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Rythu Kosam:
Andhra Pradesh Primary Sector Mission
North Coastal Region Baseline Summary Report

ICRISAT
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Rythu Kosam: Andhra Pradesh Primary Sector Mission

North Coastal Region Baseline Summary Report

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Executive Summary

Andhra Pradesh state has set for itself a target of becoming one of the top three states in India by 2022, in terms of socio-economic development and ease of doing business. The state aspires to achieve the status of a developed state in the country by 2029, and the vision is to lay the foundation for the 'Sunrise state of Andhra Pradesh'. However, achievement of this vision is incumbent upon fast-paced and sustainable double-digit growth, delivered through a combination of programmatic and project interventions with focus on sustainable and inclusive development. To achieve its vision, the government has charted out a multi-pronged strategy comprising seven Missions, five Grids and five Campaigns. Among the seven, Primary Sector Mission (Rythu Kosam Mission) is at the top – with the aim of achieving the double digit growth in agriculture and allied sectors. The massive outlay of investments over the next five-year period (2015-2020) is targeted at agricultural development through a consortium approach that brings together state, national and international partners. In partnership with the government of Andhra Pradesh, ICRISAT leads the consortium and has designed a strategy to transform agriculture and allied sectors in the state. The prime focus of this mission is on improving soil fertility, providing access to better seed, reducing the cost of cultivation, enhancing productivity, and value addition in the agriculture, horticulture, livestock and fisheries sub-sectors. Initially, thirteen pilot sites representing 13 districts of the state have been identified and established for introduction, testing and scaling-up of a range of technologies over a period of time. The proven technologies will be scaled-up to the entire district with suitable institutional reforms and on different scales. Supply and demand side interventions are aimed at improving the livelihoods of farmers in the state.

The major objective of the present study is to document the current status of the three pilot sites covering 90 villages from eight *mandals* in three districts (Visakhapatnam, Srikakulam and Vizianagaram) of North Coastal Region of Andhra Pradesh. Purposive randomized sampling framework was used to select representative villages from all study *mandals* in the region. A primary household baseline survey was conducted from representative sample farmers (1557 HHs) in the three districts' pilot sites. The present report also attempts to estimate the total gross value addition (GVA) across sample villages and pilot sites as a whole from different sub-sectors in the primary sector. Innovatively, the present study has attempted to estimate the GVA at pilot site level using household survey information collected during the baseline survey. Household survey and secondary sources of information were synchronized to estimate the GVA values, both at village and pilot site level. The Directorate of Economics and Statistics (DES)-developed methodology for district level estimation of GVA was modified and adapted for estimation of GVA using household level data. These estimates can be used as 'benchmark values' for monitoring the project's progress over a period of time. Project impact assessment studies, if any, could be undertaken in future using this baseline information. The North Coastal Region-level baseline report also helps in identifying major constraints and devising suitable strategies in the pilot sites and districts as a whole.

Small and marginal farmers dominated (78.3%) the total sample in the region. The socio-economic status of farmers in the region is poor when compared with other regions. The average family size in the region is about 3.8. Nearly 73 percent of total sample size is uneducated. About 63.15 percent of family members are engaged or participate in their own farm activities/operations. The pooled average operational landholding per household was estimated at 1.34 ha. The extent of land tenancy in the total region sample was calculated at 8.3 percent. More than 80 percent of sample households have a residential house, as well as access to television and mobile phones. The average number of livestock animals owned per household was 1.1 in the region. Agriculture, is low input-based with poor productivity levels in both field and horticultural crops. Due to partial access to canal irrigation facilities or ground water resources, the average paddy productivity levels was on par with district average yields in the three study districts. the average productivity levels in the case of maize was lower than the respective district average yields. The performance of agriculture in the three North Coastal districts' pilot sites are mixed. Paddy, the major irrigated crop in these districts, could not recover its total variable costs in the case of both Visakhapatnam and Srikakulam districts. The cultivation of fish and prawns is not a major activity in the region. Agriculture, including horticulture, contributed around 88.5% share in the total GVA of the North Coastal

Region. Animal husbandry sub-sector occupied second position and contributed nearly 10.25 percent of regional GVA value. Fisheries secured only the third place with 1.26 percent share in total GVA value in the North Coastal Region.

Major findings of the baseline survey and corresponding recommendations across sub-sectors are summarized below. Immediate steps are required to address these issues for enhancing each sub-sector's contribution to the total primary sector GVA of the North Coastal Region.

Key findings	Specific recommendations
• Majority in the region are small and marginal farmers with low economic capacity • In general, agriculture is low input-based and there is a lack of awareness in much of the tribal areas • Low adoption of technologies and poor productivity levels across both field and horticultural crops	• Good scope for further increase of productivity levels through creation of awareness and introduction of new technologies • Potential opportunity for increasing cropping intensity through efficient use of available rainfall and ground water • Ample scope for converting the existing low input cultivated area into organic clusters, branding and marketing, etc. • Linking small and marginal farmers to proper institutional credit facilities will empower them to invest more in agriculture in general, and crops cultivation in particular
• Low per capita consumption of milk in the region leading to susceptibility to diseases and malnutrition • Animal rearing is not a preferred major economic activity in the region • Low productivity levels of milk per animal due to poor awareness about fodder practices	• Animal rearing should be promoted as a business model with suitable incentives and subsidies • Immediate need for creation of awareness about both consumption and production of milk in the region • Good scope for introduction and rearing of crossbreeds and small ruminants on a large scale to make use of available resources
• Large tracts of suitably cultivated lands are ideal with good quantum of annual rainfall, congenial climate, reasonably good soils & natural landscape	• Enormous potential for introduction of new commercial crops, such as coffee, lemongrass, flax seed and floriculture, etc. • Potential scope for introduction of commercial cultivation of plantation crops (eucalyptus, casuarina, etc.) in the region
• Poor market linkages due to poor road connectivity and lack of awareness. Traders play a major role in business transactions.	• Untapped potential for setting up of horticultural value chains, specifically in coffee, mango, banana, cashew, pineapple, jackfruit, etc. • Huge opportunities for setting up of proper marketing channels for major & minor forest products
• Agriculture in the region is highly prone to climatic aberrations and cyclones (Hudhud cyclone devastated all crop yields during the year 2014-15)	• Immediate need for introduction and piloting of climate smart agriculture studies • Weather-based insurance coverage should be promoted and scaled up
• Untapped potential for mechanized marine fish and prawn cultivation in the region	• Enormous potential for commercial cultivation of marine fisheries and brackish prawns due to the presence of a long coastline in the state. This sub-sector could contribute significantly to the Primary Sector GVA
• Huge scope for promotion of non-farm employment in the region	• Non-farm skills and employment promotional activities should be initiated for increasing the per capita income

1. Background and Objectives

Andhra Pradesh (AP) is poised at an interesting juncture in history as it tries to balance the varied challenges that bifurcation has created for the residuary state against the opportunities that establishment of a new system of governance calls for in the new state. The new state of Andhra Pradesh has set out with renewed attention and energy with the purpose of making AP one of the three best states in India by 2022. Challenges are far and many; however, the determination and drive to see that AP attains an enviable position in the country is a key objective driving the populace of the state.

Moving away from the 'business as usual approach', the Government of AP has initiated an intensive 'mission mode' approach that will speed up the growth process. It realizes that, as we move along, every step of ours is going to lay a strong foundation in scripting the growth story of 'Sunrise Andhra Pradesh'. To achieve the state's goals, it has put together seven Missions, five Grids, and embarked on five Campaigns. These are the three pillars of the new edifice that the state is building on. As part of the state's inclusive growth strategy, the main focus is on the agriculture sector with emphasis on improving soil fertility, providing access to better seeds, reducing the cost of cultivation, enhancing productivity and value addition in the agriculture, horticulture, livestock and fisheries sub-sectors. As the state is perceiving a structural change – labour force shifting from agriculture to non-farm and service sectors – necessary skills need to be imparted to improve productivity of the abundant labour force.

Recently, the Government of Andhra Pradesh also unveiled 'Double Digit Growth Action Plan'[1] to achieve the status of a developed economy with per capita income likely to touch ₹ 0.662 million by 2029-30, if the economy grows consistently at the 10% level, and in the event of growth rates crossing this critical threshold the per capita income may even cross the ₹ 0.800 million mark. Specifically, to achieve 'double digit growth' in agriculture in the state, the government has initiated the 'Primary Sector Mission' (Rythu Kosam Mission) with massive outlay of investments over the next five-year period (2015-2020) under a consortium approach by bringing state, national and international partners on board. As many as 13 pilot sites corresponding to 13 districts of the state have been identified for introduction, testing and scaling-up of a range of technologies over a period of time. Both supply and demand side interventions are aimed at improving the livelihoods of farmers in the state.

With this background, the major objective of the present study is to document the current status of the three pilot sites covering 90 villages from eight *mandals* in three districts (Visakhapatnam, Srikakulam and Vizianagaram) of North Coastal Region of Andhra Pradesh. A primary household baseline survey was conducted from representative sample farmers (1557 HHs) in the three districts of the region. This total sample is comprised of 1515 agricultural sample households and 42 fishery sample households. Information was collected and summarized on socio-economic status, area allocation under different crops, average productivity levels, constraints for achieving double digit growth, accessibility to different technologies, credit and market access, perception about climate change, risk coping mechanisms, etc., before the implementation of the project. The present report also attempted to estimate the total gross value addition (GVA) across sample villages and pilot site as a whole from different sub-sectors in the primary sector. Both household survey and secondary sources of information were synchronized to estimate the GVA values both at village and pilot site level. These estimates will be used as 'benchmark values' for monitoring the project's progress over a period of time. Project impact assessment studies, if any, could be undertaken in future using this baseline information. Overall, this comprehensive North Coastal Region-level baseline report also helps in identifying major constraints and devising suitable strategies in the pilot sites and districts as a whole.

