NATIONAL AGRICULTURE DEVELOPMENT PROGRAMME (NADP)

DISTRICT AGRICULTURE PLAN

CUDDALORE

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES
TAMIL NADU AGRICULTURAL UNIVERSITY
COIMBATORE -641 003

NATIONAL AGRICULTURE DEVELOPMENT PROGRAMME (NADP / RKVY)

DISTRICT AGRICULTURE PLAN

CUDDALORE DISTRICT

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES
TAMIL NADU AGRICULTURAL UNIVERSITY
COIMBATORE - 641 003

2017

CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

In compliance of the guidelines laid out under NADP, the DAP has been prepared for Cuddalore district. The resource-base of the district has been analyzed to exposition the potentials for growth in agriculture. The thrust areas of development considered are raising the productivity of major field and horticulture crops with the application of latest production technologies, crop diversification, farm mechanization, field soil and moisture conservation practices, rehabilitation of water bodies and up-keeping of irrigation systems, feeding, breeding and health management of livestock, increasing inland-fish production, farming systems development and related activities.

To facilitate the planning process of the DAP, the Distinct Planning Unit comprising of the Head of the Sugarcane Research Station, Cuddalore as District Co-ordinator, the Scientists of KVK and RRS Virudhachalam as Block-level Scientists, Technical Expert from CARDS, TNAU, Coimbatore and the officials of the line departments under the chairmanship of the District Collector, has been formed. Several interactive meetings among the stakeholders have been conducted under the stewardship of the Joint Director of Agriculture, Cuddalore and the development interventions needed have been identified.

The resource mapping in full has been done in chapter II, through collection and reviewing the data, so as to identify the resource potentials for development. In chapter III, the growth rate analysis of area, production and productivity of major crops has been attempted, followed by assessing the yield gaps in major crops. All these indicated the potentials for increasing production and productivity of major crops. As regards area, very high growth rate has been observed in maize, followed by moderately good growth in cotton, black gram, banana and cashew. However, very marginal/stagnant growth has been observed in paddy, while negative growth has been noted in groundnut and tapioca.

Regarding productivity, positive growth has been observed in banana, groundnut and black gram, while negative growth has been experienced in paddy, maize, cotton, sugarcane and tapioca. The growth in production has been negative in paddy, groundnut, tapioca and cashew, while it is positive in maize, black gram, cotton and banana.

In the yield gap analysis, the gaps between experimental yield and (i) progressive farmers yield (ii) average yield and (iii) between progressive farmers yield and average yield were assessed and found that there existed wide yield gaps and hence there is need to bridge these gaps through appropriate developmental interventions.

In chapter IV, the sector-wise interventions identified are transformed into development projects. Seven projects in crop production sector, five projects in horticulture sector, two projects in Agriculture Engineering sector and one project in each of Agriculture Marketing sector, Animal Husbandry sector, Fishery sector, Sericulture sector, Agro-forestry sector and Co-operative sector have been formulated with budget estimates.

For increasing productivity and production of field crops, the production technologies like use of latest high yielding varieties of seeds, application of micro-nutrients mixture, bio-fertilizers and *bio agents*, adoption of IPM, the field soil fertility improvement through growing green manure crops and ploughing in-situ, reclamation of problem soils and mechanized operations have been advocated.

To step-up production and productivity of horticultural crops, the supply of high yielding varieties of seeds, encouraging home gardening, community orchards, commercial fruit and vegetable farming are given importance in the plan, in addition to developing required infrastructure facilities.

To counteract the growing labour scarcity in agriculture, speedy mechanization through the supply of farm equipment and machineries at a subsidized price is aimed at. Field soil and moisture conservation measures have also been given importance in the plan. Some organizational innovations have also been attempted.

For the development of Agricultural Marketing and Agribusiness systems, facilitation services for Jack fruit and banana fruit, organizational innovations like Farmer producer organizations, construction of storage godowns, provision of pulses processing units, construction of drying yards, distribution of tarpaulins, provision of cashew processing units to farmers, starting Farmers' Service Centre at Market Committee complex are the major development thrusts given in the plan.

With the view to improving irrigation systems and drainage outlets, the basin-wise development measures have been contemplated. In the Coleroon river basin, the up-keep and repairing of dilapidated sluices on the eastern bank of the Veeranam tank, repairing of shutters across the canals, modernizing water outlets from canals to channels, desilting of canals and tanks including Ponneri and Sathappadi eri and laying of farm roads were the major development measures included.

Regarding Perumal tank, de-silting and strengthening the bunds of the tank and Vadavar river, modernizing the sluices and water outlets of the tank, de-silting of the main canals from the tank and repairing the dilapidated water outlets from main canals to the field channels and planting of tree saplings on the bunds of the tank, Vadavar river and main canals were the major interventions included in the plan.

In Vellar river basin, construction of one check dam and strengthening the bunds of Vellar river in breach-prone areas, desilting of Wellington reservoir and its distribution channels and concrete lining of feeder canal from Thozhudur anicut to Wellington reservoir are the major measures. Construction of check dams, *etc.* in the Manimuktha river basin has also been given due consideration. In Gadilam river basin, the major intervention is to construct one more check dam near the old bridge connecting Pudupalayam and Thriruppapuliyur.

Distribution of milch animals, establishment of mini-dairies, heifer-calf rearing, deworming of calves, Azolla production unit, encouraging poultry broiler production through commercial farming and egg production through backyard poultry farming, strengthening institutional facilities are the major interventions included for the development of animal husbandry and Dairy sector.

The fishery development efforts included construction of new fish ponds and strengthening the existing ones, quality seed production, promotion of cage farming, intensive fish seed rearing in Lalpettai, provision for training and exposure visits, ranching of seeds, organizing fish festival, hygienic handling and marketing of fish *etc*.

Sericulture development efforts in selected blocks include mulberry plantation, drip irrigation, rearing shed and equipments, mobile cocoon market and training. Agro-forestry activities include distribution of saplings of Teak, Casuarina and Eucalyptus

trees and raising Casuarina plantation. Under co-operative sector, strengthening the Village Primary Co-operative Societies/Banks has been included.

The budgetary requirements for the projects formulated in Cuddalore district are summarized sector-wise below,

Budget Abstract for Cuddalore District

(₹ in lakh)

Sl. No	Sectors	2017-18	2018-19	2019-20	2020-21	2021-22	Total
1	Agriculture	21651.64	23743.30	23982.03	23790.28	24421.46	117588.70
2	Agricultural Research (TNAU)	56.00	100.00	732.00	20.00	100.00	1008.00
3	Horticulture	4886.03	4907.03	4945.91	4934.78	4950.16	24623.91
4	Agricultural Engineering	4008.65	3137.69	2580.79	2373.99	2199.29	14300.41
5	Agricultural Marketing	1708.03	1117.65	777.10	800.95	795.95	5199.68
6	Seed certification and Organic Certification	18.36	13.36	0.00	0.00	0.00	31.72
7	Animal Husbandry	826.05	896.65	764.65	627.70	527.00	3642.05
8	Animal Sciences Research (TANUVAS)	0.00	0.00	0.00	0.00	0.00	0.00
9	Dairy Development	245.00	404.00	442.00	612.00	409.00	2112.00
10	Fisheries	1053.48	1261.78	64.98	79.18	77.48	2536.88
11	Fisheries Research (TNFU)	1418.73	770.53	168.73	123.73	109.73	2591.43
12	Water Resource Organization (PWD)	6760.00	62095.00	6970.00	18340.00	5570.00	99735.00
13	Civil Supplies & Cooperatives	88.23	850.10	503.26	546.54	552.06	2540.19
	Total	**42720.20**	**99297.0**	**41931.4**	**52249.1**	**39712.1**	**275909.9**

The total budget requirement for the implementation of various interventions by different departments in Cuddalore district is **₹ 275909 Lakhs**

CHAPTER I

INTRODUCTION

Rashtriya Krishi Vikas Yojana (RKVY) vis-à-vis National Agricultural Development Program (NADP) was initiated in 2007 as an umbrella scheme for ensuring holistic development of agriculture and allied sectors by allowing states to choose their own agriculture and allied sector development activities. The scheme has come a long way since its inception and has been implemented across two plan periods i.e. during 11th and 12th plan periods. Based on feedback received from States, experiences garnered and inputs provided by various stakeholders, schemes eligible for funding under RKVY have undergone modifications to enhance efficiency, efficacy and inclusiveness of the program. The overall objectives of RKVY (NADP) are as follows:

Objectives of RKVY

a. To strengthen the farmers' efforts through creation of required pre and post-harvest agri-infrastructure that increases access to quality inputs, storage, market facilities etc. and enables farmers to make informed choices.

b. To provide autonomy, flexibility to States to plan and execute schemes as per local/ farmers' needs.

c. To promote value chain addition linked production models that will help farmers increase their income as well as encourage production/productivity

d. To mitigate risk of farmers with focus on additional income generation activities - like integrated farming, mushroom cultivation, bee keeping, aromatic plant cultivation, floriculture etc.

e. To attend national priorities through several sub-schemes.

f. To empower youth through skill development, innovation and agri-entrepreneurship based agribusiness models that attract them to agriculture.

District and State Agriculture Plans

As per the recent guidelines issued by the Government of India under Remunerative Approaches for Agriculture and Allied sector Rejuvenation (RAFTAAR), the new projects proposed and are to be implemented under NADP/RKVY must be in consonant with District Agricultural Plans (DAP), State Agriculture Plans (SAP) and State Agriculture Infrastructure Development Program (SAIDP) prepared by the individual States. Thus, such action-oriented plan documents will remain as a cornerstone of planning and implementation of the NADP/RKVY and other schemes.

The overall guidelines suggested by the Government of India to be followed for preparation of District Agriculture Plans (DAP) and State Agricultural under NADP/RKVY are as follows:

- The several states have already prepared Comprehensive District and State Agriculture plans for 12th Plan period. These plans have to be revised and updated appropriately for implementing RKVY-RAFTAAR during 14th Finance Commission keeping in view modification proposed for the plan period and emerging needs of the State.

- The District Agriculture Plan (DAP) shall not be however the usual aggregation of existing schemes but would aim at moving towards projecting the requirements for development of Agriculture and allied sectors of the district and for the State a whole.

- These plans would also present the vision for Agriculture and allied sectors within the overall development perspective of the district and further State as a whole.

- The District Agriculture Plans and the State level plan would also present their financial requirements in addition to sources of financing the agriculture development plans in a comprehensive way.

- The District Agriculture Plan will include animal husbandry and fishery development, minor irrigation projects, rural development works, agricultural marketing schemes and etc. keeping in view the natural resources and technological possibilities in each district.

- District level potential linked credit plans (PLP) already prepared by the National Bank for Agriculture and Rural Development (NABARD) and Strategic Research and

Extension Plans (SREP) developed under the Agricultural Technology Management Agency (ATMA) etc. may be referred for revision of DAPs.

- It should also be ensured that the strategies for convergences with other programs as well as the role assigned to the Panchayati Raj Institutions (PRIs) are appropriately incorporated in DAPs.

Therefore, each State will also have a comprehensive State Agricultural Plan (SAP) for the remaining period of the Fourteenth Finance Commission by integrating the District Plans. SAPs will invariably have to indicate resources that can flow from the State to the districts.

The Process

Revision and updating of SAPs could be a two-way process. Firstly, State Nodal Department (or Agriculture Department) could get DAPs revised in the first instance to ensure that priorities of the State are properly covered in the district plans. States should, at this stage of scrutiny, ensure that requirements of districts and priorities of the State are appropriately captured and aligned in DAPs. Alternately, State Nodal Agency could communicate to the districts in the first instance, the State's priorities that ought to be reflected in the respective district plans and the districts may incorporate these in their updated district plans. Preparation/revision of the DAPs need to be an elaborate, exhaustive and iterative process and care has to be taken by the State Nodal department and District Agriculture Department in ensuring that these plans cover the entire gamut of agriculture and allied sectors.

Revision and Updation of DAP and SAP in Tamil Nadu

Tamil Nadu State continued to receive Central Assistance under NADP/RKVY. The Government of Tamil Nadu also prepared District and State Agriculture Plans covering 11th and 12th Plan periods. Tamil Nadu State has 32 districts including Chennai. The District Agriculture Plan were prepared for 31 districts excluding Chennai during 12th plan period. Thus, the current exercise is the continuation of the 12th plan period: which also covered two years of the 14th Finance Commission period (2015-16 and 2016-17) and also keeping in view of the changing scenario in the development and emerging needs of the State and to

be eligible for fresh grants from Government of India. These plan were further revised and updated appropriately for implementing RKVY during the periods from 2017-18 to 2021-22.

Methodology followed

The revision of the District Agricultural Plan of Cuddalore district, was done by gathering the secondary data about district and block with respect to rainfall, land use pattern, demography, livestock, machinery, infrastructure so far created etc. In addition, the constraints in production and marketing of agricultural and livestock produce, crop/animal production and gaps between expected and actual yield and the reasons for such gaps were also discussed among the various stakeholders and incorporated in this plan document. Besides, in consultation with the line department officials and based on the data received from respective districts, a detailed year-wise action plan i.e. from 2017-18 to 2021-22 with physical and financial implications were presented.

CHAPTER II

PROFILE OF THE BLOCKS AND DISTRICT

The Socio and agro- economic features of Cuddalore district are described under the following sections.

2.1 District at glance

2.2 Area, Location and Geographical features

2.3 Administrative Structure of the district

2.4 Demographic profile

- 2.4.1 Population
- 2.4.2 Literacy
- 2.4.3 Households
- 2.4.4 Working population
- 2.4.5 Occupation distribution

2.5 Topography

- 2.5.1 Soil type
- 2.5.2 Soil classification

2.6 Climatic Condition and Rainfall

2.7 Land

- 2.7.1 Land and its types
- 2.7.2 Land-use pattern
- 2.7.3 Land holding pattern
- 2.7.4 Number and size of operational land holdings

2.8 Sources of Irrigation

- 2.8.1 Rivers, irrigation and ground water
- 2.8.2 Veeranam Tank
- 2.8.3 Wellington reservoir
- 2.8.4 Other sources

2.9 Cropping pattern

2.9.1 Major crops grown

2.9.2 Area under different crops

2.9.3 Productivity of major crops

2.10 Utilization of Chemical Fertilizers and Pesticide

2.11 Agricultural Engineering - Machineries and Implements

2.12 Agricultural Marketing and Regulated Markets

2.13 Storage Facilities

2.14 Sericulture

2.15 Animal husbandry and Dairy development

2.15.1 Livestock population

2.15.2 Veterinary institutions and hospitals

2.15.3 Dairy development

2.15.4 Poultry development.

2.15.5 Egg production

2.16 Fisheries

2.17 Banking and Insurance

2.18 Co-operation

2.19 Industries

2.20 Transport and Communication

2.21 Education and Research institutions

In the process of description, the potentials for development are also traced to the extent possible.

2.1 District at glance

The history of the systematic administration of the Land Revenue of erstwhile South Arcot District begins with the acquisition from the Nawab in 1801, when the Nawab made over the Carnatic to the Company, Captain Graham, who was appointed to take charge of the district lying between Palar and Portonovo rivers, and became the first Collector of

South Arcot**.** The district consisted of the 21 taluks of Arcot, Vellore, Thiruvathur, Polur, Arani (The Jagir of that name) Wandiwash, Chetpet, Thiruvannamalai, Gingee, Tindivanam, Valudavur, Villupuram, Anniyur, Tirukoilur, Thiruvennainallur, Tiruvadi, Elavanasur, Kallakurichi, Virudhachalam, Tittagudi and Bhuvanagiri but excluded the form of Fort St. David and the territory of Pondicherry, both of which had been separately acquired and were separately administered. In April 1805, the then taluk of Mannarkudi (which was included in what is now known as Chidambaram) was added from Tiruchirapalli to this huge charge. In 1808, however Arcot, Vellore, Thiruvathur, Polur, and Arani Jagir were transferred to North Arcot and Wandiwash to Chengalput, while the Fort St. David and Pondicherry villages (which at different times had been under both, with Collector and the commercial resident at Cuddalore) were incorporated with the District.

In 1816, Pondicherry was finally restored to the French and erstwhile South Arcot assumed practically its position**.** Cuddalore was the District Headquarters for South Arcot District for more than a century. This has been mentioned everywhere in the history. The present Cuddalore District has been formed on 30.9.1993, by bifurcating the South Arcot district into two *viz*., Cuddalore and Villupuram.

