCTURED INTERVIEW SCHEDULE - EVALUATION OF Wadi PROJECTS UNDER TDF**

	Name of the Enumerator		Date of the Structured Interview	_ _ / _ _ /2019			
<b>SECTION A: HH &amp; ASSET PROFILE</b>							
<b>Part 1: Location and Beneficiary Identity</b>							
A.1.1	District Name		District Code	D  -  _			
A.1.2	Mandal Name		Mandal Code	D  ML  -  _ _			
A.1.3	Gram Panchayat (GP) Name		GP Code	D  ML GP  -  _ _ _			
A.1.4	Village/ Habitation		V/Hab Code	D  ML GP V -  _ _ _ _			
A.1.5	Name of the Beneficiary		Beneficiary Code	D  ML GP B  -  _ _ _ _			
A.1.6	Name of the PIA						
A.1.7	Nodal officer from PIA						
<b>Part 2: Details of the HH and assistance availed under TDF</b>							
A.2.1	Name of the Respondent						
A.2.2	Mobile Number						
A.2.3	Age of the Respondent (in completed years)						
A.2.4	Gender	<input type="checkbox"/>	M =1	<input type="checkbox"/>	F =2		
A.2.5	Educational Qualification						
A.2.6	Are you the Wadi beneficiary?	<input type="checkbox"/>	Yes=1	<input type="checkbox"/>	No=2		
A.2.7	If A.2.6 is 2, Relation with the beneficiary	<input type="checkbox"/>	Spouse = 1	<input type="checkbox"/>	Son/Daughter =	<input type="checkbox"/>	Son/Daughter - in – law = 3
		<input type="checkbox"/>	Parent = 4	<input type="checkbox"/>	Brother/ Sister :	<input type="checkbox"/>	Others = 6 (Specify)
A.2.8	Land Ownership Details	<b>Ownership (A)</b>	<b>Acres</b>	<b>Type of Irrigation(B)</b>	<b>Acres</b>	<b>Crops (C)</b>	<b>Acres</b>
		Owned =1		Irrigated =1		Agriculture/ Annual =1	
		Assigned =2		Rainfed =2		Horticulture =2	
		Rented in/Leased in =3		Fallow=3		Fallow =3	
		Fallow=4					
		<b>Total =5</b>		<b>Total=4</b>		<b>Total =4</b>	



A.2.9	Livestock and allied (choose multiple options if applicable)	<b>Type of livestock (A)</b> Milch Cows/ Buffaloes=1 Goat/ Sheep=2 Poultry =3		<b>No.s</b>		<b>Allied (B)</b> Fisheries =1 Sericulture=2 Mushroom cultivation=3 Apiary =4	<b>Production in MT</b>		
A.2.11	Crops supported under <i>Wadi</i> programme and year of establishment  <i>(fill in multiple items if applicable)</i>	<b>Crop</b> Mango = 1 Cashew= 2 Acid Lime =3 Pomegranate=4	<b>Year</b>	<b>Acres</b>	<b>Crop</b> Mosambi / Sweet Lime =5 Apple Ber =6 Dragon Fruit = 7 Others (Specify) = 8	<b>Year</b>	<b>Acres</b>		

## SECTION.B- INCOME

### Portion I – Crops & Economics

B.1.1	Crops grown <b>BEFORE</b> Wadi establishment  (-collect data for a maximum of two crops per season including cereals, pulses, oil seeds, vegetables)	Season	Main Crop (B.2.1.1 to B.2.1.9)					Inter Crop (B.2.1.10 to B.2.1.18)						
			Crop	Variety	Area (acres)	Yield (Q/acre)	Annual Income (Rs/acre)	Annual Cost of cultivation (Rs/acre)	Crop	Variety	Area (acres)	Yield (Q/acre)	Annual Income (Rs/acre)	Annual Cost of cultivation (Rs/acre)
		Kharif												
		Rabi												
		Plantation (Yield in MT)												
*Q indicates Quintal, MT indicates Metric Tonnes														