2. Overview of Agriculture in North Coastal Region

North Coastal Region is a geographic region in the Indian state of Andhra Pradesh. It includes the Northern Coastal districts of Visakhapatnam, Srikakulam and Vizianagaram. With a total geographical area of 23,500 km^2,

1. See more details in Achieving Double Digit Inclusive Growth – A Rolling Plan 2015-16, Government of Andhra Pradesh.

it occupies approximately 14.4% of the state territory. It has a population of 9,338,177 (2011 Census), which is 18.8% of the state population. Visakhapatnam district is the most populous district (4.2 million) in the North Coastal Region. The region is covered with 6587 Census villages and 41 (statutory and Census) towns. The average density of the population is estimated at 402 persons per km^2. The highest population density in the region was observed in Srikakulam (463 persons per km^2) while the lowest was noticed in Vizianagaram district (359 persons per km^2). The average decadal growth of population in the region was estimated at 7.57 percent. But among the districts in the region, the highest growth in decadal population growth was observed in Visakhapatnam district (11.96%). Based on the 2011 Census, the average literacy rate in the region was 62.51 percent. Overall, the urban population has higher levels (79.20%) of literacy than the rural population in the region (55.33%). The annual normal rainfall in the region ranged between 1130-1200 mm. Out of three districts in the region, Visakhapatnam (1202 mm) receives better annual normal rainfall followed by Srikakulam (1162.0 mm) and Vizianagaram (1131 mm).

Of the total geographical (2.3 million ha) area of the North Coastal Region, about 36.2 percent (0.8 million ha) is the net area sown (including fish and prawn culture) under different crops. Around 12.3 percent of the total geographical area (0.28 million ha) is sown more than once. The gross irrigated area in the region is estimated only at around 0.53 million ha (around 13.1% share in the state). Agriculture, which is mostly irrigated-dry has been the main livelihood occupation of the farmers in the region. Nearly 83.9 percent of the total cropped area is under food crops and the remaining under non-food crops.

The spread of total area sown in the North Coastal Region under different crop groups are summarized in Figure 1. Cereals and millets together are contributing about 45.3 percent of the total cropped area. It was followed by other commercial crops (cotton, tobacco, including fruits and vegetables) which accounted for 35.2 percent. Total pulses group occupied third place (13.1%) in the total cropped area sown in the region. Total oilseeds secured fourth place in the region and covered about 6.4 percent of total area sown.

The individual crop area share in total cropped area of the North Coastal Region during 2014-15 is depicted in Figure 2. More than 37 percent of the total cropped area in the region is occupied by rice. It was followed by cashewnut (6.1%), black gram (6.1%), sugarcane (5.3%) and mango (5.3%). All these five crops together have a total share of nearly 61 percent of the total cropped area in the region during the study period. Among horticulture crops, cashewnut is leading followed by mango, banana and turmeric crops.

The break-up of the 19th Livestock Census conducted in the North Coastal Region, is summarized here. Among livestock, cattle is the single largest (39.7%) contributor in total livestock population in the region. It was followed by sheep (29.6%), goats (16.8%), and buffaloes (13.4%). Pigs and other livestock animals together had a share of just 0.6 percent in the 19th Livestock Census. Around 11.9 million population of poultry also existed in the region, which accounts for 14.6 percent of the state's total poultry population.

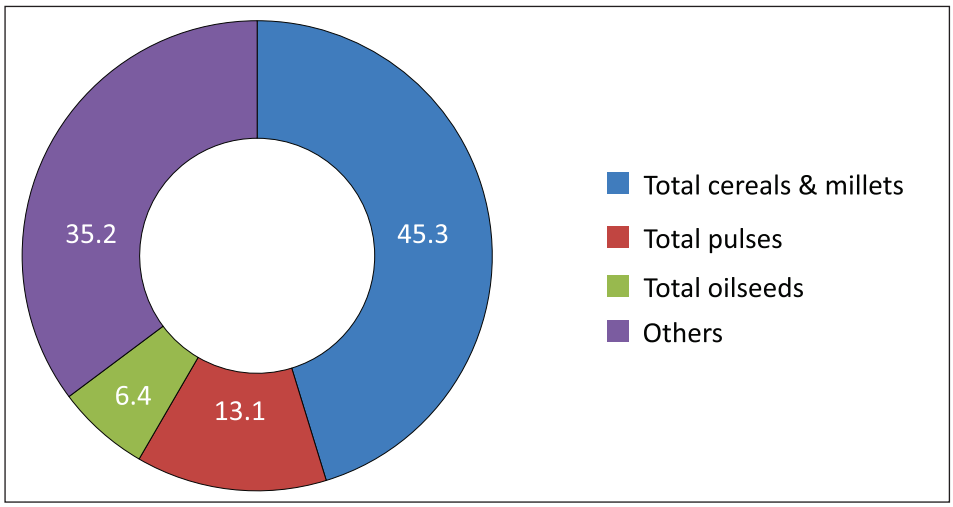

Figure 1. Share of total cropped area among crop groups.

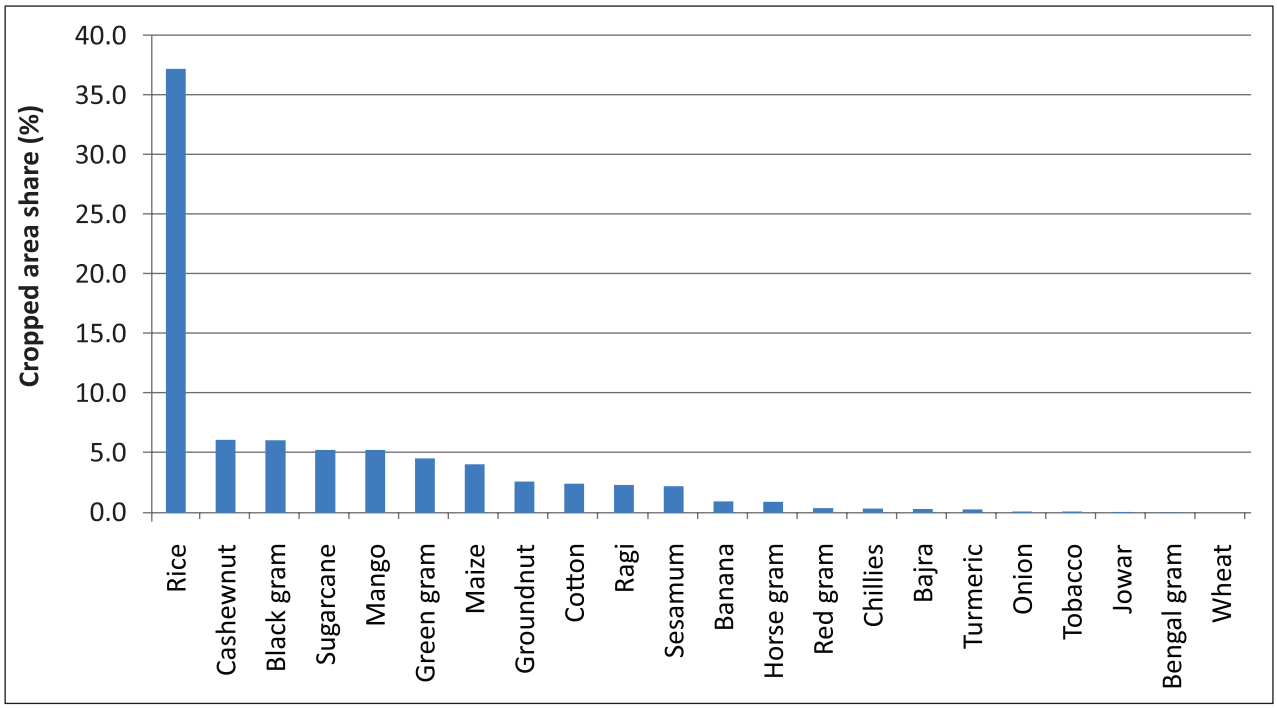

Figure 2. Cropped area shares by crop in the region (2014-15).

Table 1. Comparative status of North Coastal Region along with AP and India.

Parameter	India	Andhra Pradesh	North-Coastal region
Geographical area (000 Km^2)	3287.5 0	163.0	23.5
Population (million; 2011 Census)	1210.9	49.6	9.3
Males (million)	623.2	24.8	4.6
Females (million)	587.5	24.7	4.7
Urban (million, 2011 Census)	377.1	14.6	3.0
Males (million)	195.4	7.2	1.5
Females (million)	181.6	7.3	1.5
Rural (million, 2011 Census)	833.7	34.9	6.4
Males (million)	427.7	17.5	3.2
Females (million)	405.9	17.4	3.2
Literacy (% in 2011)	74.04	67.35	62.51
Males (%)	82.14	74.77	71.44
Females (%)	65.46	59.96	53.76
GDP (₹ million in current prices, 2014-15)	124986620	5200300	1115970
Agriculture and allied sectors (₹ million)	23372498	1434980	161150
Industry sector (₹ million)	39620758	1072240	289160
Service sector (₹ million)	61993363	2693070	665660
Shares of sub-sectors in GDP (%)			
Agriculture and allied sectors	18.0	27.6	14.4
Crops	11.8	15.4	8.1
Livestock	3.9	7.1	3.5
Forestry and logging	1.4	1.0	1.1
Fishery	0.9	4.1	1.8

Relatively, fisheries play a major role in the North Coastal Region of Andhra Pradesh. Both marine fish and prawn production contribute to the GVA in the region. Around 35 percent of total marine fish and prawn production in the state was in the North Coastal Region. Similarly, inland fish and prawn production is also a minor activity in the region. This region has a share of nearly 2.8 percent of the state's total inland fish and prawn production. A negligible share of brackish water prawn production in the state also takes place in this region. Overall, this region contributes to the state GVA of fisheries sector. A comparative status of North Coastal Region along with the state and country has been summarized and presented in Table 1.

3. Pilot Sites of AP Primary Sector Mission

The Government of Andhra Pradesh has designed a strategy to transform the agriculture and allied sectors in partnership with ICRISAT. This strategy will be operationalized in a phased manner, setting the standard for a new development paradigm in tune with change scenarios so as to enable Andhra Pradesh become one of the three best performing states in India by 2022. Initially this massive effort was called 'Primary Sector Mission' but it was later re-named as '*Rythu Kosam*' (pro farmer) Mission. The mission is implemented by adopting the principles of 4 'I's: Innovate, Inclusive, Intensive and Integrated approaches; 4 'C's: Convergence, Collective action, Consortium to build partnerships, and Capacity building; and 4 'E's: Efficiency, Equity, Environment Protection and Economic gain. Overall the mission in the state is broadly focusing on:

a. Increasing productivity of the primary sector comprising Agriculture, Horticulture, Livestock, Fisheries & Sericulture, etc.;

b. Mitigating the impact of droughts through water conservation and micro-irrigation;

c. Post-harvest management to reduce wastage; and

d. Establishment of processing, value addition capacity, and supply chain of the identified crops.