2.2 Area, Location and Geographical features

The district Cuddalore lies in the North Latitude between12^{o} 35’ and 15^{o} 5'/11^{o} 11’ and the East Longitude between 78^{o} 38’ and 80^{o}.Cuddalore district is predominately agricultural district with coastal line stretching from Pondicherry Union Territory in the North to the mouth of the River Coleroon in the South, as shown in Figure 1. The total geographical area of the district is 4283 sq.km with a coastal line of 68 kms. The boundaries of the district are:

East	:	Bay of Bengal
West	:	Villupuram, Perambalur districts
North	:	Union Territory of Pondicherry and Villupuram district
South	:	Coleroon River

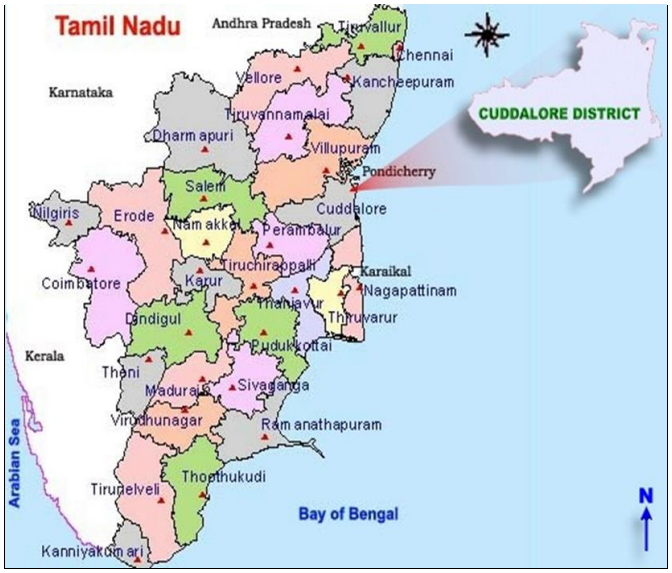

Fig. 1 Map showing the location of Cuddalore District in Tamil Nadu State.

2.3 Administrative structure of the district:

The Cuddalore district is divided in to three revenue divisions, eight taluks (Figure 2), 13 blocks (Figure 3), 681 Village Panchayats and 896 revenue villages. The names of the taluks and the blocks are listed in Table 2.1, below.

Table 2.1.Taluks, Blocks and Agricultural Divisions in the Cuddalore District

Name of the Taluks (8)	Name of the Blocks (13)
1. Chidambaram	1. Annagramam
2. Cuddalore	2. Mel-Bhuvanagiri
3. Kattumannarkoil	3. Cuddalore
4. Panruti	4. Kammapuram
5. Tittakudi	5. Kattumannarkoil
6. Kurinjipadi	6. Keerapalayam
7. Virudhachalam	7. Kumaratchi
8. Mel-Bhuvanagiri	8. Kurinjipadi
	9. Mangalore
	10. Nallur
	11. Panruti
	12. Parangipettai
	13. Virudhachalam

Source: Records of the Office of the Joint Director of Agriculture, Cuddalore

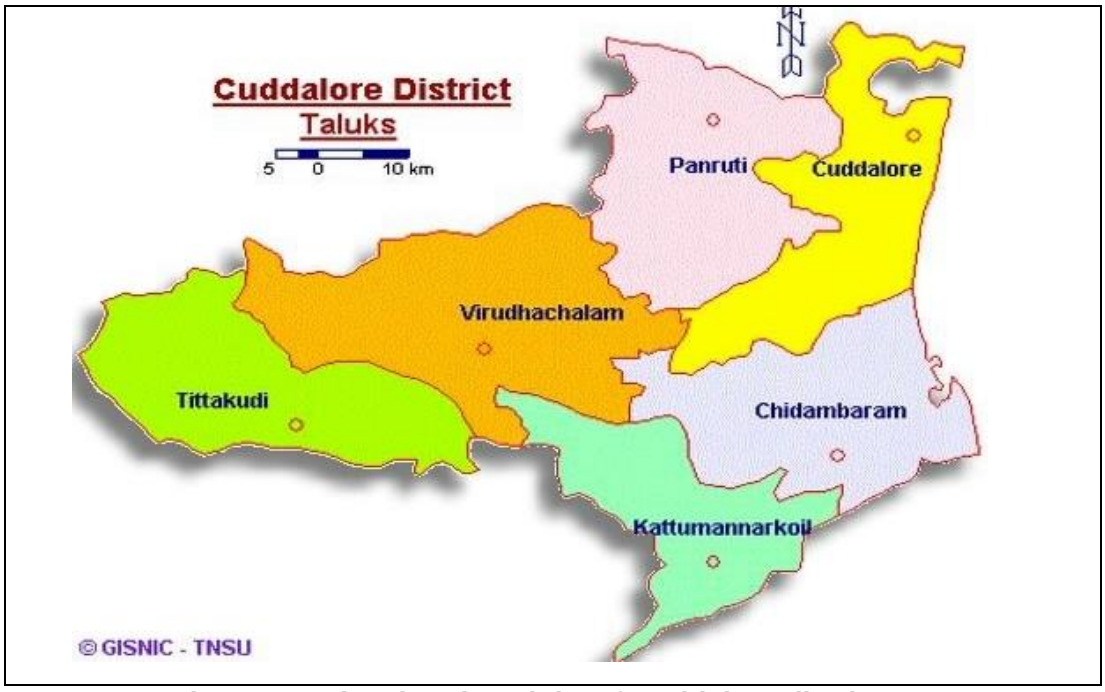

Fig. 2 Map showing the taluks of Cuddalore district

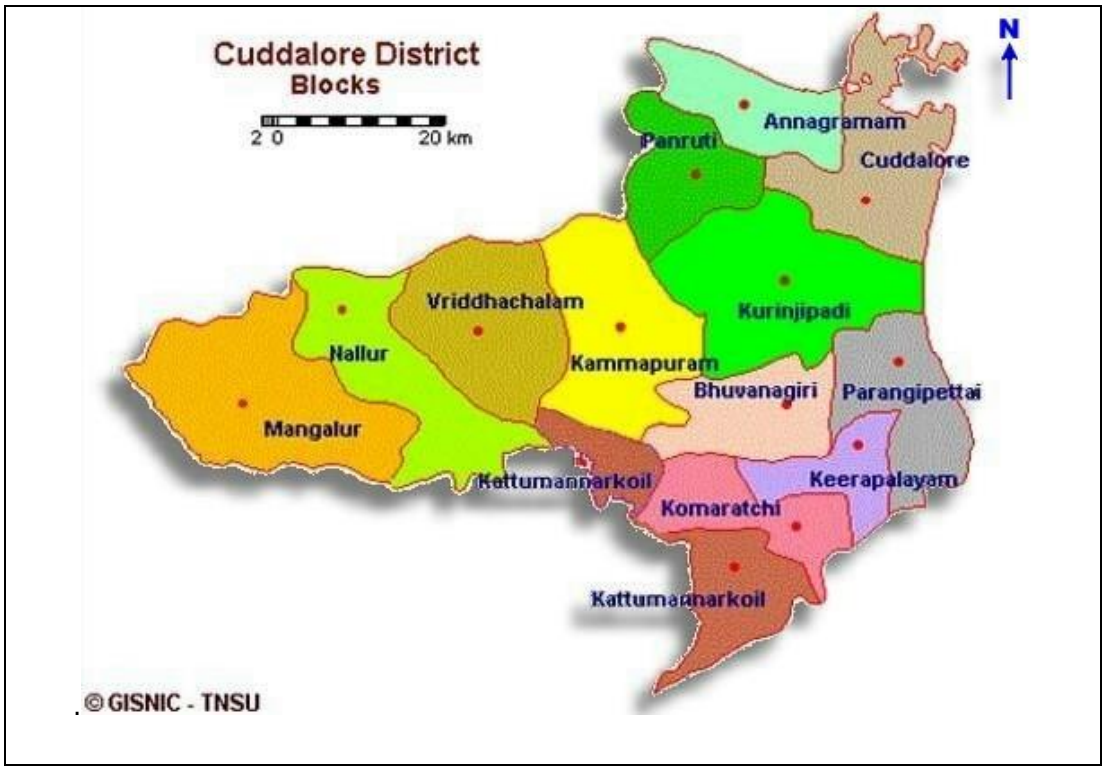

Fig. 3 Map showing the blocks of Cuddalore district

2.4 Demographic profile

The demographic features such as population size, Sex ratios and literacy levels, number of households, working force, and occupational pattern are described in this section.

2.4.1 Population

The population size of Cuddalore district is 26.37 lakhs and it constitutes 3.61 percent of the total population of the State. The population density is 702 persons per sq. km. The details on the rural and urban population as per the 2011 Census are presented below, in Table 2.2.

Table 2.2 Demographic Details of the Cuddalore District

Description	Number	Percentage
Total population	2600880	100.00
Male	1311151	50.41
Female	1289729	49.59
Rural population	1718249	66.06
Male	869252	50.59
Female	848997	49.41
Urban population	882631	33.94
Male	441899	50.07
Female	440732	49.93

Source: Census Report, 2011

The size of population of Cuddalore district is 26.01 lakhs and it consists of 17.18 lakhs of rural population and 8.83 lakhs of urban population. In the total population, the rural population accounts for 66.06 per cent, and the urban population constitutes 33.94 percent. It could also be observed from the table that the male population is marginally higher than the female population. However, the difference is more vivid in rural than in Urban population.

The block-wise population details are shown in Table 2.3. Among the blocks the Cuddalore block is the most populous one (3.05 lakhs), followed by Kurinjippadi (2.78 lakhs), Mangalur (2.28 lakhs), Panrutti (2.17 lakhs), Nallur (2.16 lakhs) etc. On the other hand, the minimum population is found in Melbhuvanagiri block. The SC population is maximum in Kurinjippadi block with 65919 followed by Nallur (63726) and Mangalur (63154), Cuddalore block with 57991, Keerapalayam block with 48698 etc. The SC

population is comparatively lower in the blocks of Melbhuvanagiri, Parangipetai and Panrutti. In overall the SC population constitutes 23.73 per cent in the total population of the district.

Table 2.3 Block-wise population details

(Numbers)

Sl. No	Particulars	B1	B2	B 3	B 4	B5	B6	B7	B8	B9	B10	B11	B12	B13	Total
I.	**Total Population**	305100	190948	217406	278804	157431	180252	129611	177835	163839	215278	175611	228286	216350	**2636751**
A	**Male**														
	i. Adult	111371	64868	82459	96084	55290	59547	43628	58900	53647	77671	60558	75320	69283	**908626**
	ii. Children	12607	7961	10730	11693	6541	6413	4994	6267	5965	9295	7325	8774	8092	**106657**
B	**Female**														
	i. Adult	110430	64532	80233	93984	54783	58929	42627	58051	53257	74979	58886	73404	67412	**891507**
	ii. Children	11546	7357	9064	10251	5848	5823	4333	5797	5185	7958	6290	7571	7068	**94091**
C	**Total**														
	i. Adult (Ai + Bi)	221801	129400	162692	190068	110073	118476	86255	116951	106904	152650	119444	148724	136695	**1800133**
	ii. Children (Aii + Bii)	24153	15318	19794	21944	12389	12236	9327	12064	11150	17253	13615	16345	15160	**200748**
D	**SC**	57991 (19.00)	45649 (23.91)	34844 (16.03)	65919 (23.64)	33939 (21.00)	48698 (27.02)	33344 (25.73)	47907 (26.93)	45024 (27.48)	44408 (20.63)	41185 (23.45)	63154 (27.16)	63726 (29.46)	**625788 (23.73)**
E	**ST**	1155	581	76	873	1030	842	685	913	761	967	1367	63	769	**10082**

B1-Cuddalore; B2- Annagramam; B3- Panruti; B4- Kurinjipadi; B5-Parangipettai; B6- Keerapalyam; B7- Mel Bhuvanagiri; B8- Kumaratchi; B9 - Kattumannarkoil ; B10 - Kammapuram; B11- Viruddhachalam; B12- Mangalur; B13- Nallur.

2.4.2 Literacy

The details on the literacy levels among the total population, as well as among males and females in the district are presented in Table 2.4 below.

Table 2.4 Literacy level in Cuddalore District

Description	Number	Literacy rate (%)
Total literates	1849805.00	71.12
Male	1019160.00	75.73
Female	830645.00	64.14

Source Census of India 2011, Statistical Hand Book 2011-2012

It could be visualized from Table 2.4 that the literacy level in overall in the district is 71.12 per cent and it is 75.73 per cent among males and 64.41 among females. Among different blocks in the district, the number of literates level (Table 2.5) was found to be the highest in Cuddalore block (1.52 lakhs), followed by Kurinjipadi (1.23 lakhs), Panruti block (1.01 lakhs), Kammapuram block (0.99 lakhs), Mangalur (0.88 lakhs), Kumaratchi (0.86 lakhs), Nallur (0.85 lakhs), Annagramam (0.83 lakhs), Keerapalayam (0.81 lakhs), Parangipettai (0.77 lakhs), Vriddhachalam (0.76 lakhs), Kattumannarkoil (0.72 lakhs) and MelBhuvanagiri (0.60 lakhs). In Cuddalore district all the blocks had higher percentage of male literates. Literacy level by social groups is block-wise presented in Table 2.5.

2.4.3 Households

The number of households in the district as well as in the blocks is given in Table 2.6. Of the total 4, 42,973 households, Cuddalore block has the largest number of households (53,812), followed by Kurinjipadi (46,917), Panruti (39,007) Kammapuram (38,080), Mangalur(36,979), Nallur (33,715), Annagramam (30746), Keerapalyam (29,848), Viruddhachalam (29,387), Kumaratchi (29,068), Parangipettai (27,128), Kattumannarkoil (26,500).The lowest number of households is found in Melbhuvanagiri block. Number of Schedule Caste households was the highest in Kurinjipadi and the lowest in Panruti block. In overall, the SC households constitute 33.19 per cent in the total households of the district. Scheduled tribes are mostly spread over in Viruddhachalam and Cuddalore block.

2.4.4 Working Population

The work force details of the Cuddalore district are presented in the Table 2.7.

Table 2.5 Literacy Level by Social Groups (Block-wise)

Sl. No	Particulars	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	Total
I	**Number of literates**														
	i. Male	83353	46524	58683	69734	42138	45132	33417	46731	39900	57605	43920	51338	49587	**618475**
	ii. Female	68985	36337	42538	53672	35413	36781	26590	40158	32544	42164	32497	37276	36020	**484955**
	iii. Total literates	152338	82861	101221	123406	77551	81913	60007	86889	72444	99769	76417	88614	85607	**1103430**

Source: Census Report 2011

B1-Cuddalore; B2-Annagramam; B3-Panruti; B4-Kurinjipadi; B5-Parangipettai; B6-Keerapalyam; B7- Mel Bhuvanagiri; B8-Kumaratchi; B9-Kattumannarkoil; B10-Kammapuram; B11-Viruddhachalam; B12-Mangalur; B13-Nallur.

Table 2.6 Distributions of Households (Block-wise)

Sl. No	Particulars	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	TOTAL
i.	No. of households	53812	30746	39007	46917	27128	29848	21786	29068	26500	38080	29387	36979	33715	442973
ii.	No. of Scheduled Caste households	13524	10283	7843	15914	8406	12020	8244	11735	11004	10601	9672	15081	14899	149226
iii.	No. of Scheduled Tribe households	274	144	17	204	258	219	176	229	194	234	304	16	179	2448

Source: Census Report 2011

B1-Cuddalore; B2-Annagramam; B3-Panruti; B4-Kurinjipadi; B5-Parangipettai; B6-Keerapalyam; B7-Mel Bhuvanagiri; B8-Kumaratchi; B9-Kattumannarkoil; B10-Kammapuram; B11-Viruddhachalam; B12-Mangalur; B13-Nallur.

Table 2.7 Category-wise Workers in Cuddalore District

Description	Number	Percentage
Total workers	11,69,880	44.89
a. Total main workers	8,37,271	32.13
b. Marginal workers	3,32,609	12.76
i. Cultivators	1,65,170	14.12
ii. Agricultural labourers	5,39,412	46.11
iii. Household industries	32,027	2.74
iv. Other workers	4,33,271	37.04

Source: Census Report, 2011

The size of the work force in the district is 1169880 and it constitutes 44.89 per cent of the district population. The Agricultural labourers alone account for 46.11 per cent of the total work force in the district, while the cultivators constitute 14.12 per cent.

2.4.5 Occupational distribution

The Occupational Pattern among the people of the district is depicted in Table 2.8, below.

Table 2.8 Block-wise workforce in the Cuddalore district during 2014-15

(Numbers)

Blocks	Cultivators	Agricultural labours	Housing workers	Other workers	Marginal workers	Total workers
Annagramam	12369	37146	1641	17437	14646	83229
Bhuvanagiri	6416	14897	1552	9804	12535	45204
Cuddalore	10516	37962	5212	68963	21849	122653
Kammapuram	14028	18802	864	12148	18987	64329
Kattumanarkoil	16274	17633	981	10221	21664	59648
Keerapalayam	8911	19688	1778	21213	17388	69025
Komaratchi	10651	16337	962	12128	16451	51545
Panruti	56579	17073	1968	59819	25316	119611
Parangipettai	5365	13391	770	15177	16703	51366
Virudhachalam	17660	19739	1287	20622	14982	74290
Kurinjipadi	15805	127651	2561	18597	28303	90085
Mangalur	27564	23633	848	8788	15021	75944
Nallur	21163	20064	1190	8665	18972	70054
Total	**22331**	**384016**	**21614**	**283582**	**242817**	**976983**

Source: Block Statistical Handbooks, Assistant Director of Statistics, Cuddalore, 2011-12

The main occupation of the people in the district is agriculture and allied activities. The shares of cultivators and agricultural labourers in the total number of workers in the district are respectively 14.12 per cent and 46.11 per cent.