\*Q indicates Quintal, MT indicates Metric Tonnes

B.1.2	Crops grown <b>AFTER</b> Wadi establishment  (-collect data for a maximum of two crops per season including cereals, pulses, oil seeds, vegetables)	<b>Season</b>  Kharif  Rabi  Plantation (Yield in MT)	<b>Main Crop (B.2.2.1 to B.2.2.9)</b>						<b>Inter Crop (B.2.2.10 to B.2.2.18)</b>					
			Crop	Variety	Area (acres)	Yield (Q/acre)	Annual Income (Rs/acre)	Annual Cost of cultivation (Rs/acre)	Crop	Variety	Area (acres)	Yield (Q/acre)	Annual Income (Rs/acre)	Annual Cost of cultivation (Rs/acre)
*Q indicates Quintal, MT indicates Metric Tonnes														
<b>SECTION.C- POST HARVEST, MARKETING &amp; ACCESS TO INPUTS, SERVICES</b>														
<b>Portion I – Post Harvest &amp; Marketing</b>														
C.1.1	How do you market/ plan to market your produce from plantations established under TDF  Location & Distance not applicable to 3 and 4	<b>Crop (A,B,C)</b>  Channel	<b>Details</b>											
			<b>Name (i)</b>	<b>Location (Mandal/ District) (ii)</b>	<b>Distance from farm (km) (iii)</b>	<b>Procurement from farm gate (Yes/No) (iv)</b>								
			Mandi/ APMC Yard = 1, Direct Marketing to Processing Unit / Traders/ Buyers =2, Pre-Harvest Contractor =3, Post-Harvest Contractor/ Commission Agent = 4, Farmer Producer Organizations = 5, Others (specify)= 6											
C.1.2	Farm gate prices of your produce from plantations established under TDF	<b>Crop Year (June to May)</b>		<b>Price (Rs/ MT)</b>										
		2016-17												
		2017-18												
		2018-19												

Portion 2 –Access to Inputs & Extension Services																																			
C.2.1	How do you source Agricultural Inputs including fertilizers and pesticides?  <i>Choose multiple options if applicable</i>	<b>Source</b>  Agri Input Dealers=1 Supplied by PIA =2 Supplied by the Village Cooperatives/ Committees=3			✓	<b>Source</b>  Supplied by FPOs=4 Others (Specify) =5			✓																										
C.2.2	What is the frequency of technical crop advisory delivered by PIA/FPO/Village Committees etc?	<b>Flowering/Fruiting Season (A)</b>  Once in a week =1 Once in a fortnight=2 Once in a month=3 During endemic pest / disease outbreaks=4 Nil advisory support =5	✓	<b>Indicate Source</b>	<b>Non-Fruiting Season (B)</b>  Once in a week=1 Once in a fortnight=2 Once in a month=3 Nil advisory support=4	✓	<b>Indicate Source</b>																												
C.2.3	Can you rate the quality of extension and training services delivered by your primary source (PIA/FPO/Village Committees etc?)  Mention the Source -----	Highly Satisfied = 1 <input type="checkbox"/> Moderately Satisfied = 2 <input type="checkbox"/> Not Satisfied = 3 <input type="checkbox"/>																																	
SECTION D- Perceived benefits related to cropping and social well being																																			
D.1	Can you choose three of the major cropping related benefits due to the assistance from TDF? <table border="1"> <thead> <tr> <th>Components</th> <th>✓</th> </tr> </thead> <tbody> <tr> <td>Crop diversification (agriculture to horticulture)</td> <td></td> </tr> <tr> <td>Conversion from non-commercial to commercial cropping</td> <td></td> </tr> <tr> <td>Conversion of fallow land into orchard</td> <td></td> </tr> <tr> <td>Improved household income</td> <td></td> </tr> <tr> <td>Effective drought management through dry land horticulture</td> <td></td> </tr> </tbody> </table>				Components	✓	Crop diversification (agriculture to horticulture)		Conversion from non-commercial to commercial cropping		Conversion of fallow land into orchard		Improved household income		Effective drought management through dry land horticulture		D.2	Can you choose three of the major social benefits due to the assistance from TDF? <table border="1"> <thead> <tr> <th>Components</th> <th>✓</th> </tr> </thead> <tbody> <tr> <td>Honour and respect in the society</td> <td></td> </tr> <tr> <td>Availability of food and adequate nutrition</td> <td></td> </tr> <tr> <td>Relation with the family members</td> <td></td> </tr> <tr> <td>Improved access to health and educational needs</td> <td></td> </tr> <tr> <td>Local livelihood opportunity and hence reduced migration</td> <td></td> </tr> <tr> <td>Participation in the local community institutions and activities</td> <td></td> </tr> </tbody> </table>				Components	✓	Honour and respect in the society		Availability of food and adequate nutrition		Relation with the family members		Improved access to health and educational needs		Local livelihood opportunity and hence reduced migration		Participation in the local community institutions and activities	
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Section E : Areas of Improvement																																			
E.4	What are your suggestions for improvement of Wadi programme?																																		