To execute the mission strategy effectively, 13 pilot sites (10,000 ha each) of learning in each of the 13 districts of Andhra Pradesh were identified to operationalize the convergence of primary sector for increasing productivity, profitability and sustainability through science-led development and climate smart agriculture. In order to integrate, innovate, intensify ensuring inclusivity, a pilot site with 10,000 ha spread is being established in each study district. These pilot sites provide an on-farm field laboratory to test and evaluate technological, institutional, policy innovations and fine-tune them as needed before scaling up in the districts. In marketing parlance, these pilot areas identified in each district are test markets for innovations, which will be demand driven and impact-oriented with measurable indicators.

The general criterion followed for selecting the pilot sites in each district are: a) representative site for the district in terms of Agro-Ecological Zones (AEZ) and cropping systems; b) good potential for impact to bridge yield gaps; c) accessibility; d) willingness of farmers to adopt new technologies; e) presence of suitable institutions; and f) predisposition for change.

The identification of a pilot site in each district was done through several iterations with proper consent of the District Administrator (Collector and Chief Planning Officer), other line department officials at district and *mandal* level, interactions with farmers and communities, and discussions with NGOs. By following the above criterion and similar steps, the pilot sites in all 13 districts were identified. District-wise distribution and coverage details of each pilot site are furnished in Table 2.

Overall, the entire primary sector mission pilot sites include 267 villages (both agril. and fishery) and are under 38 *mandals* in 13 districts of the state. Approximately 0.192 million farmers' households are directly targeted for mission interventions across 13 pilot sites. A total population of 0.685 million are covered initially during the 2015-16 cropping season. About 0.142 million ha of cropped area (including agril. and horticultural crops) have been covered across 13 pilot sites, corresponding to 13 districts in the state. Nearly 0.99 million livestock animals are also covered for a wide range of interventions in the

Table 2. Distribution and coverage of pilot sites under AP primary sector mission.

District	No. of *mandals*	No. of villages	No. of households	No. of population	Pilot site cropped area (ha)	Livestock population (no.)	Fisheries area (ha)
Chittoor	2	18	6762	31317	9001	93412	0
YSR Kadapa*	4	13	11246	46745	10314	146771	0
Anantapur*	3	14	5019	13556	12411	20,000	0
Kurnool	2	10	6864	26736	10299	24057	0
Nellore	3	11	9469	33876	11780	39915	367
Prakasam	4	28	20899	86722	8500	225550	3898
Guntur#	4	18	17634	63202	12987	19980	217
Krishna*	3	27	22805	76762	15182	60240	260
West Godavari**	2	12	23155	84044	12803	25400	1022
East Godavari	3	26	17487	67843	10470	146939	2163
Visakhapatnam	3	23	21673	33411	10516	31232	360
Vizianagaram#	2	23	8753	35976	8494	32555	451
Srikakulam#	3	44	20721	85581	9914	126595	154
Total	38	267	192487	685771	142671	992646	8892

**one *mandal* and eight villages commonly covered under both agriculture and fishery sub-sectors
#one *mandal* commonly covered under both agriculture and fishery sub-sectors
*minor changes carried out during baseline survey

selected *mandals* in the mission pilot sites. Roughly 8892 ha of fishery area (including both prawns and fish cultivation) are also covered under mission interventions. In a nutshell, the cumulative pilot site area represents about 1.75 percent of the total cropped area in the state. Approximately about 1.4 percent of the total state's population are being covered in these pilot sites.

4. Sampling Framework

The sampling framework has been designed for the entire 'Rythu Kosam Mission', which includes 13 pilot sites across the 13 targeted districts in the state by considering the extent of diversity among study villages. Each pilot site has been identified with an approximate cropped area coverage of 10,000 ha in each study district. In general, the pilot site in a district is comprised of both agricultural (mainly growing agriculture and horticulture crops) villages and a few fishery (mainly growing fish and prawns) villages. All the 13 pilot sites from 13 districts together have been distributed across 30 *mandals* and 227 villages in the case of agricultural villages, while another 47 fishery villages were covered in 11 *mandals*. As shown in Table 2, there are three common *mandals* and seven common villages across the pilot sites. Excluding these common pilot sites, the actual *mandals* and villages covered under the Rythu Kosam Mission are 13 districts, 38 *mandals* and 267 villages exclusively. This spread of total project area itself represents the large diversity and variation among selected villages across districts. All these sample villages together represent the state of Andhra Pradesh and its rich diversity among three regions (Rayalaseema, Coastal Andhra and North Coastal) and four AEZs. A systematic sampling framework has been developed to cover this diversity by means of the following steps:

1. Characterization of all sample villages using information on type of agriculture (irrigated/rainfed), major crops cultivated both in rainy and post-rainy season, major horticultural crops grown, rearing of sericulture, fish and prawns cultivation, and finally, extent of forest area available, etc.

2. Based on the dominance of each sub-sector – Agriculture, Horticulture, Sericulture, Fisheries and Forestry – in the sample villages, a scale of 1 to 3 (3 for significant area and 1 for low presence) was established for better categorization of study villages. A total of six diversity categories were identified for sample villages.
3. A cumulative diversity scale for each sample village was calculated by adding the respective scales given for each sub-sector (Agriculture, Horticulture, Sericulture, Fisheries and Forestry). This value ranges from a minimum of '4' to a maximum of '9'.
4. To undertake a baseline survey covering 38 *mandals* and 267 villages from 13 pilot sites in 13 study districts of the state is challenging. To minimize the cost of survey and time, a sub-sample of 150 villages (covering 119 agriculture and 31 fishery villages) were identified using a randomization procedure without losing their representativeness and by covering all the *mandals* in the study. Roughly 55% sample villages have been covered from 40 *mandals*.
5. The total cumulative area covered in the Primary Sector Mission (13 pilot sites @ 10,000 ha each) is estimated at 1,30,000 ha. The average operational landholding per household in the state is calculated at 1.08 ha based on the 2011 Landholding Census survey. The estimated coverage of households in the Primary Sector Mission would be nearly 120,370. In the case of large-scale representative household surveys, a reasonable coverage of 5 percent of the total population is good enough to minimize marginal error. Thus, the present baseline survey has used this thumb rule and targeted an approximate sample of 6500 households (5% of 130,000 HH) across 13 districts.
6. As per the 2011 Census nearly 73% of total households are small (less than 2 ha of operational landholding), 9% medium (having operational landholding of above 2 ha and less than 4 ha), and 3% of the sample households are large (> 4 ha). Nearly 15% of the total households fall under the landless category. This category of farmers are highly dependent on the primary sector for their livelihood. So their representation in the household survey is critical for understanding the direct and indirect impact of different interventions in the pilot sites. A minimum of six landless farmers per village (150 × 6 = 900) are accommodated in the household survey to represent this category in the study.
7. The classification of fishery farmers' operational landholding details are not available at the state level. The household data collected in the fishery villages will be post-stratified to clearly understand the economies of scale of their cultivation. However, to keep enough representation in the household survey, a minimum of 30 farm households per village were surveyed. Thus, a total of 930 HHs have been targeted to cover 31 fishery villages from the 10 *mandals*.
8. The leftover sample of 4670 HH (6500-900 landless + 930 fishery HH) have been distributed among 119 agricultural villages using the below mentioned sampling weights (see Table 3). Majority of the sample villages exhibited medium-to-high levels in the diversity scale (6 to 8) in their distribution. Thus, majority of the sample has been allocated to this category of villages.
9. Using the above sampling framework, a sub-sample of 55 percent sample villages were identified for primary household survey in the AP Primary Sector Mission. All the villages represented the calculated cumulative diversity scale range between 4 to 9 because of dominance of agricultural and horticultural crops, presence of sericulture cultivation, fisheries rearing and existence of forestry in the study villages. More details regarding total study sampling framework, distribution of sample villages based on diversity scales, break-up of different categories of sample farmers across pilot sites and distribution of sample among different sub-sector, etc., are furnished in Appendix-2. However, the sampling strategy (below) was planned for collecting the primary household data from targeted sample of 6462 HHs. The primary household survey was conducted during June, 2015 with structured questionnaires and trained field investigators. About 5222 sample households were interviewed from selected villages and information collected on socio-economic aspects, assets position, cropping pattern, extent of adoption of technologies, average productivity levels among major crops, details about credit and market access, perceptions about climate change and risk coping mechanisms, and so on. A difference of 1240 HH of targeted sample were not covered during baseline surveys due to

higher homogeneity in population and non-cooperation in few of the sample villages (especially in fishery sample villages). The complete break-up of pilot site-wise details are summarized in Table 4. Overall, 81 percent of the total targeted sample households were covered during the household survey. Out of the total sample interviewed (5222), nearly 4794 HHs were covered in agricultural sample villages while the rest (428 HH) were administered in fishery sample villages.

Table 3. Sampling strategy for cultivator households (n=4670).

Diversity category	Diversity scale	Diversity weight	Distribution of sample villages	Cul. wt	Distribution of target sample (n=4670)	Average sample per village
1	4	0.10	4	0.41	97	24
2	5	0.13	4	0.51	121	30
3	6	0.15	68	10.46	2469	36
4	7	0.18	21	3.77	889	42
5	8	0.21	17	3.49	822	48
6	9	0.23	5	1.15	272	54
Total	39	1.00	119	19.8	4670	-

Table 4. Sample distribution and coverage during baseline (BL) surveys .

District	Targeted BL sample	Sample covered in BL
Chittoor	486	481 (0)
Kadapa	396	396 (0)
Anantapur	402	366 (0)
Kurnool	228	228 (0)
Nellore	372	264 (48)
Prakasam	546	342 (91)
Guntur	444	359 (48)
Krishna	570	491 (125)
West Godavari	606	332 (22)
East Godavari	618	406 (52)
Visakhapatnam	462	423 (0)
Vizianagaram	504	460 (18)
Srikakulam	828	674 (24)
Total	6462	5222 (428)

Note: Figures in parenthesis indicate absolute no. of fishery sample coverage in the total

5. Methodology

Simple tabular average analysis was used to analyze the household data collected in the primary household survey. The results are summarized by district in Section 6 of this consolidated North Coastal Region baseline report.