Among the blocks, Cuddalore has the highest workforce (122653 No') under different categories and the lowest work force is in Mel Bhuvanagiri block (45204 No's). As regards agricultural labourers, the highest number is found in Kurinjippadi block (127651 No's) and the least number is found in Parangipetai block (770 No's).

2.5 Soils and Topography

The District in the east has the coastal line stretching 68 kms from Marakanam which is now in Villupuram District in the North to the Mouth of River Coleroon in the South. The terrain of the main land is plain, gently sloping downwards from west to east without much undulation.

2.5.1 Soil types

Different types of soils found in the district are listed in Table 2.9 below.

Table 2.9 Soil types in the Cuddalore district

Sl. No	Soil type	Characteristics	Area in ha
1.	Sandy loam	Slightly acidic to alkaline in pH, Poor in water holding capacity, low in Nitrogen, medium in P and K	91679
2.	Sandy	Neutral to Saline pH, poor in water holding capacity, low in Nitrogen, medium in P and K.	31974
3.	Clay loam	Neutral to alkaline pH, poorly drained soil, medium in N and P and high in K.	115565
4.	Sandy Clay loam	Neutral to Saline pH, low in Nitrogen medium in P and K	128573
	Total		**367791**

Source: Technical Report Series, District Ground water Brochure, Cuddalore district, 2011

As could be seen from Table 2.9, the Sandy-clay- loam soil is found on the maximum area of 128573 ha in the district, followed by clay-loam (115565 ha), sandy-loam (91679) and sandy soil (31974 ha).

The details on the block-wise soil types given in Table 2.10 indicate that the black soil is found in the maximum area of 38021 ha in the Mangalur block followed by the blocks of Nallur (12185 ha), Kattumannarcoil (9000 ha),Virudhachalam (7300 ha), Keerapalayam (4720 ha), Mel Bhuvanagiri (3450 ha) and Kammapuram (250 ha)

The loamy soil is noted on 60709 ha in the district. Block-wise data reveal that the loamy soil is found on the maximum area of 13508 ha in Kurinjipadi followed by Kumaratchi (12857 ha), Kammapuram (12152 ha), Panruti (9426 ha), Keerapalayam (4800 ha), Mel Bhuvanagiri (4140 ha) etc.

Red soil occupies third position with 44109 ha in the district. The maximum red soil area of 13633 ha is observed in Panruti block followed by Nallur with 9986 ha, Kammapuram with 7520 ha, Virudhachalam with 3700 ha, Kurinjipadi with 3200 ha, Keerapalayam with 2825 ha and Kattumannarcoil with 2000 ha. Sizable areas of alluvial soil is found in the blocks of Virudhachalam, Kurinjipadi, Kattumannarcoil and Mangalur Clay soil and Sandy loam are found in Parangipetai block, while the problem soils are spotted in the blocks of Virudhachalam, Mel Bhuvanagiri and Keerapalayam (Table 2.10).

In overall, these soils except problem soils are highly suitable to raise the major crops like Paddy, Pulses, Sugarcane, Groundnut, Cotton etc. The problem soils however need special attention to reclaim and bring under cultivation.

Table 2.10 Block-wise Soil types in Cuddalore district

(Hectares)

Sl. No	Types of Soil	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	Total
1	Black soil	-	-	-	-	-	3450	4720	9000	-	7300	250	38021	12185	74926
2	Red soil	-	3200	13633	-	-	1125	2825	2000	-	3700	7520	120	9986	44109
3	Alluvial	-	4300	-	-	-	-	-	2428	-	9500	78	2123	-	18429
4	Loamy soil	-	13508	9425	-	-	4140	4800	-	12857	3200	12152	127	500	60709
5	Problem soils	-	-	-	-	-	1675	1225	-	-	-	-	-	106	6958
6	Sandy loam	-	-	-		6800	-	-	-	-	-	-	-	-	6800
7	Clay soil	-	-	-	-	9600	-	-	-	-	-	-	-	-	9600
8	Others (specify)	-	-	-	-		-	-	-	-	-	-	1112	80	1192
	Total	**-**	**21008**	**23058**	**-**	**16400**	**10390**	**13570**	**13428**	**12857**	**27417**	**20000**	**41738**	**22857**	**222723**

Source: DAP Cuddalore, 2014

B1-Cuddalore; B2-Kurinjipadi; B3-Panruti; B4-Annagramam; B5-Parangipettai; B6-Mel Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9- Kumaratchi; B10- Virudhachalam; B11-Kammapuram; B12- Mangalore; B13- Nallur.

2.5.2 Soil Series Classification

Different soil series found in the district and their coverage in hectares are shown in Table 2.11below. The soil map of Cuddalore district is shown in Figure 4.

Table 2.11 Cuddalore Soil Series

Soil Description	Area (ha)
Deep, fine, mixed, Alfisols	59855.43
Very deep, fine, montmorillonitic, Vertisols	54649.03
Deep, fine, mixed, Inceptisols	45989.02
Deep, fine loamy, mixed, Inceptisols	37420.55
Moderately shallow, fine loamy, mixed, Inceptisols	28400.74
Deep, fine, montmorillonitic, Vertisols	24702.52
Shallow, clayey, mixed, Inceptisols	12937.03
Very deep, coarse loamy, mixed, Inceptisols	11862.93
Moderately deep, fine, mixed, Alfisols	10243.66
Very shallow, loamy, mixed, Entisols	5011.31
Very deep, fine, loamy, mixed, Inceptisols	3747.74
Deep, fine silty, mixed, Inceptisols	2875.46
Moderately shallow, loamy skeletal, mixed, Entisols	1990.67
Shallow, loamy, mixed, Inceptisols	1939.06
Deep, contrasting particle size, mixed, Inceptisols	1860.99
Shallow, clayed, mixed, Alfisols	1799.81
Deep, coarse loamy, mixed, Entisols	1785.56
Very deep, coarse loamy, mixed, Entisols	1392.92
Moderately shallow, fine loamy, mixed, Alfisols	1222.16
Very deep, very fine, montmorillonitic, Inceptisols	1219.71
Moderately deep, fine loamy, mixed, Inceptisols	933.99

Soil Description	Area (ha)
Very deep, coarse loamy, mixed, Alfisols	754.02
Very deep, fine loamy, mixed, Entisols	692.87
Moderately deep, fine, mixed, Inceptisols	692.32
Very deep, fine loamy, mixed, Alfisols	679.72
Very deep, fine, mixed, Entisols	672.26
Very deep, fine silty, mixed, Entisols	483.24
Moderately deep, fine loamy, mixed, Alfisols	357.35
Deep fine, loamy, mixed, Alfisols	334.03
Deep, sandy, mixed, Entisols	327.65
Very deep, fine kaolinitic, Alfisols	300.07
Very deep, sandy, mixed, Entisols	219.05
Moderately deep, coarse loamy, mixed, Entisols	167.69
Shallow, clayey skeletal, mixed, Alfisols	115.40
Deep, coarse loamy, mixed, Inceptisols	45.15
Moderately shallow, fine, mixed, Inceptisols	0.17
Total	**317681.3**

Source: Remote Sensing and GIS Centre, Tamil Nadu Agricultural University Coimbatore

The Soil map of Cuddalore district is depicted below in Figure 4.

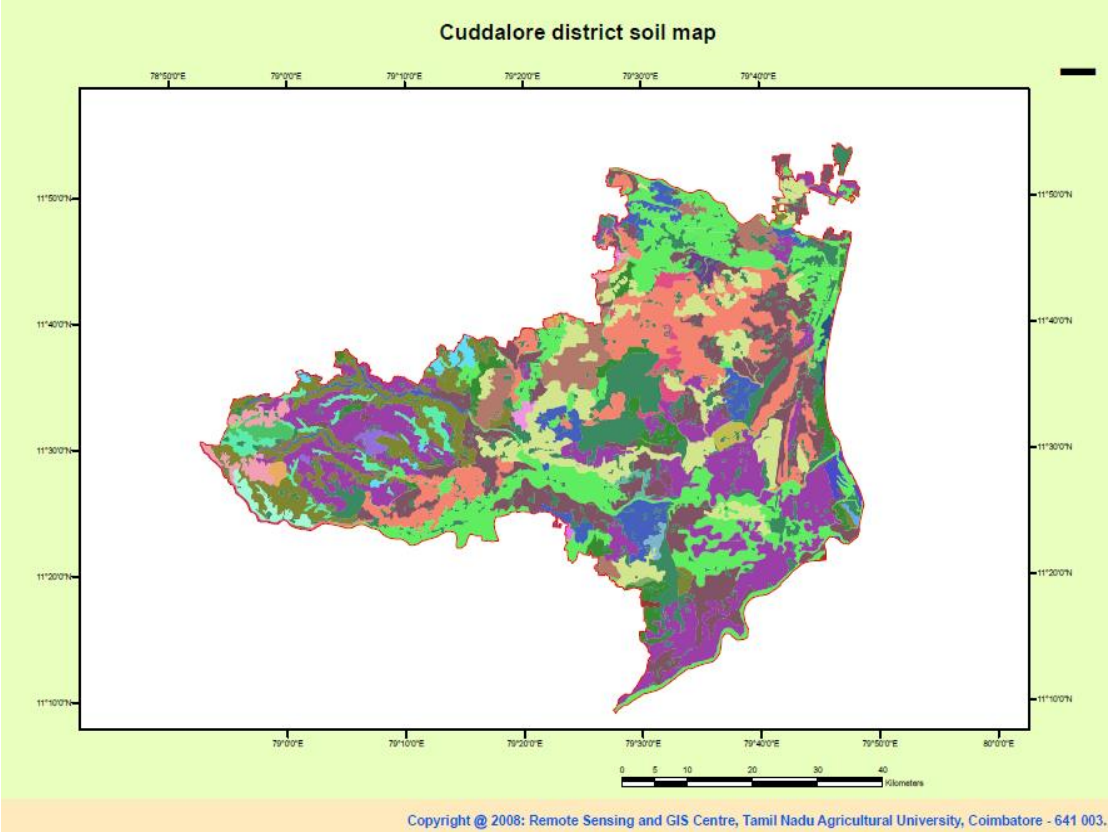

Fig. 4 Soil map of cuddalore district

Legend

- DEEP, COARSE LOAMY, MIXED, ENTISOLS
- DEEP, COARSE LOAMY, MIXED, INCEPTISOL
- DEEP, CONTRASTING PARTICLE SIZE, MIXED, INCEPTISOL
- DEEP, FINE LOAMY, MIXED, ALFISOLS
- DEEP, FINE LOAMY, MIXED, INCEPTISOL
- DEEP, FINE SILTY, MIXED, INCEPTISOL
- DEEP, FINE, MIXED, ALFISOLS
- DEEP, FINE, MIXED, INCEPTISOL
- DEEP, FINE, MONTMORILLONITIC, VERTISOLS
- DEEP, SANDY, MIXED, ENTISOLS
- MODERATELY DEEP, COARSE LOAMY, MIXED, ENTISOLS
- MODERATELY DEEP, FINE LOAMY, MIXED, ALFISOLS
- MODERATELY DEEP, FINE LOAMY, MIXED, INCEPTISOL
- MODERATELY DEEP, FINE, MIXED, ALFISOLS
- MODERATELY DEEP, FINE, MIXED, INCEPTISOL
- MODERATELY SHALLOW, FINE LOAMY, MIXED, ALFISOLS
- MODERATELY SHALLOW, FINE LOAMY, MIXED, INCEPTISOL
- MODERATELY SHALLOW, FINE, MIXED, INCEPTISOL
- MODERATELY SHALLOW, LOAMY SKELETL, MIXED, ENTISOLS
- SHALLOW, CLAYEY SKELETL, MIXED, ALFISOLS
- SHALLOW, CLAYEY, MIXED, ALFISOLS
- SHALLOW, CLAYEY, MIXED, INCEPTISOL
- SHALLOW, LOAMY, MIXED, INCEPTISOL
- VERY DEEP, COARSE LOAMY, MIXED, ALFISOLS
- VERY DEEP, COARSE LOAMY, MIXED, ENTISOLS
- VERY DEEP, COARSE LOAMY, MIXED, INCEPTISOL
- VERY DEEP, FINE LOAMY, MIXED, ALFISOLS
- VERY DEEP, FINE LOAMY, MIXED, ENTISOLS
- VERY DEEP, FINE LOAMY, MIXED, INCEPTISOL
- VERY DEEP, FINE SILTY, MIXED, ENTISOLS
- VERY DEEP, FINE, KAOLINITIC, ALFISOLS
- VERY DEEP, FINE, MIXED, ENTISOLS
- VERY DEEP, FINE, MONTMORILLONITIC, VERTISOLS
- VERY DEEP, SANDY, MIXED, ENTISOLS
- VERY DEEP, VERY FINE, MONTMORILLONITIC, INCEPTISOL
- Very SHALLOW, LOAMY, MIXED, ENTISOLS
- WATERBODY / SETTLEMENT / MISCELLANEOUS LANDFORM

2.6 Climate and Rainfall

The details on the season-wise normal rainfall and the rainfall received during the year 2014-15 are presented below in Table 2.12

Table 2.12 Month-wise / season-wise rainfall distribution in Cuddalore District

Season / Month	2014-15	
	Actual (mm)	Normal (mm)
South West Monsoon		
June	52.4	47.3
July	41.6	75.1
August	169.2	129.2
September	69.5	131.5
Total	**332.7 (27.7)**	**383.1 (31.7)**
North East Monsoon		
October	309.7	220.2
November	238.0	295.3
December	147.8	182.3
Total	**695.5 (57.8)**	**697.8 (57.8)**
Winter Season		
January	14.7	27.9
February	0.0	16.2
Total	**14.7 (1.2)**	**44.1 (3.7)**
Hot Weather		
March	0.4	14.6
April	64.1	17.0
May	95.7	50.1
Total	**160.2 (13.3)**	**81.7 (6.8)**
Annual Rainfall	**1203.1 (100.0)**	**1206.7 (100.0)**

Source: Season and Crop Report 2014-15, Tamil Nadu

The normal rainfall that is being received in the district is 1206.70 mm. Among the seasons, the North east monsoon brings more than half (57.8 %) of the total rainfall and about one-third of the rainfall (31.7 %) is received during south west monsoon. The balance of few spells is received during winter as well as hot weather periods.

After a few spells of hot weather period rains, the south west monsoon starts in June and it drenches the soil considerably till September. In October the north east monsoon soaks the soil with heavy downpour resulting in run-off flood waters. The recurrence of floods is the common feature of the district particularly during north east monsoon season. Nevertheless, the ground water is replenished and the level is getting raised. Thus, fairly a good amount of rainfall and rising groundwater regime are highly favourable in reaping a good harvest of crops in the district. The agro- climatic zones of the district is demarcated in Figure 5 below.

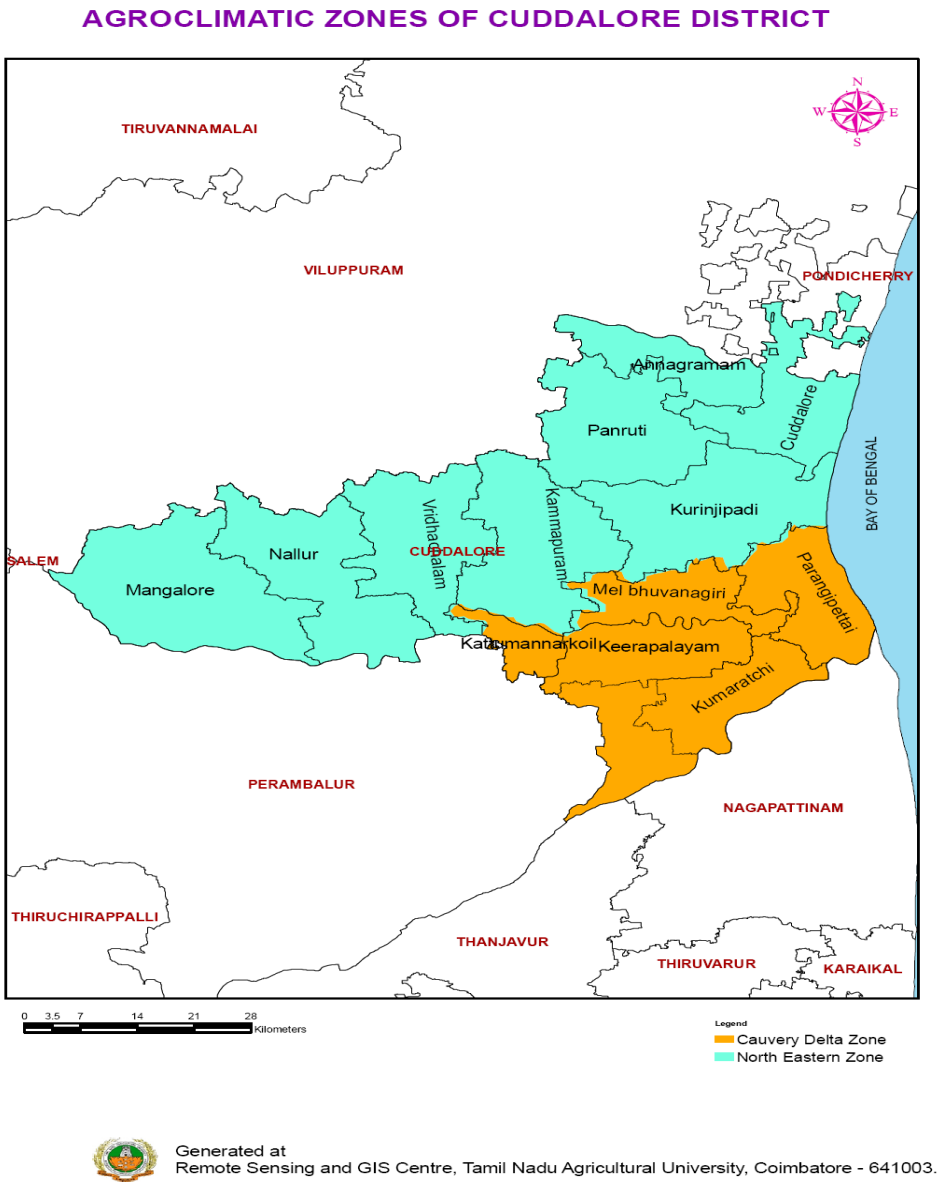

Fig.5 Map showing Agro-climatic zones of Cuddalore District

The average rainfall particulars of Cuddalore district over a period (2014-2015) are pictorially represented in Figure 6.