## Focus Group Discussions (Farmers) – Semi Structured Schedule

FGD No : \_\_\_\_\_

FGD Location : \_\_\_\_\_

Date : \_\_\_\_\_

Name of the Investigator : \_\_\_\_\_

No of participants (farmers) : \_\_\_\_\_

Pointers for Discussions	Observations
1. Assistance per acre under <i>Wadi</i> project activities of TDF (preferably component wise, year wise)	
2. Major benefits due to establishment of horticulture plantations under <i>Wadi</i> (diversification, additional income etc)	
3. Cropping pattern changes – (Before & After Crops, Diversification, Commercial crops and related aspects)	
4. Utilization of fallow lands due to establishment of horticulture plantations	
5. Other allied advantages such as intercroops, mixed crops etc	

Pointers for Discussions	Observations
6. Existing Marketing channels for horticulture crops taken up under <i>Wadi</i> programme (Discuss 2 major crops)	
7. Observations on farm gate prices of the 2 major crops for the past five years	
8. Instances of employment of modern micro irrigation methods if any	
9. Average yields of the two major horti crops promoted under <i>Wadi</i> programme	
10. Household income (before & after <i>Wadi</i> )	
11. Do you have village/cluster level organizations that are providing farm related services, specifically in horticulture? If yes, Can you list them?	

Pointers for Discussions	Observations
<i>(Services include establishment support, technical advisory, agri inputs supply, credit linkages, post harvest, processing and produce marketing)</i>	
12. Have you gained any membership or representation in any village level / cluster level organization / cooperatives/ commodity organizations/ FPOs, post Wadi intervention?	
13. Given an opportunity, would you all be interested to come together and form an organization for collective farming and marketing?	
14. How do you rate the services of the PIAs in establishment and maintenance of Wadi orchards on a scale of 1 to 5, 1 being “very low” and 5 being “excellent”?	
15. What are some of the areas of improvement when it comes to the Wadi programme?	
16. Do you have any other suggestions ?	

**Key Informant Interviews – Semi Structured Schedule**  
**for FPOs, MACS and VCs**

Date of the Interview: Name of the Interviewer:

1. Name of the Respondent :
2. Designation :
3. Organization :
4. Type (PIA/NGO/FPO/CBO/VO etc) :
5. GP/Village :
6. Mandal/Block :
7. District :
8. Mobile No :
9. Email ID :
10. What is the structure of your organization ?
11. What is the size of your organization? ( No of Members, Paid up capital, etc)
12. What are the major activities of your organization ?

Technical (Implementation of Maa thota/ Crop Management Advisory/ Distribution of inputs etc)

Marketing (Identifying buyers, Procurement from farmer members, supply, price determination etc)

Financial (Collecting thrift, Disbursement of loans, Disbursement of grant from Maa thota programme etc)

Trainings (Conduct of trainings with support agencies such as KVKs, State Agricultural Universities etc)

13. Can you discuss the marketing channel for major *Wadi* crops ?
  
  
  
  
  
  
  
  
  
  
14. Can you discuss the post harvest infrastructure availability for the above major crops ? (Post harvest includes cold storages/ cold rooms/ ripening chambers/ pack houses / grading & sorting lines etc)



15. Are there institutions nearby who are helping the farmers in the marketing the fruits?
16. What according to you are the key challenges in achieving sustainability of income through *Wadi* projects?
17. What according to you are the important areas of improvement to further strengthen the *Wadi* horticulture plantations?
18. Any other comments and observations on *Wadi* horticulture works?

**Schedule – Information on Supply Chain of Major Crops in your Wadis**

**(Focusing on Mango, Cashew, Sapota and Acid Lime)**

Dear CEO of the PIA,

Please fill in the below questionnaire emerging from our discussions held on 08/11/2019. This information is important for us to clearly map the supply chain of *Wadi* commodities and suggest a way forward for sustainability of *Wadi* clusters. You may fill in the rows corresponding to the no of crops grown in your *Wadi*. If you would like to provide any supporting information, you may like to scan and send us the documents as separate attachments. Handwritten signed, scanned copies also could be submitted. We look forward to receiving your responses by 13/11/2019.

Regards,

Srilekha

**1. Can you tell us the major source of the following agricultural inputs for *Wadi* farmers ?**

<b>Input</b>	<b>Supplier (Home grown/ Own seeds/ inputs/ supplied by Project Implementing Agency can be mentioned)</b>	<b>Rough distance from <i>Wadi</i> clusters in km</b>	<b>Mode of purchase - Credit/ Cash</b>
Saplings / Grafts			
Seeds (for intercrops)			
Fertilizers			
Pesticides			
Organic Inputs			
Agricultural Credit			

**2. Can you tell us the rough volume of production (in MT) from your *Wadi* clusters per annum? (Crop wise, for 2 major crops)**