For estimation of Gross Value Added (GVA) in primary sector from pilot site in each district, a production/value added approach was used. Among the three approaches (production, income, and expenditure) available, production/value added approach is mostly applied for the estimation of value added in primary sector. Income approach is normally applied for industry sector. Expenditure approach is generally applied in the case of service sector.

As per standard definitions, the primary sector includes agriculture, horticulture, animal husbandry, fisheries, sericulture, forestry & logging, and mining & quarrying. But, in the context of the present study, the primary sector is confined to only agriculture, horticulture, animal husbandry and fisheries. The standard methodology defined by Directorate of Economics Statistics[2] was adapted with suitable modifications for the estimation of GVA from different sectors in the pilot site using various estimates derived from the household survey. The sector-wise methodology followed for estimation of 'Gross Product' is summarized below.

Agriculture, horticulture and floriculture

This sector includes major agricultural crops (25), minor crops (17), small millets, pulses, commercial, horticultural and plantation crops, flowers, sugar, oilseeds, fruits, vegetables, fodder, and by-products.

Livestock

This sector includes milk production from cows, buffaloes and goats. Also wool production from sheep and goats, egg production from poultry, and meat production from poultry, sheep, goats and donkeys. Dung and other by-product production from milch animals and other livestock are also included. The incremental livestock value is also considered in the estimation of GVA.

Item	Source of data	Method of estimation
Agriculture Horticulture Floriculture	Household survey and secondary statistics available at village level	Value of output = production x price (base year 2014-15)
Gross value of output (1)		
Less: - inputs		
Seed Chemical fertilizers Organic manures Market charges Irrigation charges Electricity charges Pesticides and insecticides Diesel oil cost Machinery cost	Household survey	Average cost per ha per crop
Total inputs (2)		
Gross product (1-2)		

2. National Account Statistics: Manual on Estimation of State and District Income (2008), published by CSO.

Item	Source of data	Method of estimation
Milk Meat Wool Egg Dung cakes/ dung	Household survey and secondary statistics available at village level	Value of output = production x price (base year 2014-15)
Incremental stock value	DES latest report	Value of output = production x price
Gross value of output (1)		
Less: - inputs		
Livestock feed & roughages Concentrates Marketing cost Medicines and other costs	Household survey	Average cost per animal
Total inputs (2)		
Gross product (1-2)		

Fisheries

Village-wise value of inland fish, marine fish and prawns, is estimated by multiplying the production with corresponding output prices. Fish sold as salted, dried and frozen, etc., were also accounted for. The average productivity level and various input material costs per ha were estimated from the household primary survey. The gross product from fisheries sector was estimated by deducting the input costs from the total gross value product.

Forestry

Major components of this sector are industrial wood (recorded and un-recorded), fuel wood and major/ minor forest produce. However, the present study has attempted to capture only the fuel wood and forest produce components. The gross value of output is estimated by multiplying the total forest produce with corresponding output prices (base year 2014-15). In the case of forestry, the input costs were not captured in the household survey.

All the household survey information was collected with cropping year 2014-15 as the reference. For obtaining complete information on the three seasons, previous year's data were collected. Overall, the summary of methods of estimation of GVAs across sub-sectors are mentioned below.

6. Findings from Baseline Survey

The findings from baseline surveys conducted across three study districts in the North Coastal Region are summarized and discussed in the following sub-sections. Simple tabular analysis was used to analyze the primary household survey data collected during the baseline survey referring to the cropping year 2014-15. Specifically, the results presented below are summarized from agricultural and fishery sample villages (nearly 42) covering about 1557 (1515 agriculture + 42 fishery) sample households in the three pilot sites corresponding to three study districts in the region. Due to limited presence of fishery sector in a few villages in the three study district pilot sites, the baseline has only captured about 42 fishery sample households in the total targeted. Overall a total of 1557 sample baseline farmers' household data have been analyzed and summarized in this report.

Sources of data across sub-sectors

Source of information	Agriculture including horticulture (a)	Livestock (b)	Fisheries (c)	Forestry (d)	Total primary sector (a+b+c+d)
Estimation of Output (1)	HH survey and secondary information	HH survey and secondary information	HH survey and secondary information	Only secondary information	Total primary sector output
Estimation of input costs/unit (2)	HH survey	HH survey	HH survey	DES guidelines will be followed	Total input costs excluding labor costs
Gross product (1-2)	Gross product from agriculture including horticulture, floriculture, vegetables, fodder crops, etc.	Gross product from cows, buffaloes, goat, sheep, poultry, ducks and incremental value, etc.	Gross product from prawns, fish (inland and marine), salted fish, dried fish, etc.	Gross product will be estimated using DES guidelines and methodology	Primary sector GVA estimation for pilot site/ district

6.1 Distribution of sample across size groups and communities

The distribution of total baseline survey sample (agricultural sample HHs only) by district in the region is presented in Appendix-1, Table 1. Overall, 1515 sample households were interviewed from 38 sample agricultural villages in the three pilot sites of the North Coastal Region. All the sample farmers are distributed and categorized under different size groups based on their total operational landholding during the 2014-15 cropping season. Out of the total sample of 1515, 1187 sample households belonged to small size (< 2 ha) farmers' category, followed by medium (between 2 and 4 ha) size (156 HHs and represents 10.3%), and large (> 4 ha) size (26 HHs which represent 1.7%) category. Nearly a total of 146 sample households belonging to the landless (operational landholding zero) category was also covered in the baseline survey. They contribute approximately 78.3%, 10.3%, 1.7% and 9.7% shares in the total baseline sample for small, medium, large and landless categories, respectively. This allocation among size groups is truly representative of the 2011 Census survey conducted on 'operational landholdings' at the state level. The pattern of distribution of sample among study districts also closely represent the district-level situation generated in the 2011 Census survey.

The total baseline sample in the region was categorized based on the community they belonged to and by district. It is presented in Appendix-1, Table 1. The majority of the sample (700 HHs) belong to Backward Caste (BC), followed by, (394 HHs) under Scheduled Tribe (ST); (305 HHs) under Open Community (OC); (114 HHs) under Scheduled Caste (SC) and (2HHs) under Others category. They contributed approximately 46.2%, 26.0%, 20.2% and 7.6%, for BC, ST, OC and SC communities, respectively. The pattern of distribution of sample by community, varied from district to district.

6.2 Family size, extent of literacy and participation in labor market

The details of average family size, extent of literacy, and participation in labor market, etc., are analyzed and presented in Appendix-1, Table 2. The average family size of the household for the total sample in the region is 3.8. The highest family size (4.0) was noticed in the case of Srikakulam district while the lowest (3.5) was observed in Vizianagaram district. On the whole, only 27% of total sample in the region had literacy, out of which, 11.3% had primary level of education while another 15.7% had upper primary and above level of education. Nearly 73% of the total sample were uneducated or did not have access to education. The extent of illiteracy was much higher in the case of Srikakulam district sample farmers followed by Visakhapatnam district. Special attention should be placed on promotion of education and other basic amenities in Srikakulam and Visakhapatnam districts. The highest literacy rate was noticed in the case of Vizianagaram district's sample farmers, which is better than any other district in the region. Majority of family members (63%) in the sample participate in their own farm work. Majority of the

sample districts exhibited similar levels of own farm labor participation in the North Coastal Region. Another 57.8 percent of total family members were also participating in the outside labor market for their livelihoods. Most of the sample districts in the region showed relatively higher levels of outside labor market participation.

6.3 Landholdings and extent of tenancy

The particulars of landholdings and extent of tenancy by district, in the North Coastal Region are furnished in Appendix-1, Table 3. The average total own landholding per household for the entire region's sample was estimated at 1.26 ha, of which 0.62 ha of land was covered with irrigation access while another 0.64 ha were grown under rainfed situations. Specifically in the North Coastal Region's districts, both rainfed and irrigated landholdings are almost equally distributed in the total own landholdings. But in the case of Rayalaseema Region districts, rainfed landholdings have the lion's share in the total own landholdings. The extent of average operational landholding for the total sample households in the region was calculated at 1.34 ha. Marginal share of cropped land (0.08 ha per HH) was also leased-in from outside land markets in the region. The extent of tenancy for the total sample households in the region was 8.3 percent (excluding landless households). Relatively, tenancy was more prominent in Vizianagaram district, followed by Srikakulam and Visakhapatnam districts.

6.4 Household assets and livestock ownership

Details about ownership of household assets and livestock for the total sample in the North Coastal Region are presented district-wise in Appendix-1, Table 4. Nearly 90% of the total sample households stated that they possess a residential house. Only about 13.8 percent sample households indicated that they also own a cattle shed for accommodating buffaloes, cows and bullocks. Televisions (75.6%) and mobile phones (65.4%) are the most common consumer durables owned by many of the sample farmers across study districts in the region. Approximately less than a quarter (15.9%) of total sample farmers also possessed two wheelers. Slight variation in ownership was observed from item to item and its possession among study districts in the region.

Details about average livestock ownership per sample household are also summarized in Appendix-1, Table 4. On an average, every tenth sample HH in the region had one draft animal. Every third sample HH in the North Coastal Region also owned at least one cow. Similarly, every fifth sample HH in the region also possessed one buffalo. Apart from these animals, many sample households also own young stock, sheep, goats and poultry in a significant manner. So the total number of livestock animals owned by each sample household was estimated at 1.1. The composition of different livestock animals varied significantly from district to district in the region. Overall, the highest number of livestock animals per household was owned in Visakhapatnam (1.7) while the lowest was observed in the case of Srikakulam (0.5).

6.5 Major crops and their productivity levels

Details about major crops grown in each pilot site in the region and their corresponding productivity levels in comparison with district, state and national average yields are summarized in Appendix-1, Table 5. The district and pilot site-wise productivity levels are discussed below.

The Visakhapatnam pilot site productivity levels were on par with the district average yields except in the case of sugarcane, black gram and finger millet crops. But the relative productivity levels in the pilot site are much higher than the district average in the case of paddy, maize and green gram. So there is huge potential for contribution to pilot site GVA from major crops. The mean productivity levels were significantly lower in the case of sugarcane and black gram than the district average yield, as reported by Directorate of Economics and Statistics.