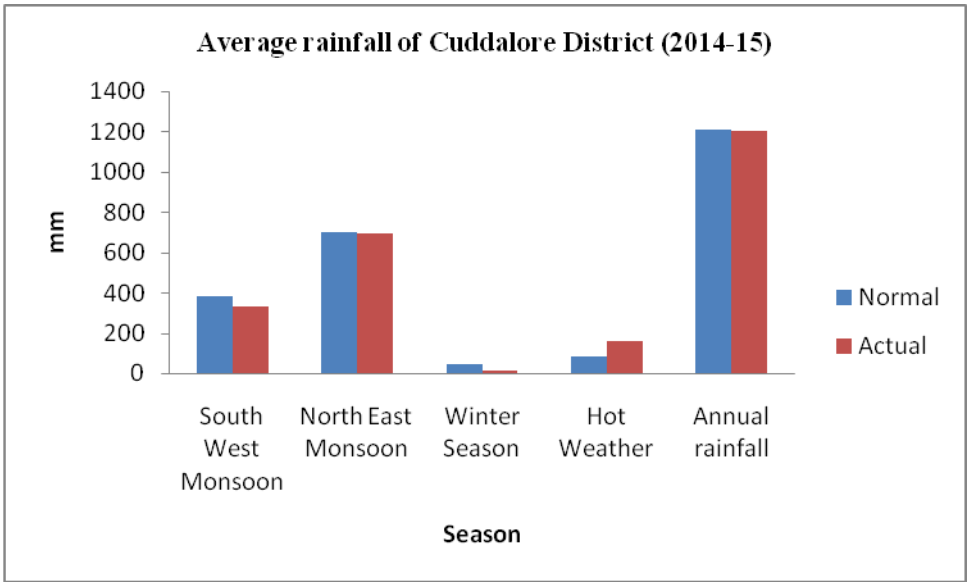

Fig. 6 Average Rainfall of Cuddalore District (2014-15)

Particulars on the mean maximum and minimum temperatures are given in Table 2.13 below.

Table 2.13 Mean Temperature and Humidity in Cuddalore District

Month	Temperature (^{0} C)		Mean Relative Humidity (%)
	Maximum	Minimum	
April 2011	39.5	24.5	64.2
May 2011	39.7	26.1	69.8
June 2011	38.4	25.5	71.6
July 2011	36.8	24.7	75.3
August 2011	35.5	23.7	79.7
September 2011	35.4	23.6	74.0
October 2011	38.9	23.1	73.3
November 2011	30.5	18.5	76.2
December 2011	30.4	18.3	82.7
January 2012	32.7	18.3	85.3
February 2012	34.3	19.5	83.7
March 2012	39.2	22.4	85.0
Total/Mean	**35.5**	**22.8**	**75.2**

Source: Deputy Director General of Meteorology, Chennai

The maximum and minimum temperatures recorded in the district are respectively 39.7^0 C in May and 30^0 C in December, the average being 35.5 ^{0} C.

Comparatively lower temperatures during July-August to January-February favor excellent crop growth. Though the temperatures are comparatively higher during March-June, the crops are brought-up with ground water.

2.7 Land

The land-use pattern and land types in Cuddalore are described in this section.

2.7.1 Land and its types

The details on the land-use pattern in the district are furnished in Table.2.14 below.

Table 2.14 Land Use Pattern of Cuddalore District (2014-15)

Sl.No	Particulars	Area (ha)	per cent
1	Geographical Area	367781	100.00
2	Forest	1415	0.38
3	Barren & Unculturable Area	14623	3.98
4	Land Put to Non-agricultural Uses	58942	16.03
5	Permanent Pastures & Other grazing lands	604	0.16
6	Misc.tree crops & groves not incl. in the net area sown	13601	3.70
7	Current Fallow	27198	7.40
8	Other Fallow	25605	6.96
9	Net area sown	219759	59.75
10	Area sown more than once	112543	30.60
11	Gross area sown	332302	90.35

Source: Season and Crop Report 2014-15, Tamil Nadu

The total geographical area of Cuddalore district is 3.68 lakh ha as could be seen from the above table. Forest occupies a meager area of 1415 ha only. The net sown area (2.19 lakh ha) accounts for nearly 60 per cent of the total geographical area. Area sown more than once is 112543 ha. The barren and uncultivable waste is 14623 ha and other follows are 25605 ha. If current fellow (27198 ha) is added, thus, nearly one-third of the geographical area is under fallow and this is a serious concern that may require specific development interventions.

Among the blocks (Table 2.15), Panruti has the highest forest cover of 1033 ha followed by Mangalore (333 ha), Annagramam (149 ha) and Vridhachalam (138 ha) respectively. Regarding net sown area, Panruti has the highest area (23058 ha), followed by Kurinjipadi (21708 ha), Nallur (21285), Vridhachalam (17496 ha) and Kammapuram (16349

ha). The percentage of net area sown to the total geographical area is the lowest in Mangalore block because of high extent of forest cover, waste lands and pastures.

2.7.2 Land types

Based on the irrigation and cropping patterns, the lands are classified into three major types namely viz. Wet land, Garden land and Dry land. The extent of these lands in Cuddalore district is given in Table 2.16. It could be noted from the table that sizeable extent of wet lands is found almost in all the blocks, except Mel Bhuvanagiri and Keerapalayam. About 10000 ha of wet lands are found in each of Kurinjipadi, Parangipetai, Kattumannarcoil, and Kumaratchi blocks which are coming under the Cavery-Coleroonayacut. Virudhachalam is also having nearly 10000 ha of wet land and this might be due to Manimuktha river irrigation system.

Garden land area is found predominately in Kurinjipadi, Nallur, Cuddalore and Kammapuram blocks and on the other hand, dry land is found predominately in Mangalur, Panruti, Annagramam, Parangipetai and Virudhachalam blocks. Mangalur has got the maximum area of 28348 ha of dry land.

Table 2.15 Land Use Pattern (Triennium average ending 2014-15) and Extent of Waste Land Area

(Hectares)

Sl. No	Land Use Pattern	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	District Level Total
1	Area under forest	-	-	1033	149	70	-	-	-	-	138	19	333	5	**1747**
2	Land put to non-agrl. Uses	6155	7104	2851	3083	4132	3257	3774	4330	5226	3424	9853	6862	2521	**62572**
3	Area under cultivable waste	456	892	1585	265	559	109	93	193	49	2073	176	1384	2041	**9875**
4	Area under permanent pastures	6	20	2	21	2	0	12	0	68	146	59	7433	57	**7826**
5	Area under miscellaneous tree crops and groves not included in net area sown	1062	4701	169	236	1616	399	2292	1639	1511	529	1011	285	295	**15745**
6	Area under current fallows	2103	2874	1046	813	2628	941	1227	2698	1538	3800	1402	790	6956	**28816**
7	Area under other fallows	297	538	425	266	3450	780	2228	1103	548	1644	2052	911	1630	**15872**
8	Net area sown	15264	21708	23058	1205	9518	12435	13934	13478	11568	17496	16349	1006	21285	**178304**
9	Total geographical area	25647	39821	30293	16980	22898	18045	23741	25054	21275	30429	31497	44754	35258	**365692**
10	Area sown more than once	5222	5917	5202	2460	6906	1580	9354	10026	11001	1957	6519	26326	1572	**94042**
11	Gross cropped area	20486	27625	28260	155	16425	14015	24024	23504	25824	19453	18882	27331	22858	**268842**
12	Extent of Waste lands	753	1430	2009	-	4009	-	-	1296	-	3717	2066	2295.	-	**17575**

B1-Cuddalore; B2-Kurinjipadi; B3-Panruti; B4-Annagramam; B5-Parangipettai; B6-Mel-Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9-Kumaratchi; B10-Virudhachalam; B11-Kammapuram; B12-Mangalore; B13-Nallur.

Table 2.16 Types of Land

(Hectares)

Sl. No	Types of Land	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
1	Wet Land	5850 (38)	9600 (48)	1503 (7)	4445 (34)	9616 (58)	NA	NA	10443 (77)	12857 (95)	10051 (57)	8120 (43)	3600 (11)	8500 (37)
2	Garden Land	9414 (61)	10408 (52)	6094 (26)	-	50 (0)	NA	NA	1710 (13)	650 (5)	1646 (9)	8612 (46)	1126 (3)	11857 (52)
3	Dry Land	-	-	15461 (67)	8464 (66)	6960 (42)	NA	NA	1325 (10)	-	5799 (33)	2150 (11)	28348 (86)	2500 (11)
	Total	**15363 (100)**	**20108 (100)**	**23091 (100)**	**12943 (100)**	**16684 (100)**	NA	NA	**13568 (100)**	**13607 (100)**	**17563 (100)**	**18971 (100)**	**33088 (100)**	**22946 (100)**

B1-Cuddalore; B2-Kurinjipadi; B3-Panruti; B4-Annagramam; B5-Parangipettai; B6-Mel Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9-Kumaratchi; B10-Viruddhachalam; B11-Kammapuram; B12-Mangalore; B13-Nallur.

Note: The figures in parentheses denote percentage to total

NA=Not Available

2.7.3 Land Holding Pattern

The details on the number and size of the operational land holdings are furnished in Table 2.17, below.

Table 2.17 Average Size of Holding in the Year: 2014-15

Sl. No	Classification category	Category area*	Operational area in ha	% to total operational area	Number of holdings	% to total number of holdings
1	Marginal	< 1ha	87455	38.00	242959	78.728
2	Small	1-2 ha	57680	25.06	42142	13.655
3	Small-medium	2-5 ha	47490	20.63	17691	5.732
4	Medium	5-10 ha	29754	12.92	5325	1.725
5	Large	>10 ha	7741	3.363	488	0.158
	Total		**230120**		**308605**	

Source: http://www.kvkvri.org/Cuddaloredistrict

Out of the total operational area, 38.0 per cent is under marginal holdings and 25.06 per cent is under small (1-2 ha area) and 20.63 per cent of the area is under small-medium holdings. The number of holdings is also the highest with marginal players (242959 holdings). Thus, while the least percentage of holdings is large owning more than 10 ha, the highest number is recorded with marginal players (less than one hectare). Further, the small and marginal farmers put to gather accounts for about 92 per cent of the holdings operating about 62 percent of the area.

The details on the pattern of operational holdings block-wise are furnished in Table 2.18. From the above table it could be observed that among the blocks Kammapuram has the marginal and Vridhachalam has the small farmers in largest percentage followed by Kumaratchi, Nallur etc in order. The lowest is noted in Panruti. Fairly larger numbers of medium farmers are found in blocks like Mangalore, Panruti, and Virudhachalam etc. Larger holdings are found mostly in Panruti, Kurinjipadi, Cuddalore and Parangipetai. In overall, this district is characterized by larger number of small and marginal farmers.

Table 2.18 Land Holding Pattern of the district (Block-wise)

(Numbers)

Sl. No	Land holding pattern	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	Total
1	> 1 Ha (Marginal)	4473 (27)	6409 (27)	4265 (18)	-	5176.4 (37)	4845 (39)	6258 (38)	2812 (21)	4932 (46)	7939 (40)	9679 (59)	10131 (31)	9184 (42)	55780 (34)
2	1 - 2 Ha (Small)	3488 (21)	5340 (22)	3347 (15)	-	2882 (20)	3255 (26)	3952 (24)	5535 (41)	3355 (31)	9094 (46)	2160 (13)	8843 (27)	5922 (27)	57171 (26)
3	2.1 - 4 Ha (Small-Medium)	3273 (20)	4676 (20)	6654 (29)	-	2671 (19)	2780 (22)	3547 (21)	5099 (38)	1418 (13)	1721 (9)	2120 (13)	8106 (25)	4435 (20)	46500 (21)
4	4.1 - 10 Ha (Medium)	4199 (25)	5068 (21)	5732 (25)	-	2098 (15)	1258 (10)	2289 (14)	132 (1)	985 (9)	789 (4)	1810 (11)	5192 (16)	1990 (9)	31542 (14)
5	Above 10.1 Ha (Large)	1329 (8)	2330 (10)	3060 (13)	-	1264 (9)	395 (3)	554 (3)	-	129 (1)	208 (1)	580 (4)	776 (2)	201 (1)	10826 (5)
	Total	**12381 (100)**	**17504 (100)**	**18880 (100)**	**-**	**9006 (100)**	**12630 (100)**	**16696 (100)**	**13678 (100)**	**10918 (100)**	**19849 (100)**	**16445 (100)**	**33145 (100)**	**21831 (100)**	**201915 (100)**

B1-Cuddalore; B2-Kurinjipadi; B3-Panruti; B4-Annagramam; B5-Parangipettai; B6- Mel Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9-Kumaratchi; B10-Virudhachalam; B11-Kammapuram; B12-Mangalore; B13-Nallur.

2.8 Sources of irrigation

The details on area irrigated by various sources are given in Table 2.19 below.

Table 2.19 Irrigation by Different Sources in Cuddalore District during 2014-15

Sl. No	Sources	Number	Net Area Irrigated (ha)	Percentage	Gross Area Irrigated (ha)
1	Dug wells / Open wells	11149	5416	3.89	6084
2	Tube wells / Bore wells	36783	91333	65.57	135405
3	Tanks	592	3524	2.52	4304
4	Canals	270	39022	28.02	49949
	Total	**48794**	**139295**	**100**	**195742**

Source: Season and Crop Report, 2014-2015

It could be evident from the above table the major sources of irrigation in the district are tube/bore wells and canals. Tube/bore wells irrigate 65.57 per cent of the total area irrigated under various sources, while canals irrigate 28.02 total net area irrigated by various sources. The dug/open well irrigation covers 3.89 per cent of the net irrigated area in the district.

The growth rates of various sources of irrigation are given below in Table 2.20.

Table 2.20 Area irrigated by different sources

S.No.	Particulars		2012-13	2013-14	2014-15	Average
1	Canals	Gross	52941	52327	49949	51739.00
		Net	46275	44884	39022	43393.67
2	Tanks	Gross	5140	4895	4304	4779.67
		Net	4664	4401	3524	4196.33
3	Tube wells / Bore wells	Gross	98371	120402	135405	118059.33
		Net	77872	84937	91333	84714.00
4	Open wells	Gross	9103	9024	6084	8070.33
		Net	8955	8679	5416	7683.33
5	Other Sources	Gross	1000	875	1173	1016.00
		Net	570	539	709	606.00

Source: Season and Crop Report 2014-15, Tamil Nadu

The growth rates of net as well as gross area irrigated given in Table 2.20, indicate that the net area irrigated by canals and bore wells has declined marginally. The net area irrigated by all the sources also has shown negative growth and this is a major concern for development intervention.

2.8.1 River Basins and Ground Water irrigation

Cuddalore district is endowed with the following five river basins

a) Cauvery- coleroon river basin
b) Vellar river basin
c) Manimukthar river basin
d) Lower Pennaiyar river basin and
e) Gadilam river basin

The present condition of the above river basins is highlighted further in this section.

a. Cauvery- Coleroon River Basin

Heavy rain and consequent discharges of surplus water from the dams in Cauvery basin of Karnataka state at times result in the flooding of Cauvery basin in Tamil Nadu State particularly during southwest monsoon season. The local heavy rains received during north-east monsoon also causes heavy flooding in Cauvery basin in Tamil Nadu in most of the years.