<b>Crop</b>	<b>Variety (ies)</b>	<b>Production (in MT)</b>
<b>Mango</b>		

Crop	Variety (ies)	Production (in MT)
Cashew		
Sapota		
Acid Lime		

3. Can you tell us the rough volume of produce handled and marketed by FPOs in your clusters (recent experience could be mentioned)

FPO Name	Name of the commodity	Quantity marketed by FPO (in MT)	Details of the buyer	Location of the buyer	Net profit per MT of produce (in comparison with usual marketing practice)
	(A)				
	(B)				
	(C)				
	(A)				
	(B)				
	(C)				
	(A)				
	(B)				
	(C)				
	(A)				
	(B)				

FPO Name	Name of the commodity	Quantity marketed by FPO (in MT)	Details of the buyer	Location of the buyer	Net profit per MT of produce (in comparison with usual marketing practice)
	(C)				

4. Can you list three major buyers (processors or traders) whom you think can be approached in the future for marketing of produce?

FPO Name	Name of the commodity	Potential buyer (Processing Unit/ trader)	Distance from Wadi clusters (Km)
	(A)		
	(B)		
	(C)		
	(A)		
	(B)		
	(C)		
	(A)		
	(B)		
	(C)		
	(A)		
	(B)		
	(C)		

5. Can you tell us the post-harvest infrastructure requirements of the Wadi clusters in the coming years ?

Name of the commodity	Production Volume (MT)	Existing storage capacity (MT) for the produce nearby (list if more than one)	Distance of the existing facility from Wadi cluster (in km)	Requirements (Facility Name and Capacity desired)	Land identified for the facility (Yes/ No)
(A)					

Name of the commodity	Production Volume (MT)	Existing storage capacity (MT) for the produce nearby (list if more than one)	Distance of the existing facility from Wadi cluster (in km)	Requirements (Facility Name and Capacity desired)	Land identified for the facility (Yes/ No)
(B)					
(C)					
(D)					

**6. Please tell us the requirement of marketing/ retail facilities for your Wadi**

Name of the commodity	Existing marketing channel	Proposed market infrastructure by the FPO (Rural Haat/ Mart etc)	Distance from Wadi cluster	Land identified for the facility (Yes/ No)
(A)				
(B)				
(C)				
(D)				

**7. Please tell us the value addition plans of FPO for Wadi crops in your cluster**

Name of the commodity	Value addition plans if any  <i>Primary –Drying, Sorting, Grading and Packing Secondary – Pulping/ Deseeding etc Tertiary – Value Added Products</i>	Land identified for the facility (Yes/ No)	Any funding agency approached already?	Status of the project
(A)				

<b>Name of the commodity</b>	<b>Value addition plans if any</b> <i>Primary –Drying, Sorting, Grading and Packing Secondary – Pulping/ Deseeding etc Tertiary – Value Added Products</i>	<b>Land identified for the facility (Yes/ No)</b>	<b>Any funding agency approached already?</b>	<b>Status of the project</b>
<b>(B)</b>				
<b>(C)</b>				
<b>(D)</b>				

**8. Can you please tell us the number of SHGs functioning as part of livelihoods programmes of Wadis and their nature of activities?**

<b>Name of the SHG</b>	<b>Name of the village or cluster</b>	<b>Major revenue generating activity</b>	<b>Total turnover of the group in the last year (Rs)</b>	<b>Improvement in household income of these families over years (in %)</b>
<b>(A)</b>				
<b>(B)</b>				

<b>Name of the SHG</b>	<b>Name of the village or cluster</b>	<b>Major revenue generating activity</b>	<b>Total turnover of the group in the last year (Rs)</b>	<b>Improvement in household income of these families over years (in %)</b>
(C)				
(D)				

**9. Please list us the nature of trainings imparted to FPOs so far**

<b>FPO Name</b>	<b>Name and Designation of the BOD/ Member who attended the training</b>	<b>Training topic</b>	<b>Duration</b>	<b>Training Institution</b>
(A)				
(B)				
(C)				
(D)				

.....

### ***Annexure 3 Field Visit Photographs***



**ASCI study team with *Wadi* beneficiaries in Chittoor district of Andhra Pradesh**



***Maa Thota* in Chittoor district of Andhra Pradesh**





**Border plantation in Chittoor district of Andhra Pradesh**



**Focus Group Discussions with Village Committees (VCs) in Srikakulam district of Andhra Pradesh**





**High Density Wadi Orchard in Araku valley, Visakhapatnam**



**Enumeration of data from Wadi beneficiaries through structured schedules in Anantapur district**



**Discussions with Board Directors of Navajeevan Agri and Horticulture Rythu Producer Company Ltd, Nellore**



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