The Vizianagaram pilot site productivity levels were on par with the district average yields only in the case of paddy and sesame crops. The relative productivity levels in the pilot site are lower than the district

average in the case of maize, black gram and groundnut. So there is huge potential for contribution of major crops to pilot site GVA. Mean productivity levels were significantly lower in the case of black gram than the district average yield, as reported by Directorate of Economics and Statistics. Huge potential exists in the Vizianagaram pilot site to prosper in future through better management practices, scientific post-harvest handling, and market linkages.

The Srikakulam pilot site productivity levels were less than the district average yields except in the case of paddy, black gram and green gram. But the relative productivity levels in the pilot site are much lower than the district average in the case of maize, sugarcane and finger millet. So, there is huge potential for contribution to pilot site GVA by major crops. The mean productivity levels were significantly lower in the case of finger millet and sugarcane than the district average yield, as reported by Directorate of Economics and Statistics.

6.6 Economics of crop and fish enterprises

The details about economics of major crop enterprises per ha across pilot site districts are summarized in Appendix-1, Table 6. Information about costs and returns per ha across crops cultivated in the pilot site were collected during the primary household survey from one-fourth of the sample households. The information thus collected was then fine-tuned through village-level focus group discussions (FGDs) conducted at each sample village in the baseline survey. This information was collected on a one-year recall basis, pertaining to the 2014-15 cropping period. While calculating the economics of crops cultivation, only total variable costs (paid out costs across each operation, including seeds, fertilizers, pesticides, machinery, labor and irrigation costs, if any) were considered for deducting from total returns (including total output plus by-products, if any) per ha. Fixed costs, such as rental value of own land per ha, depreciation of farm implements, etc., were not considered. The net returns per ha were estimated after deducting the total variable costs per ha from total returns per ha. The benefit-cost ratio (B:C ratio) was calculated by dividing the total returns with total variable costs per ha. Details about pilot site-wise performances of major crops in the North Coastal Region are discussed and summarized below.

The performance of agriculture in the three North Coastal districts' (Visakhapatnam, Vizianagaram and Srikakulam) pilot sites are mixed. Paddy being the major irrigated crop in these districts was not able to recover its total variable costs in the case of both Visakhapatnam and Srikakulam districts (see Figure 3). It only recovered its total variable costs in Vizianagaram district. Maize also performed well in both Vizianagaram and Srikakulam district pilot sites. But it did not recover its total variable costs in the case of Visakhapatnam district pilot site (see Figure 4). Sugarcane, another major irrigated crop grown in

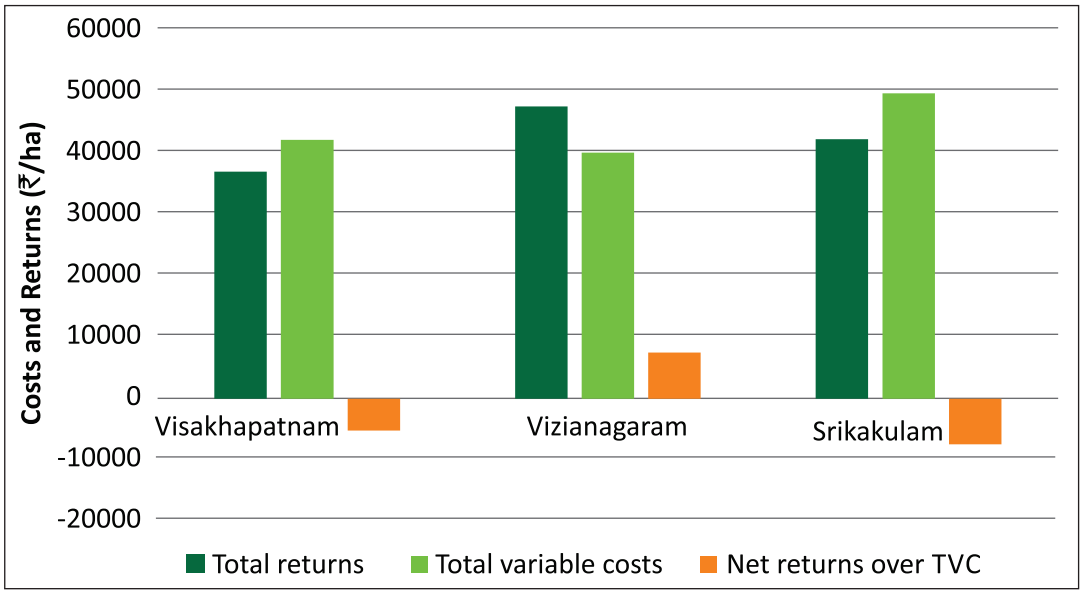

Figure 3. Performance of paddy in North Coastal Region.

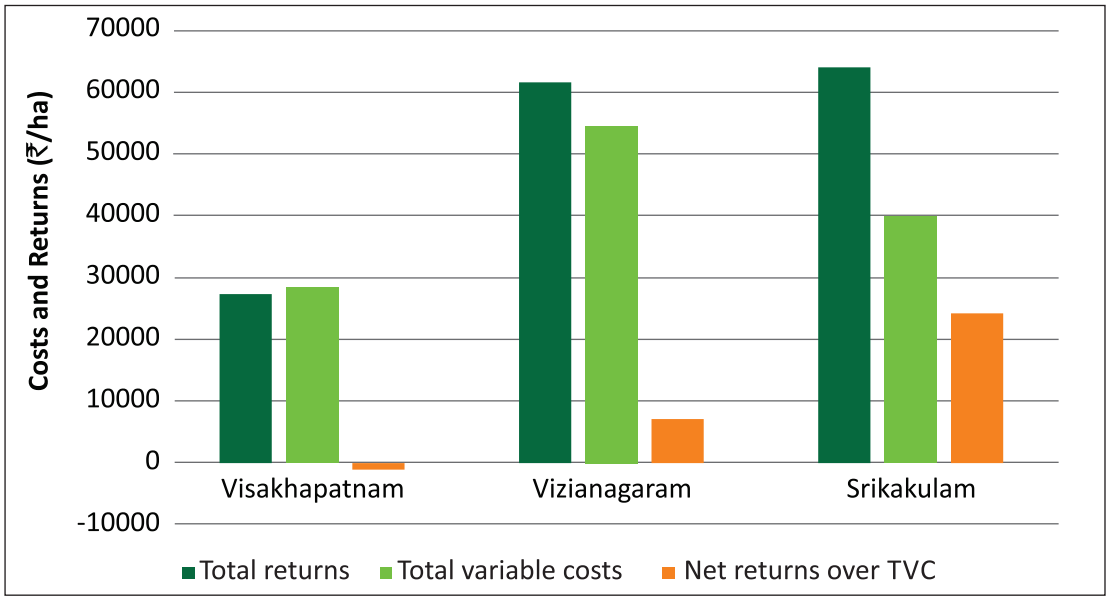

Figure 4. Performance of maize in North Coastal Region.

Visakhapatnam district, recovered its total variable costs and earned significant profits per ha. Sesame in Vizianagaram and black gram in Srikakulam districts exhibited better recovery of total variable costs per ha. If we consider the total costs per ha, all the rainfed crops across districts were not able to recover them. For further details on costs and returns of various crops per ha across pilot sites see the district-specific baseline reports prepared under similar guidelines.

Since cultivation of fisheries is a very minor economic activity in the region, the detailed costs and returns on them were not analyzed and presented. However, huge marine fish and prawn cultivation potential is available in the North Coastal Region. But this industry is still in its infancy in the region.

7. Pilot Site GVA Estimations across Sub-sectors

The details about pilot site-wise Gross Value Addition (GVA) estimations across sub-sectors in the primary sector are furnished in Appendix-1, Table 7, for the North Coastal Region. As described in the earlier sections, estimation of current value of GVA in the 13 pilot sites corresponding to 13 districts of Andhra Pradesh state is one of the major objectives of the AP Primary Sector Mission baseline survey. However, the present report summarizes the results for the three major districts in the North Coastal Region.

These values will be used as a benchmark value before the implementation of Primary Sector Mission/ Rythu Kosam Project activities across three district pilot sites in the region. Any monitoring or impact studies in future carried out over a project period will use this baseline information as the reference benchmark points. Information from the primary household survey (including FGDs) coupled with secondary sources of information was used for the estimation of GVAs across sub-sectors. Complete details about methodology used across sub-sectors have been furnished in Section 5 of this report. The present study has considered only four major sub-sectors in the estimation of total GVAs of primary sector. They are: agriculture, horticulture, animal husbandry, and fisheries sub-sectors. The current estimation of GVAs is devoid of both sericulture and forestry contributions due to limited or insufficient data. However, additional efforts are in place to estimate these contributions as well. The results generated from primary household data analysis are discussed in detail sub-sector wise below.

Overall, the total estimated GVA from the AP Primary Sector Mission's three pilot sites in the North Coastal Region are ₹ 1852.4 million, of which, ₹ 1639.3 million (88.50 percent) is contributed by the agriculture sub-sector including horticulture. Another ₹ 189.8 million is contributed by animal husbandry which accounts for 10.25 percent share in the total GVA of the AP Primary Sector Mission in the region.

The fisheries sub-sector contributed an amount of ₹ 23.3 million towards total GVA value. The sector-wise contributions and corresponding share value are depicted in Figure 5.

Among all the three pilot sites, Visakhapatnam district pilot site has contributed the highest value (1086.4 million), followed by Srikakulam district pilot site (419.4 million) and Vizianagaram (346.6 million). The lowest GVA value was recorded in Vizianagaram district pilot site. The total GVA values by district pilot site in the region are presented in Figure 6.

The highest value of GVA contributed by the agricultural sub-sector including horticulture was observed in Visakhapatnam district pilot site (₹ 1027.1 million) followed by Vizianagaram district pilot site (₹ 315.2 million). The lowest value was contributed by Srikakulam district pilot site (₹ 297 million). In the case of animal husbandry sub-sector, the highest value was contributed by Srikakulam district pilot site (₹ 99.1 million) followed by Visakhapatnam district pilot site (₹ 59.3 million).