The river Coleroon is the drainage carrier of Cauvery, branching out near upper anaicut located in Tiruchirappalli district of Tamil Nadu State. Normally, the entire flood water of Cauvery surplusing from Mettur dam is being diverted to Upper Anaiuct in the Cauvery river and Coleroon river direct and also through Grand Anaicut to Coleroon river. The total length of river Coleroon is160 miles starts from Upper Anaicut and passing through the districts of Tiruchirappalli, Thanjavur, Perambalur, Ariyalur, Cuddalore and Nagapattinam falling finally into the Bay of Bengal.

Lower Anaicut is the only anaicut located at mile 67/3 across Coleroon river. The Cuddalore and Nagapattinam districts are directly benefited to an extent of 1,31,799 hectares. The left bank of Coleroon river from mile 67/3 to 100/2 is under the control of Coleroon Basin Division, Chidambaram, which is in Cuddalore District. This anaicut gets flood discharges from Upper anaicut, Grand anaicut and its own way side catchment areas. In October, 2005, the Mettur dam received heavy surplus water from Karnataka and about 2, 90,482 cusecs were surplused into Coleroon river on 26-10-2005. Due to the above heavy discharge realized in the river Coleroon, the left bank in many places were over washed and hence damaged.

The lower anaicut across the Coleroon River in normal course of the year stagnates a normal flow of water in the river and a part is diverted to Cuddalore district through north Rajan canal and Vadavar. The Rajan canal traverses parallel to the Coleroon river to a lagoon at 25 km from lower anaicut, at the lower level than the bed of

the Coleroon river, irrigating major areas of Kattumannarkoil and Chidambaram taluks. The Vadavar river traverses from lower anaicut 10 miles north-ward and ends in the southern tip of Veeranam tank at Lalpet of Kattumanarkoil taluk, feeding the whole Veeranam tank. From the northern tip of the Veeranam tank, the water is let into the Sethaiyathope anicut across Vellar river and the water flows north-ward feeding the Perumal Eri irrigating parts of Chidambaram and Cuddalore taluks.

The tanks for Irrigation in the Coleroon Basin in Cuddalore district are very ancient and constructed in Chola and Pallava periods. The System tanks get supply from the anaicuts and their own catchment areas during rainy season. The Channels do not get continuous supply because the monsoon runoff in the area is meager with a shorter duration of rain. Sometimes, on the formation of depression in Bay of Bengal, heavy to very heavy rains are received but flows as flood, as the rain water could not be stored and utilized fully for getting the maximum advantage and most of the channels and tanks remain silted up. The livelihood of the people in this basin depends on agriculture only.

The names, locations and ayacut areas of anaicuts, tanks and command areas under the Coleroon river basin are presented below in Table 2.21

Table 2.21 Names of Anaicuts / Tanks and Ayacut Areas under Cauvery–Coleroon River Basin

Sl. No	Name of Anaicut / Tanks	Ayacut area in Ha.
A	**Anaicut**	
1.	Lower Anaicut	43360
2.	Sethiathope Anaicut	16465
	Total	**59825**
B	**Tanks**	
1.	System tanks (15 Nos.)	29200
2	Non-System Tanks (3 Nos.)	273.27
	Grand Total	**89298.27**

b. Vellar River Basin

The Vellar river basin is one of the 17 river basins of Tamil Nadu and the basin lies in the Northern part of Tamil Nadu in South India, between the latitudes $11^{o}13'$ N-$12^{o}00'$ N and Longitudes $78^{o}13'$ E-$79^{o}47'$ E and in between Pennaiyar, Paravanar and Cauvery river basin. The total area of the basin is 7520.87 Sq. km**.** The total length of the river is about 150 kms. The Vellar river originates in the Chitheri hills of Dharmapuri district in the names of Anaimaduvu river, Thumbar river and SingipuramAru originates at Jallattu reserve forest area at 8 kms east of Salem taluk in Salem District. The river Vellar drains into Bay of Bengal near Parangipettai in Chidambaram taluk of Cuddalore

district.

The river Vellar is having six tributaries viz., Anaimaduvu, Swethanadhi, Kallar, Chinnar, Manimukthanadhi and Gomukhi river. A portion of Dharmapuri, Salem, Namakkal, Perambalur, Tiruchirappalli, Villupuram and Cuddalore districts are covered under Vellar river basin. Manimukthanadhi, which is the major tributary of Vellar river, originates from Kalrayan hills in Villupuram district, traverses about 111km and joins Vellar near Srimushnam in Chidambaram taluk of Cuddalore district.

Singipuram aru and Swetha nadhi originate from Kolli hills, Kallar river originates from Pachaimalai hills, Chinnar draining Vannadu and Kombainadu, Manimuktha and Gomukhi rivers draining from eastern slopes of Kalrayan hills. Thus, the Vellar basin is having the following river systems.

1. Vasista Nadhi
2. Swetha Nadhi
3. Chinnar River
4. Anaivari Odai
5. Manimuktha Nadhi
6. Gomukhi Nadhi and
7. Periya Odai

Among the above, the following five reservoirs as shown in table 2.22 are located in this basin.

Table 2.22 Reservoirs Located in Vellar river basin

Sl. No	Name of the reservoir	Gross capacity in M cum	Ayacut area in ha
1.	Anaimaduvu Reservoir	7.56	2119.00
2.	Kariyakoil Reservoir	5.38	1457.00
3.	Gomukhi Reservoir	15.86	2023.00
4.	Manimukthanadhi Reservoir	20.62	1720.00
5.	Wellington Reservoir	73.40	11198.00
	Total	**123.07**	**18517.00**

Among the River systems indicated above, the following six major Anaicuts are located as shown in table 2.23.

Table 2.23 Names of Anaicuts located in Vellar Basin

S.No.	Name of Ayacut	Ayacut in ha
1.	Pakkambadi	1103.00
2.	Tholudhur	636.06
3.	Pelandurai	5394.50
4.	Sethiathope	19466.00
5.	Memathur	2570.90
6.	Virudhachalam	3809.79
	Total	**32980.25**

The details of reservoirs, ayacuts, tanks and command areas in Vellar basin are furnished in Table 2.24.

Table 2.24 Command Areas of Reservoirs and Anaicuts in Vellar Basin

S.No.	Description	Number	Command Area (ha)
1	Reservoirs	5	18386.00
2	Anaicuts	6	32980.25
3	Anaicuts in Tributaries / No. of System Tanks	215 / 71	21516.00
4	Non System Tanks	386	6972.00
	Total		**79854.25**

Most of the tanks and irrigation sources have not been taken up for improvements in the past 15 years and only a few were taken up for improvements, subject to the availability of funds under the DAP. The following activities have been proposed.

1. Standardization of bunds with adequate width and side slopes.
2. De-silting of tank beds and the standardization of bunds.
3. Dilapidated sluices are to be reconstructed.
4. Weir leakages are to be arrested by constructing a skin wall in the upstream or reconstruction.
5. Drops in the channels have to be reconstructed.
6. Spouts in the channels are proposed to be reconstructed.
7. Approach earthen roads leading to anaicuts, reservoirs are to be black topped with two courses of WBM.
8. Jeep able track in canal banks, in selected places.
9. Repairs to sluices and weirs.
10. Providing controlled shuttering arrangements to sluices.

2.8.2 Veeranam Tank

Veeranam tank, under Lower Coleroon anaicut system is the major tank with an ayacut of 44856 hectares. The length of its bund is 16 km. The fore-shore bund length is 30.60 km. The original capacity of this tank was about 1400 Mc. ft. It has got 34 sluices, the sill level of the lowest is (+) 27.69. The sill level of the highest sluice is (+) 40.00. Besides supplying irrigation water, it serves as a source for the drinking water to Chennai Metropolitan water supply scheme also.

2.8.3 Wellington Reservoir

Wellington Reservoir is located in Keelacheruvai village of Thittagudi taluk. The reservoir height is 29'.71" with an ayacut area of 24059 acres. This reservoir was constructed during 1913-1923.

Table 2.25 Name of Canals under Cauvery Delta Area (Chidambaram and Kattumannar Koil)

S.No.	Name of the Canal	Ayacut area (ha)
1.	Vadavar	4740
2.	North Rajan	10934
3.	Khan Sahib & Kavarapattu	4997
4.	Veernam Tank	19776
5.	Vellar Rajan Vaikkal	8761
6.	Wallajah Eri	4557
7.	Perumal Eri	2601

Non-Cauvery Delta Area (Cuddalore, Panruti, Virudhachalam & Tittagudi Taluks)

Name of the Reservoir/Tank : Wellington
Ayacut Area (Ha) : 9623
Location of Reservoir : Tittagudi

2.8.4 Other Sources of Irrigation

1. Tube Wells : 77223
2. PWD / Minor Irrigation Tank : 6525
3. Other Sources : 857
   a) Manimuktha river basin
   b) Pennaiyar river basin / No details
   c) Gadilam river basin

Table 2.26 Sources of Irrigation and Gross Area Irrigated

(Hectares)

Sl. No	Source	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
1	Canal (Length)	-	386	-	116	16423	8320	9274	7353	12854	136	385	-	1008
2	Tanks (Public)	-	4010	1890	146	-	360	1100	420	12854	216	339	916	956
3	Tanks (Private)	-	-	-	-	-	-	-	-	-	-	37	-	-
4	Open well	-	-	-	-	-	-	-	8	-	681	-	4125	4088
5	Bore well	-	16866	-	13481	-	3480	7709	4498	1515	10986	16349	4481	206
	Total	**-**	**21262**	**1890**	**13743**	**16423**	**12160**	**18083**	**12279**	**27223**	**12019**	**17110**	**9522**	**6258**

B1-Cuddalore; B2-Kurinjipadi; B3-Panruti; B4-Annagramam; B5-Parangipettai; B6-Mel-Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9-Kumaratchi; B10-Viruddhachalam; B11-Kammapuram; B12-Mangalore; B13-Nallur.

The particulars on gross area irrigated source-wise and block-wise are furnished in Table 2.26. As could be observed from the table, the Canal irrigation is predominant in the Cauvery-Colanoon basin blocks of Parangipetai, Mel-Bhuvanagiri, Kattumannarcoil, and part of Kurinjipadi blocks. In these blocks, except Parangipetai, the canal irrigation is also supplemented by bore-wells irrigation to a considerable extent. However, the bore wells are predominantly found in blocks such as Kurinjipadi, Annagramam, Virudhachalam and Kammapuram. Table 2.26 also reveals the fact that the open wells irrigation is predominant in Mangalore and Nallur blocks. It is also pertinent to observe that Panruti block is having very minimal area under irrigation. Nallur block also has compareately the lower area under irrigation.

2.9 Cropping pattern

2.9.1 Major crops grown

The details on area under various crops cultivated in the district are presented in Table 2.27, below.

Table 2.27 Area, Production and productivity under major crops during 2014-15

Sl.No	Particulars	Area (in ha)	Production (in tonnes)	Productivity (in tons/ha)
1	Paddy	134677	641958	4.7666
2	Maize	23911	166934	6.9815
3	Cholam	106	213	2.0094
4	Cumbu	3363	11099	3.3003
5	Ragi	136	498	3.6618
6	Total Cereals	163512	823663	5.0373
7	Red Gram	813	1022	1.2571
8	Black Gram	53072	60421	1.1385
9	Green Gram	12022	13113	1.0908
10	Horse Gram	8	6	0.7500
11	Groundnut	11372	53028	4.6630
12	Sunflower	1	2	2.0000
13	Gingelly	5275	3201	0.6068

Sl.No	Particulars	Area (in ha)	Production (in tonnes)	Productivity (in tons/ha)
14	Castor	1	1	1.0000
15	Cotton	6978	27045	3.8758
16	Coconut	17723	153	0.0086
17	Sugarcane	27531	3307106	120.1230
18	Onion	32	539	16.8438
19	Brinjal	246	2188	8.8943
20	Bhendi	153	1125	7.3529
21	Cabbage	4	244	61.0000
22	Tomato	2	29	14.5000
23	Banana	4348	221235	50.8820
24	Mango	531	3420	6.4407
25	Jack Fruit	711	6475	9.1069
26	Pine Apple	8	293	36.6250
27	Guava	568	2156	3.7958
28	Chillies	200	132	0.6600
29	Coriander	22	19	0.8636
30	Turmeric	275	1108	4.0291
31	Tamarind	111	536	4.8288
32	Tapioca	4530	76983	16.9940
33	Sweet Potato	73	780	10.6849
	Total	**420870.67**	**5041754.33**	**415.77238**

Source: Season and Crop Report 2014-15, Tamil Nadu

From the above table it could be noted that Paddy, the major food crop is grown on more than one lakh hectares in the district. Maize and Cumbu are cultivated on a considerable area. Pulses namely green and black grams are cultivated on more than 65000 hectares. Sugarcane is the next important crops grown on about 27531 hectares. Groundnut is the major oil seed crop cultivated on an area of about 11372 hectares. The

oil seed crops like Sunflower and Gingelly are also cultivated on sizeable extent. Horticultural crops like Cashew and Jack are famous and their cultivation is localized in Panruti and Kurinjipadi blocks of the district. The productivity in Paddy, Cumbu, Ragi, Black gram, Green gram, Groundnut, Sunflower, Cotton, Sugarcane, Cashewnut and Brinjal in Cuddalore district is higher than that of the state, while it is lower in Sorghum, Maize and Gingelly. It is also pertinent to note from the above table that the contribution of Cuddalore district in the state production is substantial in crops like Cumbu, Black gram, Gingelly, Sugarcane and Cashewnut. The horticultural crops like fruits, vegetables and flowers are also grown commercially and marketed in the district.

2.9.2 Block-wise area under different crops

The areas under major crops in 13 blocks are presented in the Table 2.28. Among the blocks, Mangalore has the highest area under crops (29635.18 ha) followed by Keerapalayam (27500.64 ha), Kurinjipadi (25017.00 ha), Kattumannarkoil (25861.00 ha) and Kumaratchi (24167.00 ha). Though paddy is cultivated almost in all the blocks, the maximum area is found in Kattumannarkoil and the minimum area is noted in Panruti block. While more than 12000 ha are under paddy in blocks coming under the Cauvery–Kollidam Ayacut area namely Kattumannarkoil, Keerapalayam, Kumaratchi, Mel-Bhuvanagiri and Parangipetai blocks, lesser than 10000 ha are found in the other blocks. The cholam cultivation is confined to only Mangalore block, while Cumbu is cultivated on a sizable area in the blocks of Virudhachalam, Kurinjipadi and Kammapuram. The cultivation of maize is mostly confined to Mangalore and Nallur blocks.

Pulses namely green gram and black gram are cultivated on the maximum area of 13598 ha in Keerapalayam block, followed by Kattumannarkoil (8505 ha), Kumaratchi (7881 ha) and Melbhuvanagiri (4662 ha) blocks and all these blocks are under Cauvery-Kollidam ayacut. In these blocks green gram and black gram are cultivated in the rice fallows. In Kammapuram block also the pulses are cultivated on nearly 4000 ha. Here also pulses are grown in rice fallows. Around 3000 ha are under pulses (mostly black gram) in Nallur block.

Among oil seeds crops, Ground nut is the major crop cultivated on more than 4000 hectors in each of Kurinjipadi, Mel Bhuvanagiri and Virudhachalam blocks. Ground nut is cultivated on an area of around 1000 hectors in each of Cuddalore, Anna gramam and Kammapuram blocks. Gingelly is yet another important oil seed crop, whose cultivation is confined to Kurinjipadi, Nallur and Mangalore blocks. Cultivation of newly introduced crop namely Sunflower is confined to Virudhachalam block only.

Sugarcane cultivation is taken up on more than 4000 hectares in each of Annagramam and Nallur blocks. In blocks such as Cuddalore, Kurinjipadi, Panruti, Kattumannarkoil and Kammapuram sugarcane cultivation is taken up under 2000 to 3000 hectors in each. In Keerapalayam and Virudhachalam blocks it is cultivated in area of 1000 hectares in each. The newly introduced sugar beet crop is cultivated on an area of nearly 4000 hectares in Mangalore block only.

With regard to horticultural crops, vegetables are cultivated on an area of about 10000 hectares in the district. More than half of this area is found in Mangalore block. About one-third of area is found in Virudhachalam block. Very much limited areas are found under vegetables in the blocks of Cuddalore, Annagramam, Panruti etc. The Vegetable Research Station is located in Palur that comes under Panruti/ Annagramam block. Flowers (particularly Jasmine) are cultivated in less than 100 hectares in each of Cuddalore, Keerapalayam, Kattumannarkoil and Mangalore blocks. The cultivation of the famous horticultural tree crops namely Cashew and Jack is localized in Panruti and the adjoining Cuddalore and Kurinjipadi blocks of the district. The percentages of area across and within blocks are given in Tables 2.29 and 2.30 respectively.