Srikakulam district pilot site contributing significantly in animal husbandry sub-sector even though it was relatively backward in agriculture including horticulture. The lowest value GVA from animal husbandry sub-sector in the region was contributed by Vizianagaram district (₹ 31.4 million). But the fisheries sub-sector contributed marginally only in the Srikakulam district pilot site (₹ 23.3 million). The other two districts in the region did not contribute to fisheries GVA. The compositions of each pilot site GVA by sub-sector are summarized in Figure 7.

The dominance and significant share contributions of different sub-sectors in each district's total pilot site GVA estimations in the North Coastal Region are presented in Figure 8. Nearly 94.54 percent share of total GVA in the Visakhapatnam district's pilot site is contributed by agriculture including horticulture sub-sector. In contrast to Visakhapatnam district, Srikakulam district's pilot site had the highest (23.63 percent) contribution from animal husbandry sub-sector. In the case of Vizianagaram, both agriculture including horticulture and fisheries sub-sectors played a significant role in the total GVA contributions.

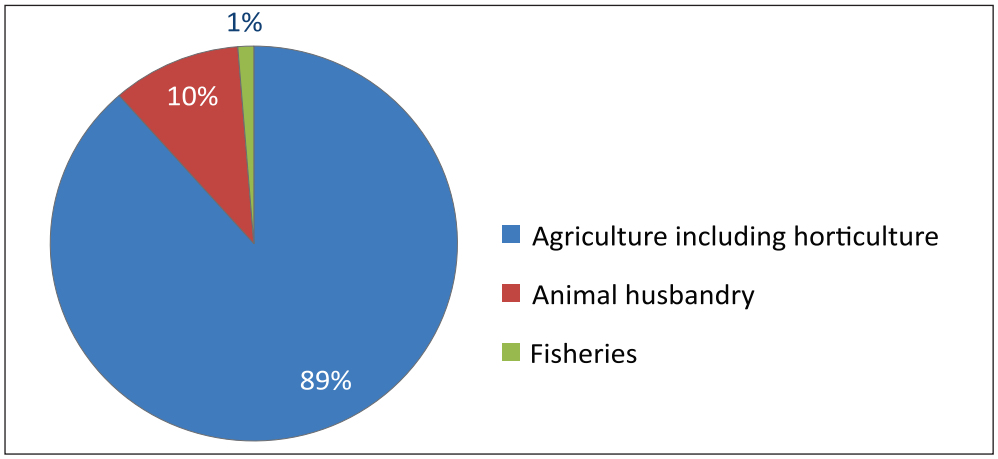

Figure 5. Sub-sector wise shares in the total GVA estimation.

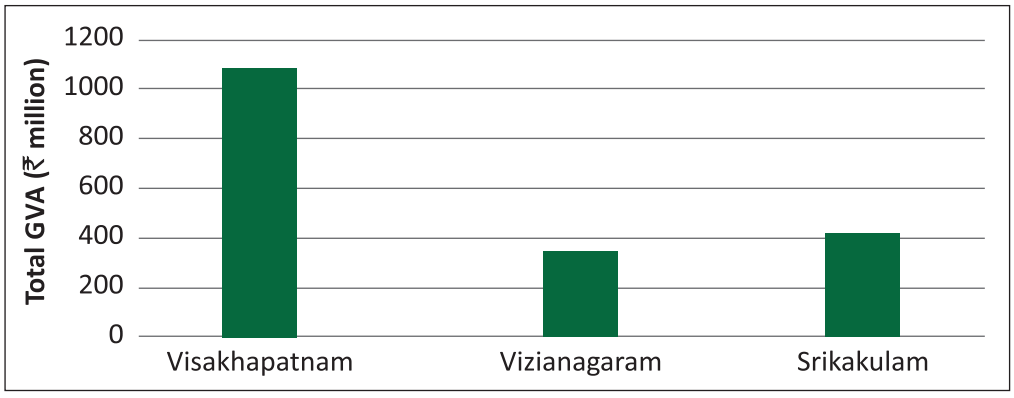

Figure 6. Total GVAs estimation by district pilot in the region.

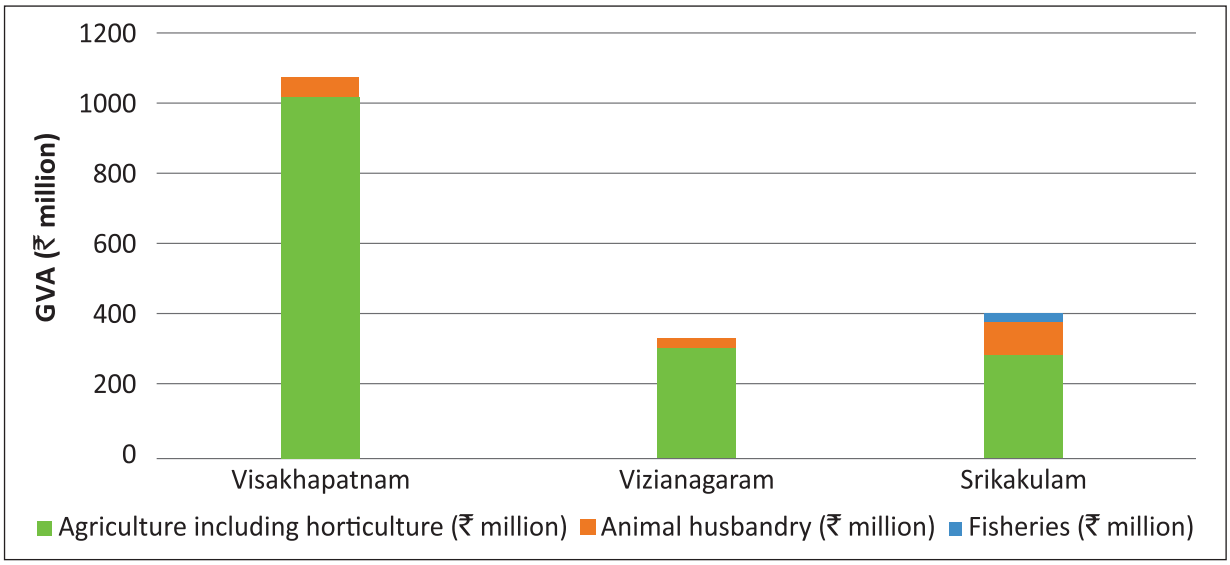

Figure 7. Compositions of pilot site GVAs by sub-sector in the region.

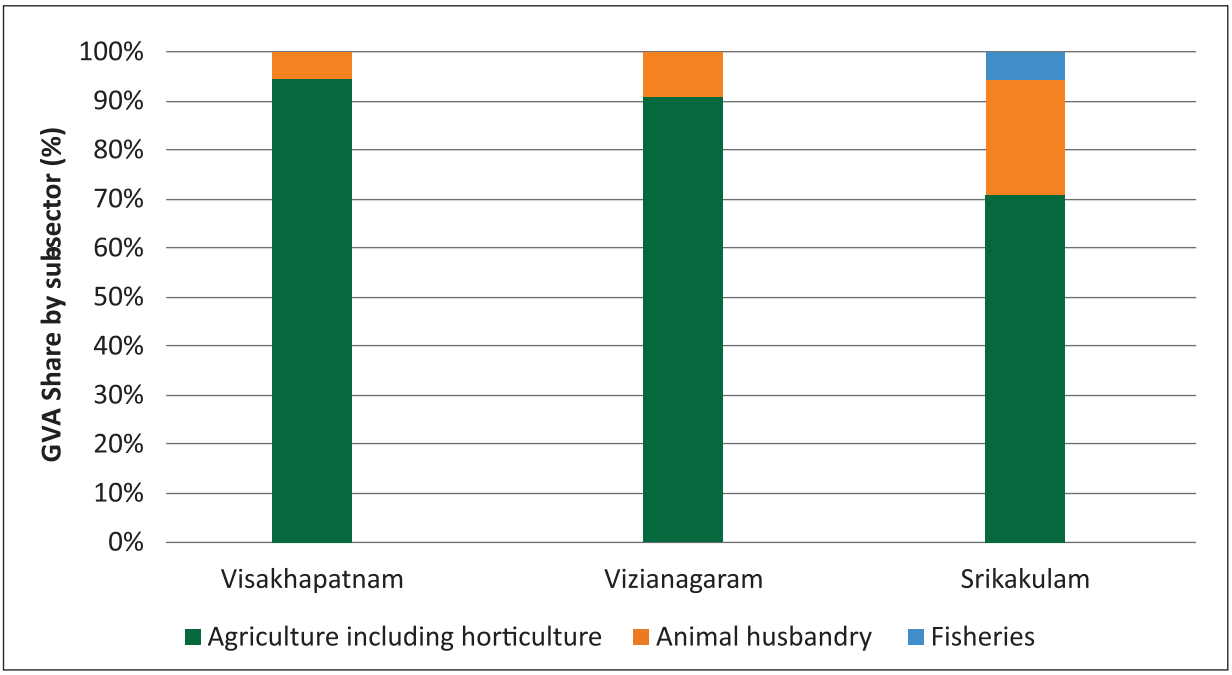

Figure 8. Share of different sub-sectors in total GVA.

The total district GVA value per pilot site village was estimated in order to understand the extent of potential contributed by each pilot village in the North Coastal Region. The district-wise estimations in the region are summarized in Figure 9. The per village contribution to GVA was the highest in the case of Visakhapatnam district pilot site, followed by Vizianagaram and Srikakulam district pilot sites. It is very interesting to note that each district pilot site village in Visakhapatnam is contributing nearly 4.9 times higher the GVA value than each district pilot site village in Srikakulam. There is clear disparity among these villages in terms of potential to contribute to total GVA in the pilot site.