Table 2.28 Area under major Crops in hectares (Block-wise) (Triennium average ending 2014-15)

Sl. No	Crops	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	District Level Total
1	Paddy	10076.00	12550.00	657.50	5810.00	-	12803.00	12728.77	13226.00	12854.00	9128.00	10784.00	2822.30	6472.58	**109912.15**
2	Cholam	2.33	-	-	-	-	-	-	-	-	-	-	1632.00	45.00	**1679.33**
3	Cumbu	15.59	1700.00	25.00	21.00	-	-	-	18.00	-	1588.00	732.00	16.98	-	**4116.57**
4	Ragi	15.38	-	15.00	85.00	-	-	-	-	-	24.00	10.00	2.00	27.11	**178.49**
5	Maize	56.25	251.00	20.00	118.00	-	6.00	-	76.00	-	151.00	38.00	13966.32	6096.46	**20779.03**
6	Pulses Blackgram	642.25	1100.00	1120.00	926.00	-	4662.00	13598.40	8505.00	7881.00	123.00	3783.00	430.12	3144.74	**45915.51**
7	Groundnut	1153.90	4750.00	103.00	963.00	-	4371.00	14.21	680.00	3359.00	65.00	1219.00	70.77	58.22	**16807.10**
8	Gingelly	46.30	1113.00	123.00	357.00	-	340.00	2.69	130.00	10.00	33.00	68.00	553.26	1501.09	**4277.34**
9	Sunflower	-	-	2.00	-	-	-	-	-	26.00	4566.0	-	351.99	3.71	**4949.70**
10	Oil palm	52.25	1273.00	140.00	52.25	-	0.00	40.00	101.00	8.00	1800.0	2.70	-	19.77	**3488.97**
11	Sugarcane	2113.67	2280.00	2050.00	4865.00	-	10.00	942.37	2955.00	-	800.00	1924.00	8.94	4367.13	**22316.11**
12	Sugar beet	-	-	-	-	-	601.00	-	-	-	-	-	3815.96	-	**4416.96**
13	Cotton	-	-	110.00	-	-	-	-	-	29.00	97.00	-	-	1652.86	**1888.86**
14	Vegetables (Total)	492.54	-	-	492.54	-	-	36.00	146.00	-	3300.00	-	5438.54	-	**9905.62**
15	Fruits (Total)	2306.98	-	-	-	-	36.00	-	-	-	-	-	56.00	6.50	**2405.48**
16	Flowers (Total)	83.02	-	-	-	-	-	39.94	24.00	-	-	-	58.00	7.12	**212.07**
17	Others (Cashew)	-	-	2460.25	-	-	-	98.28	-	-	-	412.00	-	-	**2970.53**
Block level Total		**17056.46**	**25017**	**6825.75**	**13689.79**	**-**	**22829**	**27500.66**	**25861**	**24167**	**21675**	**18972.7**	**29223.18**	**23402.29**	**256219.8**

B1-Cuddalore; B2-Kurinjipadi; B3- Panruti; B4- Annagramam; B5-Parangipettai; B6- Mel Bhuvanagiri; B7- Keerapalyam; B8-Kattumannarkoil; B9- Kumaratchi; B10- Virudhachalam; B11-Kammapuram; B12- Mangalore; B13-Nallur.

Table 2.29 Percentage of Area under major Crops (Across Blocks)

Sl. No	Crops	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	District Level Total
1	Paddy	9.17	11.42	0.60	5.29	-	11.65	11.58	12.03	11.69	8.30	9.81	2.57	5.89	**100.00**
2	Cholam	0.14	-	-	-	-	-	-	-	-	-	-	97.18	2.68	**100.00**
3	Cumbu	0.38	41.30	0.61	0.51	-	-	-	0.44	-	38.58	17.78	0.41	-	**100.00**
4	Ragi	8.62	-	8.40	47.62	-	-	-	-	-	13.45	5.60	1.12	15.19	**100.00**
5	Maize	0.27	1.21	0.10	0.57	-	0.03	-	0.37	-	0.73	0.18	67.21	29.34	**100.00**
6	Pulses (Blackgram)	1.40	2.40	2.44	2.02	-	10.15	29.62	18.52	17.16	0.27	8.24	0.94	6.85	**100.00**
7	Groundnut	6.87	28.26	0.61	5.73	-	26.01	0.08	4.05	19.99	0.39	7.25	0.42	0.35	**100.00**
8	Gingelly	1.08	26.02	2.88	8.35	-	7.95	0.06	3.04	0.23	0.77	1.59	12.93	35.09	**100.00**
9	Sunflower	-	-	0.04	-	-				0.53	92.25	0.00	7.11	0.07	**100.00**
10	Oilpalm	1.50	36.49	4.01	1.50	-	0.00	1.15	2.89	0.23	51.59	0.08	-	0.57	**100.00**
11	Sugarcane	9.47	10.22	9.19	21.80	-	0.04	4.22	13.24	0.00	3.58	8.62	0.04	19.57	**100.00**
12	Sugar beet	-	-	0.00	-	-	13.61	-	-	-	-	-	86.39	-	**100.00**
13	Cotton	-	-	5.82	-	-	-	-	-	1.54	5.14	-	-	87.51	**100.00**
14	Vegetables (Total)	4.97	-	-	4.97	-	-	0.36	1.47	-	33.31	-	54.90	-	**100.00**
15	Fruits (Total)	95.91	-	-	-	-	1.50	-	-	-	-	-	2.33	0.27	**100.00**
16	Flowers (Total)	82.82	-	-	-	-	0.00	3.31	-	-	-	-	13.87	-	**100.00**
	Block Level Total	**222.59**	**157.30**	**34.70**	**98.35**	-	**70.93**	**50.39**	**56.06**	**51.37**	**248.35**	**59.16**	**347.43**	**203.37**	**1600.00**

B1-Cuddalore; B2-Kurinjipadi; B3- Panruti; B4- Annagramam; B5-Parangipettai; B6- Mel Bhuvanagiri; B7- Keerapalyam; B8-Kattumannarkoil; B9- Kumaratchi; B10- Virudhachalam; B11-Kammapuram; B12- Mangalore; B13- Nallur.

Table 2.30 Percentage of Area under Major Crops (Within the blocks)

Sl. No	Crops	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
1	Paddy	51.63	50.17	15.06	42.44	-	56.08	46.29	51.14	53.19	42.11	58.10	9.52	27.66
2	Cholam	0.01	-	-	-	-	-	-	-	-	-	-	5.51	0.19
3	Cumbu	0.08	6.80	0.57	0.15	-	-	-	0.07	-	7.33	3.94	0.06	-
4	Ragi	0.08	-	0.34	0.62	-	-	-	-	-	0.11	0.05	0.01	0.12
5	Maize	0.29	1.00	0.46	0.86	-	0.03	-	0.29	-	0.70	0.20	47.13	26.05
6	Pulses (Blackgram)	3.29	4.40	25.66	6.76	-	20.42	49.45	32.89	32.61	0.57	20.38	1.45	13.44
7	Groundnut	5.91	18.99	2.36	7.03	-	19.15	0.05	2.63	13.90	0.30	6.57	0.24	0.25
8	Gingelly	0.24	4.45	2.82	2.61	-	1.49	0.01	0.50	0.04	0.15	0.37	1.87	6.41
9	Sunflower	-	-	0.05		-	-	-	-	0.11	21.07	-	1.19	0.02
10	Oilpalm	0.27	5.09	3.21	0.38	-	0.00	0.15	0.39	0.03	8.30	0.01	-	0.08
11	Sugarcane	10.83	9.11	46.96	35.54	-	0.04	3.43	11.43	-	3.69	10.37	0.03	18.66
12	Sugar beet	-	-	-	-	-	2.63	-	-	-	-	-	12.88	-
13	Cotton	-	-	2.52	-	-	-	-	-	0.12	0.45	-	-	7.06
14	Vegetables (Total)	2.52	-	-	3.60	-	-	0.13	0.56	0.00	15.22	-	18.35	-
15	Fruits (Total)	11.82	-	-	-	-	0.16	-	-	-	-	-	0.19	0.03
16	Flowers (Total)	0.43	-	-	-	-	-	0.15	0.09	-	-	-	0.20	0.03
	Block Level Total	**87.39**	**100.00**	**100.00**	**100.00**	-	**100.00**	**99.64**	**100.00**	**100.00**	**100.00**	**100.00**	**98.61**	**100.00**

B1-Cuddalore; B2-Kurinjipadi; B3- Panruti; B4-Annagramam; B5-Parangipettai; B6-Mel Bhuvanagiri; B7-Keerapalyam; B8-Kattumannarkoil; B9- Kumaratchi; B10-Viruddhachalam; B11-Kammapuram; B12-Mangalore; B13-Nallur.

2.10 Fertilizers and Pesticides used

The Department of Agriculture shoulders the responsibility of closely monitoring the demand for and supply of fertilizers, in order to ensure timely availability to the farmers. To monitor the fertilizer supply, Facilitation centres are opened in all the districts from 8.00 A.M to 8.00 P.M. and the Department ensured timely availability of fertilizers at correct prices. The details on the utilization of fertilizers and pesticides during 2014-15 are given in Table 2.31.

Table 2.31 Utilization of Chemical Fertilizers and Pesticides during 2014-15 in Cuddalore district.

Fertilizers (in lakh Tonnes)				Pesticides
Nitrogenous	Phosphatic	Potassic	Total	Dust
(N)	(P2 05)	(K2 0)	(NPK)	(MT/ha)
0.57	0.13	0.15	0.85	87

(Source: Department of Agriculture, Chennai-5.)

From the above table it could be observed that the utilization of nitrogenous fertilizers was the highest (0.57 lakh tones) followed by Potassic fertilizers (0.15 lakh tones) and Phosphatic fertilizers (0.13 lakh tones) in Cuddalore district. Pesticide used in the form of dust was 87 MT/ha.

2.11 Agricultural Engineering - Machineries and Implements

Agricultural Engineering plays a strategic role in transforming the traditional farming into modern farming through the process of farm mechanization. Mechanization in farming involves using energized pumpsets for lifting ground water for irrigation, tractors and power-tillers for ploughing the fields, tractors for threshing, winnower for winnowing, tractors and power-tiller for transporting farm produce, sprayers and dusters for the application of plant protection chemicals, transplanter for transplanting paddy-seedlings, threshers for threshing ear-heads, combine harvester for harvesting the crops and the like. In land shaping and leveling, the earth movers and tractors are utilized. Drilling machine is used for digging bore-wells, and inter-cultivator is used for weeding.

In Tamil Nadu State, in the process of rural electrification during in 1950's through 1970's, the farmers started installing and energizing irrigation pump sets on large numbers in their farms. During 1980's and 1990's farmers started using the tractors on a large scale and from 1990's and till now farmers started using combine harvesters on large scale. For spraying chemicals, in the early periods the hand sprayers were used

on large scale and in the recent years power sprayers are widely used in farming.

In the recent times the availability of agriculture labour has become scarce and hence farm mechanization seems to be inevitable and handy to the farmers in completing the agriculture operations on time. Thus, farm mechanization has become crucial for accelerating agricultural development in the state. The details on the number of various agricultural implements and machineries used in Tamil Nadu State are furnished in Table 2.32 below.

Table 2.32 Agricultural Machineries and Implements in Cuddalore District in 2014-15

Sl. No	Implements	Numbers
1	Ploughs	
a	Wooden	27694
b	Iron Ploughs	39383
	Total	67113
2	Water pumps for irrigation purposes	
a	Worked by oil engines	4064
b	worked by electric power	36721
	Total	41032
3	Tractors	
a	Government	17
b	Private	2418
	Total	2435
4	Sugarcane Crushers	
a	Worked by power	18
b	Worked by bullocks	66
	Total	84
5	Oil Ghanis	
a	5Kgs and above	1649
b	Less than by 5 Kgs	8
	Total	**1657**

It could be noted from the above table that at present 39383 iron ploughs, 36721 pump sets with electric motors and 4064 pump sets fitted with oil engines and 2435 tractors are utilized by the farmers in Cuddalore district. Sizable numbers of oil-Ghanis and sugarcane threshers are also in operation in the district.

Block-wise details on implements and machineries utilized in Cuddalore district are presented below in Table 2.33.

2.33 Agricultural Engineering - Machineries and Implements

(Numbers)

Sl. No	Implements	Annagramam	Bhuvanagiri	Cuddalore	Kammapuram	Kattumanarkoil	Keerapalayam	Komaratchi	Panruti	Virudhachalam	Kumjipadi	Mangalur	Nallur
1	Ploughs												
a	Wooden	710	210	1263	1648	400	-	1042	1050	2499	6580	7433	4859
b	Iron	-	730	1824	5234	8215	80	1503	50	6210	13354	802	1381
	Total	**710**	**940**	**3087**	**6918**	**8615**	**80**	**2545**	**1100**	**8709**	**19934**	**8235**	**6240**
2	Water pumps for irrigation purposes												
a	Worked by oil engines	56	616	46	-	397	10	75	49	61	1262	615	877
b	worked by electric power	4371	1630	5673	3865	1509	1041	1282	131	4766	3773	4451	4229
	Total	**4427**	**2246**	**5716**	**3865**	**1906**	**1051**	**1357**	**180**	**4827**	**5235**	**5066**	**5156**
3	Tractors												
a	Government	-	2	2	-	-	-	-	5	1	3	-	4
b	Private	36	240	84	153	434	582	216	13	87	193	352	28
	Total	**36**	**242**	**86**	**153**	**434**	**582**	**216**	**18**	**88**	**196**	**352**	**32**
4	Sugarcane Crushers												
a	Worked by power	-	-	18	-	-	-	-	-	-	-	-	-
b	Worked by bullocks	-	-	36	-	-	-	-	-	-	-	-	30
	Total	**-**	**-**	**54**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**30**
5	Oil Ghanis												-
a	5Kgs and above	-	-	-	-	-	-	-	-	-	14	1635	-
b	Less than by 5 Kgs	-	-	-	-	-	-	-	-	-	8	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**22**	**1635**	**-**

Source: Block Statistical Handbooks, Asst Director of Statistics, Cuddalore, 2014-15

The above table reveals that the maximum number of 13354 iron ploughs is used in Kurinjipadi block followed by the blocks of Kattumannarkoil, Virudhachalam, Kammapuram etc. In other blocks, around 1000 iron ploughs are utilized. The irrigation pump sets fitted with electric motors are found to be maximum in Cuddalore block, closely followed by Virudhachalam, Mangalore, Nallur and Annagramam. Kurinjipadi and Kammapuram blocks are also having fairly large number of pumpsets fitted with electric motors. In Cauvery-Kollidam ayacut areas namely Kattumannarkoil, Kumaratchi, Keerapalayam and Melbhuvanagiri the pump sets fitted with electric motors are found to be in the range of 1000 to 1600 in each. Further, the Mangalore block has the maximum number of pump sets fitted with oil engines followed by Nallur, Melbhuvanagiri and Mangalore blocks.

2.12 Agricultural Marketing - Regulated Markets

There are ten regulated markets in Cuddalore district (Table 2.34). Majority of these Regulated Markets (RMs) are provided with the necessary infrastructure such as godowns, transaction sheds, drying yards and farmers' rest sheds etc. The total arrival of agricultural produce to these markets during 2014-15 was of the order of 87300 MTs, worth of Rs. 255 cores. In order to avoid distress sale by the small and marginal farmers in the peak season, some of the RMs have been identified for providing pledge loans to the farmers. Under this scheme, the farmers can store their produce in these godowns for a maximum period of six months and take pledge loan at a maximum of 75 per cent of the value of the produce and up to the maximum limit of Rs. 25000. The sector depends, to a large extent, on the support from the government. The number of regulated markets, the quantity and value of the commodities transacted in those markets are given in Table 2.34, below.

Table 2.34 Quantities of commodities transacted in the Regulated Markets of Cuddalore district during 2014-15

Sl. No	Name of the Regulated Market	Quantity of Arrival (MT)	Value (Rs in Lakhs)
1	Cuddalore	3641.95	2017
2	Panruti	9369.94	2483
3	Virudhachalam	65921.00	12155
4	Thittakudi	1905.50	410
5	Kurinjipadi	3887.38	2145
6	Thirumuttam	151.14	823
7	Kattumannarkoil	911.10	1377
8	Chidambaram	521.00	1532
9	Bhuvanagiri	479	1068
10	Sethiyathoppu	512.00	1500
	Total	**87300**	**25510**

Source: Office Records of the Joint Director of Agriculture, Cuddalore, 2015

In overall, the facilities available for marketing agricultural produce in Cuddaore district are Regulated Markets, Co-op marketing societies, Uzhavar Sandhai's, Contract farming (crops / area covered), and Wholesale markets. The market committee is located in the district headquarters namely Cuddalore. The details on the nature of market infrastructure available in the regulated markets of Cuddalore district are presented in Table 2.35, below.

Table 2.35 Infrastructure Facilities Available in Regulated Markets of Cuddalore district during 2014-15

Market Committees	Numbers
Own Land	5
Transaction shed	13
Rural Business Hub	1
Drying Yard	13
Farmers Rest Shed	5
Sanitary Facilities	9
Drinking water Facilities	5

Source: Office Records Joint Director of Agriculture, Cuddalore, 2015

- In Cuddalore district , AGMARK Grading Laboratory is located in Panruti
- The farmers market is located in Cuddalore, Chidambaram, Virudhachalam, Panruti and Vadalur.