The GVA values per district pilot site household was estimated and compared across study districts in the North Coastal Region. Details are furnished in Figure 10 in a descending order of merit. Visakhapatnam district pilot site households retained their first rank followed by Vizianagaram and Srikakulam districts' pilot site households. The average household earnings per annum during the year 2014-15 in the Visakhapatnam district pilot site were calculated at ₹ 50,127. Vizianagaram district is closely behind Visakhapatnam district in terms of GVA value per HH in the region, while the lowest earning per pilot site

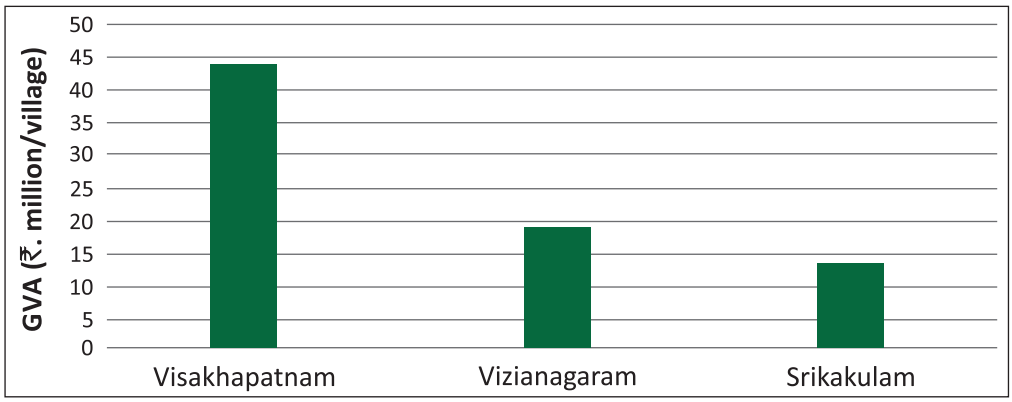

Figure 9. GVA value per pilot site village in the region.

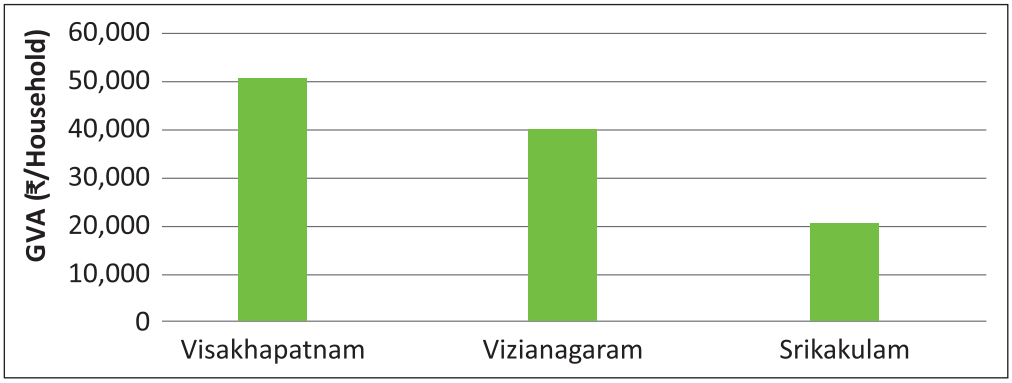

Figure 10. GVA values per district pilot site household in the region.

household per annum (₹ 20,240) was observed in the case of Srikakulam district. The average earnings from agriculture and allied sectors of each household from Visakhapatnam district was close to 2.5 times higher than the average sample household's earnings in Srikakulam district pilot site.

The average total GVA contributions from each per ha landholding in the district pilot site was also calculated and compared among study districts in the North Coastal Region (see Figure 11). Also, per ha agricultural land in Visakhapatnam district pilot site is contributing almost ₹ 103,309 per annum towards total GVA of the district primary sector. This was the highest value observed among study districts in the North Coastal Region. The average earnings from each per ha cultivated land were the lowest in Vizianagaram (₹ 33,739) district pilot site. Good access to irrigation facilities and intensive cultivation of high value crops in the district may have helped Visakhapatnam district to earn three times higher income than irrigated-dry per ha cultivation in Vizianagaram district. A more detailed break-up of GVA values across three pilot sites in the region are summarized in Appendix-1, Table 8.

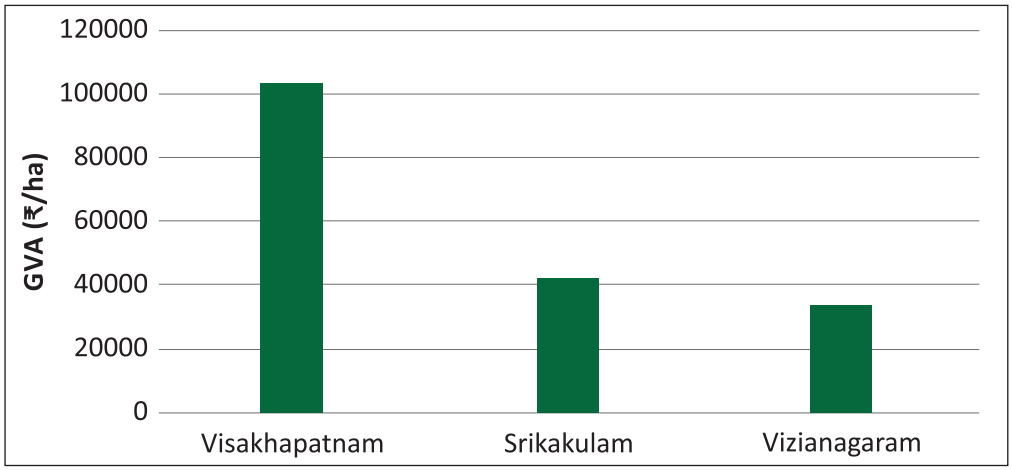

Figure 11. GVA value per ha area in the district pilot site in the region.

8. Major Constraints and Potential Opportunities

All the district pilot sites have enormous potential to grow and contribute to the region's and state's GVA in the primary sector. The sample farmers across pilot sites are highly determined and keen on continuing agriculture and allied activities, provided it becomes highly remunerative. There are a few constraints

District	Major constraints	Potential opportunities
Visakhapatnam	• Low input agriculture and lack of awareness in tribal areas • Low adoption of technologies and low productivity levels across field and horticultural crops • Poor market linkages and traders play a major role • Poor productivity levels of milk and low domestic demand • Highly prone to climatic aberrations and cyclones • Under penetration of crop insurance schemes	• Huge scope for converting the area into organic clusters, branding and marketing • Enormous potential for introduction of new commercial crops, such as coffee plantations, lemon grass, flax seed and floriculture, etc. • Good scope to increase cropping intensity • Huge opportunities for pooling, grading and exporting of valuable forest products • Ample scope for setting up of value chains on mango, cashewnut and coffee crops • Huge scope for insurance industries with suitable insurance products
Vizianagaram	• Small and marginal farmers with low economic capacity • Low awareness and poor adoption of technologies • Low productivity levels across field and horticultural crops • Poor productivity levels of milk • Water scarcity in selected pockets • Under penetration of crop insurance schemes • Reluctance of insurance companies to cover shrimp crop due to high risk of crop losses	• Good scope for further increase of productivity levels and introduction of new technologies • Excellent opportunities for plantation crops and trading • Good scope for introduction of cross-bred animals and further increase in milk productivity levels • Huge scope for development of non-farm employment opportunities and skills • Huge scope for insurance industries with suitable insurance products
Srikakulam	• Small and marginal farmers with low economic capacity • Low input agriculture and low productivity levels • Low livestock activity and poor demand for milk • Poor market linkages and traders play a major role • Highly prone to climatic aberrations and cyclones • Under penetration of crop insurance schemes • Reluctance of insurance companies to cover shrimp crop due to high risk of crop losses	• Ample scope for converting the area into organic clusters, branding and marketing • Good scope for *in-situ* and *ex-situ* water conservation practices to improve groundwater recharge • Creating awareness on livestock rearing and small ruminants • Huge potential for scientific post-harvest handling of major horticultural crops like mango, pineapple, jackfruit and cashewnut • Good scope for strengthening commercial capturing of marine fisheries and brackish prawns due to presence of the longest coastline in the state • Huge scope for insurance industries with suitable insurance products

observed across pilot site locations, which are hindering the growth and development of agriculture and allied activities in the respective districts and pilot sites. To harness the fullest potential for growth across sub-sectors, the state has to undertake immediate measures to remove these constraints. There is also a need for proactive policies and institutional reforms to achieve the targeted 'double digit growth' in primary sector of the state. The district pilot-site wise constraints and potential opportunities available across sub-sectors of the North Coastal Region's primary sector are listed below.

Summary and Way Forward

The comprehensive baseline survey conducted in the region has covered about 1557 sample households spread over 90 villages from eight *mandals* in three districts (Visakhapatnam, Vizianagaram and Srikakulam) of the North Coastal Region of Andhra Pradesh. Specifically, the results are summarized from agricultural and fishery sample villages (nearly 42) covering about 1557 (1515 agriculture + 42 fishery) sample households in three pilot sites corresponding to three study districts in the region. Small and marginal farmers dominated (78.3%) the total sample in the region. The socio-economic status of the farmers in the region is poor when compared with other regions. The average family size in the region is about 3.8. Nearly 73 percent of the total sample are uneducated. About 63.15 percent of family members engage or participate in their farm activities/operations. The pooled average operational landholding per household was estimated at 1.34 ha. The extent of land tenancy in the total region sample was calculated at 8.3 percent. More than 80 percent of sample households have a residential house, access to television and mobile phones. The average number of livestock animals owned per household was 1.1 in the region. Agriculture, in general, is low input-based with poor productivity levels among both field and horticultural crops. Due to partial access to canal irrigation facilities or groundwater resources, the average paddy productivity levels was on par with district average yields in the three study districts. But the average productivity levels in the case of maize was lower than the respective district average yields. The performance of agriculture in the three North Coastal districts' pilot sites are mixed. Paddy being the major irrigated crop in these districts was not able to recover its total variable costs in the case of both Visakhapatnam and Srikakulam districts. The cultivation of fish and prawns are not a major activity in the region. Agriculture including horticulture contributed around 88.5% share in the total GVA of the North Coastal Region. Animal husbandry sub-sector occupied the second position and contributed nearly 10.25 percent of regional GVA value. Fisheries secured only the third place with 1.26 percent share in total GVA value in the North Coastal Region.

Other major findings of the baseline survey and corresponding recommendations across sub-sectors are summarized below. Immediate steps are required to address these issues in order to enhance each sub-sector's contribution to the total primary sector GVA of the North Coastal Region.