2.13 Storage Facilitates

A capital investment subsidy scheme for construction/expansion/modernization of multi chamber / multi product cold storages and storages for horticultural produce was introduced by the GOI. Cold storages would help in minimizing post-harvest losses being suffered by farmers, particularly small and marginal farmers. The scheme is implemented by National Horticulture Board in collaboration with NABARD / National Cooperative Development Corporation (NCDC) in IX Five Year Plan starting from 1999 –2000. The cold storage capacity may vary from 10 MT to 5000 MT depending upon the volume, value, etc. of the products to be stored such as horticultural produce and other perishable items such as dairy products, meat, fish, chicken, etc.

The permissible subsidy is subject to a maximum of Rs. 50 lakhs per project. The scheme has been extended for implementation during the X plan period also. Many bankers are encouraging the farmers in taking up this credit linked subsidy

scheme. The storage facilities available in cuddalore district are given in table 2.36, below.

Table 2.36 Storage facilities in the Cuddalore district

S.No.	Storage facilities	Numbers
1	Seeds / Fertilizers / Pesticides depot	29
2	Rural Markets / Mandis	10 (Regulated Markets)
3	Rural Godowns	6
4	Cold Storages	Nil.

(Source: Office Records Joint Director of Agriculture, Cuddalore, 20145)

It seems that the entrepreneurs are hesitant to venture into the cold stroage activities in the district.

2.14 Sericulture

The details on mulberry cultivation in the district are given in the Table 2.37, below

Table 2.37 Mulberry cultivation and trainings in the district

Particulars	Area (in acres)	Place and Number of Training Centres
Mulberry cultivation	161.50	-
Government Silk Training Centres	-	Neyveli 10 Farmers Training Centre

Source: Department of Sericulture, Policy Note, 2015

In Tamil Nadu, mulberry is cultivated in an area of about 36482.15 acres, of which 161.50 acres are under mulberry production in Cuddalore district. For promotion of mulberry cultivation, the Government started Farmers Training Centre at Neyveli and conducted regular trainings to the farmers on mulberry cultivation and silk rearing.

2.15 Animal Husbandry and Dairy Development

2.15.1 Livestock population

Livestock and poultry are the important components of integrated farming system.

The details on the livestock and poultry population in Cuddalore district are presented in Table 2.38 below

Table 2.38 Livestock population in Cuddalore district – 2011-12

(Numbers)

Sl. No.	Particulars	Population
1	Cattle	334203
2	Buffaloes	14428
3	Sheep	59345
4	Goats	328824
5	Horses and ponies	188
6	Donkeys	192
7	Camels	1
8	Pigs	15469
	Total Livestock	**752650**
9	Dogs	43571
10	Rabbits	1183
	Poultry	
11	Back yard Poultry	432983
12	Farm Poultry	517474
	Total Poultry	**950457**

Source: 19th Livestock Census, 2012.

2.15.2 Veterinary institutions and hospitals

The veterinary institutions functioning in the district are depicted in Table 2.39.

Table 2.39 List of Veterinary Institutions and Hospitals

Sl. No	Name Of the Institution	No. of Institutions	Location
1	Clinician Centre	1	Cuddalore
2	Veterinary Hospital	5	1.Panruti, 2.Melpattampakkam, 3.Bhuvanagiti, 4.Kurinjipadi, 5.Thittakudi
3	Animal Disease Intelligence Unit	1	Cuddalore
4	Veterinary Dispensaries	30	
5	Poultry Extension Centre	1	Bhuvanagiri
6	Other Mobile Veterinary Units	1	Chidambaram
7	Rinder pest Check post	1	Cuddalore
8	Sub-Centres	98	
9	Cattle Breeding and Fodder Development	1	Cuddalore
10	Mobile Veterinary Dispensary	13	

Source: http://Cuddalore.tn.nic.in/animal.htm

The veterinary hospitals and dispensaries are functioning in different blocks in the district. There are about more than hundred veterinary institutions in this district as shown in the above table 2.40. Government hospitals are located in Panruti, Melpattampakkam, Bhuvanagiri, Kurinjipadi and Thittakudi. Clinician Centre, Animal Disease Intelligence Unit, Rinder pest Check post and Cattle Breeding and Fodder Development are located at Cuddalore. Poultry Extension Centre is located at Bhuvangiri block and other Mobile Veterinary Units are located at Chidambram. There are 98 sub-centres and 13 Mobile Veterinary Dispensary areas available in Cuddalore district.

2.15.3 Dairy development

The details on the Milk Production in Cuddalore district are presented below in Table.2.40.

Table 2.40 Estimated milk production in Cuddalore district (2014-15) (Provisional)

(in '000 Tonnes)

District	Cow's milk			Buffalo	Total milk production
	Indigenous	Exotic/Cross	Total		
Cuddalore	23.828	163.684	187.512	8.730	196.242

Source: Department of Animal Husbandry and Veterinary Services, Chennai-600 006

Out of the total milk production of 1.96 lakh tonnes in the district, the shares of indigenous cows, cross breed cows and buffaloes are respectively 12.15 per cent, 83.41 per cent, 4.44 per cent. Thus, the contribution of cross breed cows in total milk production is rather substantial.

2.15.4 Poultry Development

The details on the population of poultry are given below, in Table 2.41.

Table 2.41 Poultry Population in Cuddalore District (2007 & 2012)

(Numbers)

District	Total poultry		% Growth over previous census
	2007	2012	
Cuddalore	333043	527338	58.34

Source: 18th & 19th Live Stock Census –2007 & 2012, Department of Animal Husbandry and Veterinary Services, Chennai - 600 006

The poultry population between two Census periods has grown tremendously in Cuddalore district as could be noted from the above table. This might be mainly due to the growth of poultry broiler industry in the recent times in Cuddalore district.

2.15.5 Egg production

The details on the total egg production in the district are given in the Table.2.42, below.

Table 2.42 Estimated Egg production in Cuddalore district (2014-15)

(In lakhs no's)

District	Desi	Improved	Total
Cuddalore	155.343	0.00	155.343

Source: Department of Animal Husbandry and Veterinary Services, Chennai-600 006

The estimated egg production in the district is 155.343 lakhs, as could be inferred from the above table. It is also pertinent to note that the egg production is mainly due to Desi birds and hence the commercial egg production with improved breeds is yet to find a place in Cuddalore district

2.16 Fisheries

Cuddalore District is one of the most potential districts, not only for marine, but also for inland and brackish water resources. The district has a coast line of 68 kms. There are 8104 ha of inland water resources as detailed below.

1. Major irrigation and long seasonal tanks - 5986 ha
2. FFDA tanks - 312 ha
3. Derelict water - 1000 ha
4. Aquaculture farms - 806 ha

There are 11,735 Inland fishermen's in the district.

An Overview of Fisheries Activities

1 45 marine fishermen villages are located in the district
2 Cuddalore District is having a coastal length of 68 kilometers.
3 The total marine fishermen population is 47,000 and active fishermen are around 23,840.
4 The total members in the Marine Fishermen Cooperative Societies are 15,133 and the members of Fisherwomen Cooperative Societies are 13,094.
5 The fishing fleet of Cuddalore District includes 606 mechanized boats, 1010 motorized country craft and 5580 traditional crafts.
6 There are three fish landing centres for mechanized boats in Cuddalore, Parangipettai and Mudasalodai.

7 Inland Fishermen Cooperatives Societies – 28

8 Total inland Cooperative Society fishermen – 2600

9 Total inland Cooperative Society fisherwomen – 400

10 In the inland sector 15 fish rearing centres owned by private sector

11 There is one shrimp hatchery (*P. monodon*) which is not functioning at present.

12 164 Nos. of shrimp aqua farms with 366.41 ha water spread area.

13 Lot of scope for developing inland fish farming and brackish water shrimp farming.

14 In the inland landings, major carps such as Catla, Rohu, Mrigal, Common Carp, Silver carp and fresh water prawns are available.

Table 2.43 Basic details of fisheries sector

Length of Coastal line (KM)	69
No. of Coastal Block	57.5
No. of Coastal centers (Landing)	3
No. of Fisherman engaged (Land/marine)	13769

Estimated production of Fisheries (Marine fish in tonnes)

The total production of marine fishing in the district is given in Table 2.44 below.

Table 2.44 Estimated marine fish production craft-wise in Cuddalore district (2014-15)

(Quantity in tonnes)

District	Mechanised	Non-mechanised			Total
		Motorised	Non-motorised	Shore sheine crafts	
Cuddalore	16541.00	5393.83	3396.99	488.86	25820.68

(Source: Commissioner of Fisheries, Chennai-6)

The total production is about 25820.68 tonnes, of which 16541 tonnes are caught by mechanised system and the remaining is caught by non-mechanised forms (Motorised – 5393.83 tonnes, Non-motorised - 3396.99 tonnes and Shore sheine crafts – 488.86 tonnes).

Estimated Inland Fish Production

The estimated inland fish production and its share in total fish production in the district are detailed below, in Table 2.45.

Table 2.45 Inland fish production in the district

District	Total quantity in tonnes	Percentage
Cuddalore	16848.07	8.89

(Source: Commissioner of Fisheries, Chennai-600 006)

It could be vivid from above table that the inland fish production is 16848 tonnes and it constitutes 8.89 per cent of the total fish production in the district.

2.17 Banking and Insurance

The Cuddalore district has 8 nationalized banks and 36 cooperative banks for the social welfare of the district. Also has 5 Life Insurance companies in the district for aiding people in the needy hours, such as accidents, natural deaths, loans etc.,

2.18 Co-operation

The various co-operative institutions functioning in the district are listed in Table 2.46, below

Table 2.46 Co-operatives functioning in Cuddalore District

Sl. No	Particulars	Number
1	Primary Land Development Bank	6
2	Co-Operative Apex Banks	Nil
3	District Central Cooperative Banks	35
4	Urban Banks	2
5	Primary Agricultural Credit Societies	167
6	Housing Cooperative Societies	30
7	Employees Cooperative Societies	76
8	Lift Irrigation Societies	1
9	Weavers Cooperative societies	36
10	Industrial Cooperative Societies	16
11	Khadi and Village Industries Societies	22
12	Primary Cooperative Societies	8
13	Cooperative Sugar Mills	1
14	Cooperative Marketing Societies	4
15	Other Cooperative Societies	2

2.19 Industries

Cuddalore district consists of various industries and industrial parks. The details on the major industries, chemical companies and various industrial parks are furnished in the Tables 2.47, 2.48, and 2.49.

Table 2.47 List of Industries Functioning in Cuddalore District

S. No.	List of Industries	Numbers
1	No. of Working Factories	228
2	No. of Trade Unions	57
3	Large Scale Industries	35
4	Small Scale Industries	617
5	Cottage Industries	200
6	Medium Scale Industries	114

There are about 228 Working Factories, 57 Trade Unions, 35 Large Scale Industries, 617 Small Scale Industries and 200 cottage Industries in the district. The names of eleven important industries are listed in Table 2.48, below

Table 2.48 Names of the Important Industries in the District

Sl. No	List of Important Industries
1	Neyveli Lignite Corporation , Neyveli
2	MRK Sugar Mill, Sethiathope
3	EID Parry (I) Ltd, Nellikuppam
4	Ambiga Sugar Mills, Pennadam
5	TANFAC, Cuddalore O.T
6	Vanavil , Cuddalore O.T
7	National Cotton Mills, Chidambaram
8	SPIC Pharma Chemicals , Cuddalore O.T
9	Asian Paints(I) Limited, Cuddalore O.T
10	Tagros Chemicals (I) LTD., Cuddalore O.T
11	Clariant Chemicals LTD., Cuddalore O.T

Regarding Industrial park, Cuddalore district has three major parks at various locations as indicated in Table 2.49, below.

Table 2.49 Names of the Industrial Parks

Sl. No	List of Industrial Parks
1	SIPCOT, Cuddalore O.T
2	SIDCO, Semmandalam, Cuddalore a) Cuddalore b) Vridhahalam c) Vadalur
3	Neyveli Lignite Corporation, Neyveli

2.20 Transport and Communication

Transport

The Transport and communication particulars of Cuddalore district such as Roadways, railways and sea port are given below, in Tables 2.50 and 2.51.

Table 2.50 Mode of Transport and Sea Port in Cuddalore District

Particulars	Length (Kms)
I. Roadways	
National Highways	183.738
State Highways	1671.024
Corporation & Municipalities Roads	436.93
Panchayat Union & Panchayat Roads	4283.93
Town Panchayat& Township Roads	791.634
II. Railway	
Broad Guage	107
Meter Guage	81
No. of Railway Stations	27
No. of Sea Port	1

Communication

Table 2.51 Communication particulars in Cuddalore District

Post & Telegraph (in numbers)	
Post offices doing postal business alone	488
Post offices doing Post and Telegraph business	25
Telephones (in numbers)	
No. of Telephones in use	1, 60,366
No. of Public call offices	9413
No. of Telephone exchanges	163

Electricity

Details on the generation and consumption of electricity in Cuddalore district are given in Table 2.52 below

Table 2.52 Electricity generation and consumption in Cuddalore District

a. Generation of Electricity (in M.U)		
1	Thermal power	16242.43
2	Power purchased	383.69
b. Consumption of Electricity (in M.U)		
1	Agriculture	630
2	Industry	28.52
3	Commercial	44.16
4	Domestic & water works	230.16
5	Public lighting	39.35
6	Miscellaneous	577.154
c. Rural Electrification		
1	No. of Pump sets energized	1308
2	No. of Villages electrified	896
3	No. of Hamlets electrified	2660

2.21 Educational and Research Institutions

Educational Institutions

In Cuddalore revenue district, 1164 Elementary Schools, 259 Middle Schools, 184 Government and Government Aided High Schools and Higher Secondary Schools are functioning. Besides, 23 Matric Schools and 41 Matriculation Higher Secondary Schools are also functioning. Hence, in total 1692 Schools are functioning in Cuddalore district. As regards Cuddalore Revenue District one Chief Educational officer is working in Cuddalore, the District Head Quarters, and two District Educational officers are working in respect of Cuddalore and Virudhachalam Divisions.

As regards elementary education, one District Education Officer is working at Cuddalore. For the district as well as Panchayat Unions, 13 Assistant Elementary Educational Officers and 13 Additional Assistant Elementary Educational officers are working in the district. As regards collegiate education, the institutions available in the district are given in Table 2.53, below.

Table 2.53 Educational institution present in Cuddalore District

S.No.	Institutions	Numbers
1	No. of University	1
2	Arts and Science Colleges	8
3	Medicine – Allopathy	1
4	Engineering Colleges	4
5	Agricultural Colleges	1
6	Colleges for Special Education	2 (Music)
7	Teacher Training Colleges	9

Research Institutions

The Sugarcane Research Station in Cuddalore, Regional Research Station in Virudhachalam and Vegetable Research Station in Palur is involved in carrying out research works focusing on sugar cane, groundnut and vegetables, respectively.

Sugarcane Research Station, Cuddalore

This is one of the Pioneer institutes involved in carrying out research works on sugarcane crop in Tamil Nadu. This institute was started initially at Palur during 1955 and subsequently shifted to Cuddalore during 1957. Fourteen early season varieties, 6 middle season varieties and 4 late season sugarcane varieties were released from this research institute so far. CoC.671 is the variety released during 1975, which ruled in various parts of the state for more than 15 years. Here Co denotes Coimbatore and CoC denotes Cuddalore. Other varieties released in this institute are Co 6304, CoC 771, CoC 772, CoC 774, CoC 775, CoC 777. CoC 778, COC 779, CoC 8001, CoC85061,CoC 86062, CoC 90063, Co 8021, CoC 91061, Co 8362, CoC 92061, Co 86249, CoC 98061, CoC99061, CoC 22, CoC 23, CoC (SC) 24 and CoC 25. CoC 23 was recognized at national level as CoC 01061.

Regional Research Station, Virudhachalam

This is the oldest Cashew Research Station in India, working under the control of Tamil Nadu Agricultural University, Coimbatore. Research work for evolving suitable Cashew variety was commenced in this institute from 1963. So far four Cashew varieties

were released from this institute. They are VRI 1, VRI 2, VRI 3 and VRI 4. The variety VRI 2 is found to be highly adaptable not only in Tamil Nadu, but also all over India and it is recognized as a national variety.In case of groundnut, VRI1 , VRI 8 and ICGV00348 were released by this station.

Vegetable Research Station, Palur

Vegetable Research Station, Palur is located 17 Kms West of Cuddalore and 10 Kms East of Panruti. Total area of the research station is 55 Acres. This station is engaged in research activities from 1905 onwards. The research activity on vegetable production technology is under-taken in this station. Brinjal variety PLR 1 and 2, Jack variety PLR I , PLR 2, Snakegourd variety PLR 1 and 2, Amaranthus variety PLR1, Bottlegourd variety PLR 1 and Chilli variety PLR 1 were released from this station so far.