Key findings	Specific recommendations
• Majority are small and marginal farmers with low economic capacity in the region • In general, agriculture is low input-based and there is lack of awareness in most of the tribal areas • Low adoption of technologies and poor productivity levels across both field and horticultural crops	• Good scope for further increase of productivity levels through creation of awareness and introduction of new technologies • Potential opportunity for increasing cropping intensity through efficient use of available rainfall and groundwater potential • Ample scope for converting the existing low input cultivated area into organic clusters, branding and marketing, etc. • Linking small and marginal farmers to proper institutional credit facilities will empower them to invest more in agriculture in general, and crops cultivation in particular.
• Low per capita consumption of milk in the region leading to susceptibility to diseases and malnutrition • Animal rearing is not a preferred major economic activity in the region • Low productivity levels of milk per animal due to poor awareness about fodder practices	• Animal rearing should be promoted as a business model with suitable incentives and subsidies. • Immediate need for creation of awareness about both consumption and production of milk • Good scope for introduction of crossbreeds and small ruminants in large scale rearing to make use of available resources
• Large tracts of suitably cultivated lands are ideal with good quantum of annual rainfall, congenial climate, reasonably good soils & natural landscape	• Enormous potential for introduction of new commercial crops, such as coffee, lemon grass, flax seed and floriculture, etc. • Potential scope for introduction of commercial cultivation of plantation crops (eucalyptus, casuarina, etc.)
• Poor market linkages due to poor road connectivity and lack of awareness. Traders play a major role in business transactions.	• Untapped potential for setting up of horticultural value chains, specifically in coffee, mango, banana, cashew, pineapple, jackfruit, etc. • Huge opportunities for setting-up proper marketing channels for major & minor forest products
• Agriculture in the region is highly prone to climatic aberrations and cyclones (Hudhud cyclone devastated all crop yields during 2014-15)	• Immediate need for introduction and piloting of climate smart agriculture studies in the region • Weather-based insurance coverage should be promoted and scaled up in the region
• Untapped potential for mechanized marine fish and prawn capturing in the region.	• The region has enormous potential for commercial capturing of marine fisheries and brackish prawns due to availability of a long coastline in the state. This sub-sector could contribute significantly to the Primary Sector GVA of the region
• Huge scope for promotion of non-farm employment in region	• Non-farm skills and employment promotion activities should be initiated for increasing the per capita income in the region

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Appendix-1

Table 1. Distribution of sample (agriculture) in North Coastal Region.

District	Total sample	Distribution by size group				Distribution by community wise				
		Small	Medium	Large	Landless	OC	BC	SC	ST	Others
Visakhapatnam	423	338	47	8	30	115	178	27	101	2
Vizianagaram	442	327	38	7	70	99	242	24	77	0
Srikakulam	650	522	71	11	46	91	280	63	216	0
North Coastal region*	1515 (100.00)	1187 (78.30)	156 (10.30)	26 (1.74)	146 (9.66)	305 (20.13)	700 (46.20)	114 (7.53)	394 (26.00)	2 (0.14)

*Figures in parenthesis indicate their respective shares to total sample

Table 2. Socio-economic details of sample in North Coastal Region.

District	Avg. family size* (no.)	Sample farmers' educational status (%)			Extent of labor participation	
		Un-educated	Primary	Upper primary and above	Own farm* (no.)	Outside farm* (no.)
Visakhapatnam	3.9	72.8	11.8	15.4	2.4	2.3
Vizianagaram	3.5	67.0	18.8	14.3	2.4	2.0
Srikakulam	4.0	79.1	3.2	17.7	2.4	2.3
NC region	3.8	73.0	11.3	15.7	2.4	2.2

*including children in the family

Table 3. Landholding particulars in North Coastal Region pilot sites (ha).

District	Own landholding (ha)			Operational landholding (ha)			Extent of tenancy in the sample %
	I	R	T	I	R	T	
Visakhapatnam	0.49	0.73	1.21	0.49	0.77	1.26	6.0
Vizianagaram	0.57	0.61	1.17	0.61	0.65	1.26	9.8
Srikakulam	0.81	0.57	1.38	0.89	0.61	1.50	9.0
Average	0.62	0.63	1.26	0.66	0.67	1.34	8.3

I: irrigated; R: Rainfed; T: Total

Table 4. Household assets and livestock ownership in North Coastal Region pilot sites.

District	% sample households possess assets					Average no. per sample Hh			
	Residential house	Cattle shed	TV	Mobile	Two wheelers	Draft animals	Cows	Buffaloes	Total livestock animals*
Visakhapatnam	93.0	17.0	72.0	59.0	11.0	0.1	0.2	0.4	1.7
Vizianagaram	80.1	11.3	75.8	68.3	19.7	0.1	0.4	0.1	1.3
Srikakulam	97.7	13.2	79.0	69.0	17.0	0.1	0.3	0.1	0.5
Average	90.3	13.8	75.6	65.4	15.9	0.1	0.3	0.2	1.1

*includes draft animals, cows, buffaloes, young stock, sheep, goats and poultry

Table 5. Pilot site-wise major crops and their average productivity levels.

District	Major crops	Productivity during BL (2014-15) (Kg/ha)	District average productivity (Kg/ha)	State average productivity (Kg/ha)	Nation average productivity (Kg/ha)
Visakhapatnam	Paddy	3504	1752	3094	2462
	Sugarcane	25754	36000	60000	69118
	Maize	4968	2366	6287	2361
Vizianagaram	Paddy	3438	2491	3094	2462
	Maize	4229	4415	6287	2361
	Sesame	317	203	NA	NA
Srikakulam	Paddy	3340	1749	3094	2462
	Maize	4322	5159	6287	2361
	Black gram	629	564	781	555

Table 6. Economics of crop enterprises in North Coastal Region pilot sites.

District	Crop	Total returns (₹ per ha)	Total variable costs (₹ per ha)	Net returns over TVC (₹ per ha)	B:C Ratio
Visakhapatnam	Paddy	37025	42222	-5197	0.88
	Sugarcane	120647	61459	59189	1.96
	Maize	27281	28361	-1079	0.96
Vizianagaram	Paddy	47659	40130	7529	1.20
	Maize	61545	54466	7079	1.10
	Sesame	28454	21946	6508	1.30
Srikakulam	Paddy	42356	49788	-7432	0.85
	Maize	63958	39797	24162	1.61
	Black gram	32611	17448	15163	1.87

Table 7. Primary sector GVA estimations in North Coastal Andhra pilot sites (base year: 2014-15).

	Sub-sector wise				Sub-sector wise share		
District	Agriculture including horticulture (₹ million)	Animal husbandry (₹ million)	Fisheries (₹ million)	Total GVA estimation (₹ million)	Agriculture Including horticulture	Animal husbandry	Fisheries
Visakhapatnam	1027.1	59.3	0.00	1086.4	94.54	5.46	0.00
Vizianagaram	315.2	31.4	0.00	346.6	90.94	9.06	0.00
Srikakulam	297	99.1	23.3	419.4	70.82	23.63	5.56
Regional total	1639.3	189.8	23.3	1852.4	88.50	10.25	1.26

Table 8. District-wise pilot site GVA by unit values.

District	GVA/pilot site village (₹ million)	GVA/pilot site HH (₹/HH)	GVA/pilot site cropped area (₹/ha)
Visakhapatnam	47.2	50,127	1,03,309
Vizianagaram	16.5	39,598	33,739
Srikakulam	9.5	20,240	42,304

Appendix-2 (Sampling Details)

Table 1. Extent of coverage of pilot site by district.

Sl. No	District	Pilot site coverage		Pilot site coverage	
		No. of *mandals*	No. of Agril./Hort. villages	No. of *mandals*	No. of Fishery villages
1	Anantapur	2	14	0	0
2	Kurnool	2	10	0	0
3	YSR Kadapa	4	14	0	0
4	Chittoor	2	18	0	0
5	SPS Nellore	2	8	1	3
6	Prakasam	2	13	2	15
7	Guntur	2	14	3	4
8	Krishna	2	22	1	3
9	West Godavari	2	12	1	8
10	East Godavari	2	16	1	10
11	Vishakhapatnam	3	23	0	0
12	Vizianagaram	2	21	1	2
13	Srikakulam	3	42	1	2
	Total	30	227	11	47

Table 2. Extent of diversity in total pilot site villages (only for agriculture and horticulture villages).

District/Diversity scale	4	5	6	7	8	9	Total
Anantapur			12		2		14
Chittoor					18		18
East Godavari			9	7			16
Guntur			14				14
Kadapa			3	7	4		14
Krishna			22				22
Kurnool		6	4				10
Nellore			5	3			8
Prakasam			13				13
Srikakulam	9		14	19			42
Visakhapatnam			13	3	7		23
Vizianagaram			17	4			21
West Godavari			4			8	12
Grand Total	9	6	130	43	31	8	227

Table 3. Extent of diversity in selected baseline villages (only for agriculture and horticulture villages).

District/Diversity scale	4	**5**	6	7	8	9	Total
Anantapur			7		2		9
Chittoor					9		9
East Godavari			5	4			9
Guntur			8				8
Kadapa			1	4	3		8
Krishna			11				11
Kurnool		4	2				6
Nellore			4	2			6
Prakasam			7				7
Srikakulam	4		6	8			18
Visakhapatnam			6	1	3		10
Vizianagaram			8	2			10
West Godavari			3			5	8
Grand Total	4	4	68	21	17	5	119

Table 4. Targeted baseline sample coverage across sub-sectors.

	Agriculture sample					Fishery	Grand
District	Landless	Small	Medium	Large	Total	sample*	total
Anantapur	54	290	31	27	402	0	402
Chittoor	54	369	36	27	486	0	486
East Godavari	54	230	72	46	402	216	618
Guntur	48	208	56	24	336	108	444
Kadapa	48	286	38	24	396	0	396
Krishna	66	297	66	33	462	108	570
Kurnool	36	156	18	18	228	0	228
Nellore	36	172	38	18	264	108	372
Prakasam	42	203	28	21	294	252	546
Srikakulam	108	472	118	58	756	72	828
Visakhapatnam	60	307	65	30	462	0	462
Vizianagaram	60	312	30	30	432	72	504
West Godavari	48	273	71	34	426	180	606
Grand Total	714	3575	667	390	5346	1116	6462

*a few landless households also covered in the fishery sample

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