CHAPTER III

DEVELOPMENT OF AGRICULTURE AND ALLIED SECTORS

Before suggesting an action plan for development of agriculture and allied sectors, a brief analysis (at district level) was done on the following components:

i. Assessing the trends in area, production and productivity of major crops and projection till the 12th Plan period end (2016-17).
ii. Yield gap analysis for the major crops

3.1 Trends in area, production and productivity of major crops

The past trends in area, production and productivity of major crops need to be analysed to plan for future agricultural development. Compound Growth Rate (CGR) tool was used to measure the annual rate of growth in area, production and productivity of major crops cultivated in the district and it was expressed in percentage. The compound growth rate was estimated using 15 years time series data from 2000-2001 to 2014-15. The equation used to estimate the annual compound growth rate was:

$$Y_t = ab^t e$$

Logarithmic form of the above equation is: ln Y =ln a + t ln b

The compound growth rate (CGR) in percentage was derived using the formula:

$$CGR(r) = [\text{Antilog } b-1] \times 100$$

where, Y_t = Area or Production or Yield

a = Intercept

b = Regression co-efficient of t

t = Time variable

r = Compound Growth Rate

The details on the average area, production and productivity are presented in Table 3.1. It could be noted from Table 3.1 that paddy, maize, black gram, groundnut, sugarcane are the major crops grown in the district. Jackfruit is an important horticultural crop. Banana and Tapioca are also grown on a limited extent. On an average, paddy was grown on area of 1.34 lakhs hectares. The Black gram was cultivated on an average area of 53072 ha and the total annual production was 60421 tonnes. The groundnut on an area of 11372 ha yield 4.66 tonnes/ha, sugarcane on an area of 27531 ha yield 120.12 tonnes/ha and banana on an area of 4348 ha produced 50.88 tonnes/ha. Tapioca was grown on a modest area of 4530 ha with the production of 76983 tonnes. Cotton was grown on an area of 6978 ha and the annual production was 27045 tonnes.

Table 3.1 Average Area, Production and Productivity of Major Crops in Cuddalore District during 2014-2015

Sl. No	Crops	Area (ha)	Production (tonnes)	Yield (kg/ha)
1	Paddy	134677	641958	4.7666
2	Maize	23911	166934	6.9815
3	Black gram	53072	60421	1.1385
4	Ground nut	11372	53028	4.6630
5	Cotton	6978	27045	3.8758
6	Sugar cane	27531	3307106	120.1230
7	Tapioca	4530	76983	16.9940
8	Banana	4348	221235	50.8820
	Total	**266419**	**4554710**	**209.4244**

Source: Season and Crop Report of Tamil Nadu, 2014-15.

The growth rates of major crops in the district in terms of percentages are presented in Table 3.2, below.

Table 3.2 Compound Growth Rates (CGR) of Area, Production and Productivity under Major Crops in Cuddalore District

Sl. No	Crops	Compound Growth Rate (%)		
		Area	Production	Productivity
1	Paddy	0.557	-2.742	-3.299
2	Maize	79.323	77.962	-1.361
3	Black gram	4.629	6.647	2.018
4	Ground nut	-10.104	-7.425	2.679
5	Cotton	18.669	13.222	-5.447
6	Sugar cane	-2.242	-4.836	-2.594
7	Tapioca	-4.380	-5.858	-1.478
8	Cashew nut	1.228	-3.312	-4.540
9	Banana	2.326	10.299	7.973

The growth rates in Table 3.2 indicated that except groundnut, sugarcane and tapioca all the other crops showed increasing trend in the area. Though there is an increasing trend in area for the crops such as paddy and cashew nut, the production of these crops showed declining trend. The decrease in production trend was also associated with the declining trend in the productivity.

Subsequently, the crops like maize and cotton showed declining trend in productivity and increasing trend in area and production. Black gram showed increased trend in terms of area, production and productivity. Groundnut showed declining trend in area and production and increasing trend in the productivity. These indicated that the technological interventions could increase the productivity of the crops in Cuddalore district

3.2 Projected Area, Production and Yield of Selected Crops

The area, production and yield were projected using CGR for the year's up to 2015-16 and the results are presented in Table 3.3

The major crops grown in the district are paddy, maize, black gram, ground nut, cotton, sugar cane, tapioca cashew nut and banana. Therefore, these crops can be further exploited for their yield potentials and hence will be focused as potential crops to be intervened in the technological gaps, for their improvement in production and productivity.

The compound growth rate analysis revealed the current pattern of changes (percentage) in the area, production and yield would continue. The area of crops like paddy, groundnut and tapioca showed reduction in the area than in the year 2011-12. Though the yield trend showed a positive sign, the loss in the area could not compensate with a higher production in the district. In order to reduce the declining area, production and yield in the district, adequate interventions have to be made in the areas of planting materials, crop management and plant protection measures for the various crops that are grown in the district.

Table 3.3 Projected Area, Production and Yield Based for the Major Potential Crops Identified

Description	Paddy			Maize			Black gram		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Compound Growth Rates (%)	0.557	-3.168	-3.299	79.323	77.247	-1.361	4.629	6.493	2.018
Triennium Average ending 2011 - 12	116105	290903	2517	12088	20955	1744	49373	24245	488
2012-13	114104	253565	2247	114104	167359	1733	49960	21854	439
2013-14	114739	245533	2173	114739	296638	1709	52272	23273	448
2014-15	115378	237755	2101	115378	525781	1686	54692	24784	457
2015-16	116021	230223	2032	116021	931930	1663	57224	26393	466
Description	**Ground nut**			**Cotton**			**Sugar cane**		
	Area	**Production**	**Yield**	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
Compound Growth Rates (%)	-10.104	-8.116	2.679	18.669	13.813	-5.447	-2.242	-4.811	-2.594
Triennium Average ending 2011 - 12	10943	34611	3193	5552	7770	239	29781	3073767	104
2012-13	9000	26464	3095	6518	6107	151	29713	2876575	97
2013-14	8091	24316	3178	7735	6950	143	29046	2738184	95
2014-15	7273	22343	3263	9179	7910	135	28395	2606452	92
2015-16	6538	20529	3351	10893	9003	127	27759	2481056	90
Description	**Tapioca**			**Cashew nut**			**Banana**		
	Area	**Production**	**Yield**	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
Compound Growth Rates (%)	-4.380	-5.793	-1.478	1.228	-3.360	-4.540	2.326	10.484	7.973
Triennium Average ending 2011 - 12	3589	104496	29561	30791	17330	572	4651	177244	37260
2012-13	3342	110079	32941	31819	16769	527	4781	226514	47381
2013-14	3195	103702	32454	32210	16205	503	4892	250261	51159
2014-15	3055	97694	31974	32605	15661	480	5006	276497	55238
2015-16	2922	92034	31502	33005	15135	458	5122	305484	59642

3.3 Yield Gap Analysis

Yield Gap is the difference between the progressive farmer's yield and average farm yield which explains the gap due to soil and climatic factors, technologies adopted, availability of farm inputs like suitable varieties, fertilizers, plant protection chemicals, irrigation water, labour, cultivation practices followed, etc.

In order to raise the productivity of the major crops, the technical knowledge on high yielding varieties, average yield, its potential yield, progressive farmer's yield etc., were collected from the office of the Joint Director of Agriculture and Deputy Director of Horticulture. From this, information yield gaps were analysed and the results are shown in Table 3.4 that follows.

Table 3.4 Yield gap analysis

(kg/ha)

Sl. No	Crops	Potential Yield	Progressive Farmer's Yield	Avg. yield	Yield Gap I	Yield Gap II	Gap I + II
		1	2	3	4=1-2	5=2-3	6=1-3
1	Paddy (Kg/ha)						
	a. ADT 36	4000	3650	3100	350	550	900
	b. ASD 16	5600	5200	4000	400	1200	1600
	c. ADT 38	6200	5600	3580	600	2040	2640
	d. ADT 43	5900	5100	4100	800	1000	1800
	e. ADT(R) 47	5400	5350	4650	50	700	750
	f. CR 1009	5300	5420	5200	-120	220	220
	g. BPT	5400	5100	4347	300	753	1053
2	Black gram (Kg/ha)						
	a. ADT 3	720	670	510	50	160	210
	b. VBN 3	900	860	841	40	19	59
	c. VBN 4	900	830	710	70	120	190
3	Sugarcane (T/ha)						
	CO 86032	133	184	101	-51*	83	83
4	Groundnut (Kg/ha) (Rainfed)						
	a. VRI 2	2060	2100	1910	-40	190	150
	b. TMV 7	1900	1810	1370	90	440	530
5	Groundnut (Kg/ha)						

	(irrigated)						
	VRI 2	2030	4995	3069	-2935*	1926	1926
6	Cashewnut (kg/ha)						
	VRI 3	2978	3000	1600	-22*	1400	1400
7	Maize (kg/ha)						
	NK 6240	9000	8185	6525	815	1660	2475

Source: Records, Joint Director of Agriculture, Cuddalore, 2013

*Note: * Progressive farmer's yield is taken to calculate the overall yield gap.*

From the above table, it is obvious that all the three yield gaps indicate that there is ample scope to increase the productivity levels of major crops by the application of science- based latest production technological know-hows.

3.4 Technological Interventions and strategies to reduce the yield gaps

The adoption of suitable high yielding varieties and crop production technologies are the pre-requisites to boost the production. The strategy for increasing the production of potential crops in Cuddalore district through the increase in productivities of those identified crops has already been discussed in the previous section. The productivities could be raised by growing the suitable high yielding varieties and as a consequence, the prevailing yield gap could be bridged. The specific features and the technologies for cultivating the selected high yielding varieties of the select crops are presented in Table 3.5.

Table 3.5 Technological Interventions and strategies to reduce the yield gaps for major crops in the Cuddalore district

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
1		Lack of awareness about the promising quality rice variety for Kuruvai season	Assessment of promising quality rice variety for Kuruvai season	Variety suitable: MDU 6	FLD on Demonstration of paddy variety MDU 6 for Kuruvai season in Cuddalore district
		Low yield due to lack of awareness about high yielding varieties	Assessment of high yielding varieties and proper package of practices	**1. List of high yielding varieties** **Season:** Sornavari (April-May) - ADT 36, ASD 16, MDU 5, ADT 43, CO 47, CORH 3 Samba (Aug) - White Ponni, CR 1009, TNAU Rice ADT 50 Navarai (Dec – Jan) - ADT 36 **2. Nursery stage** • Seed up gradation using egg floatation technique to remove ill filled and immature seed (with salt water of 1.13 specific gravity. • Seed hardening with 1% KCl (seed and KCl solution 1:1) for 16 hours to withstand early moisture stress • Seedling dip with *Pseudomonas fluorescens* (Pf-1) @ 2.5 kg/ha or seed treatment (10g/kg) **3. Planting and Crop establishment** • Adoption of SRI technique with low seed rate (5-7 kg/ha), wider spacing (25 cm × 15cm) and improved package of practices.	OFT and FLD on Demonstration SRI techniques and plant protection measures.

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
				• Applied based on Site Specific Nutrient Management (SSNM) approach for P & K and can be applied @ 30 P_2O_5 kg/ha and 50 K_2O kg/ha. • Foliar Nutrition in flowering stage: - 2% DAP + 1% KCL + 1% Urea at 50% flowering stage or TNAU Rainfed rice MN mixture @ 12.5 kg/ha as EFYM at 1:10 ratio at tillering and panicle initiation stages. **4. Plant Protection (Need based)** • **Rice blast & Sheath blight** – Seed treatment with TNAU Pf 1 10 ml/kg of seeds or spray Carbendazim 50WP @ 500g/ha or Tricyclozole 75 WP @ 500g/ha or Azoxystrobin 25 SC @ 500 ml/ha or Neem oil at 3% • **Rice root and White tip nematodes -** Seed treatment with *Pseudomonas fluorescens*(10 g/kg seed) and as foliar spraying @ 1 kg/ha thrice at 45, 55 and 65 DAT. • **Sucking pests (Brown leafhopper, Green leaf hopper, Thrips & Gall midge), Stem borer and leaf folder** – Spray Fipronil 5% SC 1000-1500 ml/ha	

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
				or Triazophos 40% EC 625-1250 ml/ha or Seed treatment @ 5g/Kg of seed and foliar application of *Beauveria bassiana*@ 5g/l twice at 15 days interval **5. Farm mechanization** Seed drill – Sow of seeds with 20 cm inter row spacing. Single row or double row rotary weeder for weeding and combine harvester for harvesting	
2	Sugarcane	Unhealthy seedlings due to nutrient deficiency, High mortality rate, yield reduction	Assessment of nutrient enrichment techniques	1.Composted coir pith @150kg/ac 2.DAP @ 1.5 kg/ac 3.MN mixture @ 0.5 kg 4.Foliar application of TNAU Sugarcane Booster @ 1.0, 1.5 and 2 kg/acre in 200 litres of water at 45,60 and 75 days after planting enhances cane growth and weight, internodal length, cane yield, sugar content and offers drought tolerance.	Demonstration of enriched coir pith as a medium for protray sugarcane seedling
		Low yield, lack of awareness about the techniques for crops to withstanding in problem soils, with excessive moisture where it is difficult to drain water	Assessment for Planting of suitable varieties which are high yielder is the most important for increasing the production and productivity of per unit area and field bed preparation	1. The primary seed materials are available in large quantity at the Sugarcane Research Stations at Cuddalore, Sirugamani and Melalathur. 2. Drought tolerant varieties- CoV 92102, CoC 90063, Co Si(Sc)6,Co G (Sc)5, Co C (Sc)22, CoC 24 TNAU SC Si7, TNAU SC Si 8 3. Raised beds at 30 cm intervals with Length - 5 m, Width - 80 cm	OFT and FLD on Demonstration for preparation of raised beds and plant protection measures.

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
				and Height -15 cm. 4. Irrigate the crop depending upon the need during different phases of the crop. Recommended N & K @ of 275 and 112.5 kg. ha^{-1} may be applied in 14 equal splits with 15 days interval from 15 DAP. 5. Setts should be soaked in 100 liters of water dissolved with 50g Carbendazim, 200 ml Malathion and 1 kg urea for 15 minutes or treat setts with aerated steam at 50°C for one hour to control primary infection of grassy shoot disease 6. Paired row system of planting double side planting of sugarcane setts with 150 + 30 cm spacing for Astraf 8000 series (Mechanical harvester) operated areas and 150 + 30 cm spacing for New Holland 4000 series operated areas may be adopted with single row of cane planting. 7. Intercropping of daincha or sunnhemp along ridges and incorporation of the same on the 45th day during partial earthing up helps to increase the soil fertility, and also the cane yield. Especially Intercropping of Co.1 Soybean	

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
				gives a yield of 800 kg/ha without any adverse effect on cane yield. 8. 50 kg /ha of micronutrient mixture containing 20 kg Ferrous sulphate,10 kg Manganese sulphate, 10 kg Zinc sulphate, 5 kg of Copper sulphate, 5 kg of Borax mixed with 100 kg of well decomposed FYM, can be recommended as soil application prior to planting or Apply TNAU MN mixture @ 50 kg/ha as EFYM for higher cane yield. 9. Spraying of Sodium metasilicate 4 kg/ha in 750 litres of water on the foliage of crop at 6, 8 & 10th month after planting will enhance cane yield and sugar percentage 10. Adoption of sett treatment with Carbendazim before planting (Carbendazim 50 WP @ 0.05% or Carbendazim 25 DS @ 0.1% along with 1.0% Urea for 5 minutes) to control red rot disease. 11. Sett treatment with fungicides *viz*., Triadimefon @ 0.1% or Carbendazim @ 0.1% for 10 minutes or Treating the seed setts with Aerated Steam Therapy (AST) at 50 ºC for 1 hour or in hot water at 50 ºC for 30 minutes or at 52 ºC for 18 minutes to control smut disease. 12. Spraying of Fipronil 5%SC 1500-	

Sl. No	Major crops & enterprises being practiced in the district	Prioritized problems in these crops/ enterprise	Title of intervention	Technology options	Proposed Intervention (OFT, FLD, Training, extension activity etc.)
				2000 ml/ha or Fipronil 0.3%GR 25-33.3 Kg/ha or Quinalphos 25%EC 2000 ml/ha or intercropping of daincha in sugarcane can lower the shoot borer incidence. 13. Dip the setts in Imidacloprid 70 WS 0.1% or Chlorpyriphos 20 EC 0.04 % for 5 minute or Imidacloprid 17.8% SL 350 ml/ha or Chlorpyriphos 20%EC 750 ml/ha to control termite infestation. 14. TNAU mechanical planter is useful for cost effective planting with saving of Rs.3750 / ha and it can cover an area of 1.5ha/day	

CHAPTER IV

DISTRICT PLAN

The interventions proposed, the associated outlays, the physical targets, budgetary requirements, time frame for achievements in the Agriculture, Agricultural Research, Horticulture, Agricultural Engineering, Agricultural Marketing, Seed and organic Certification, Animal Husbandry, Dairy Development, Fisheries, Fisheries Research, Public Welfare Department and Cooperation and Civil Supplies sectors are discussed in this chapter. This would comprehend the activities and the achievements to be made in beyond twelfth plan.

4.1. Agriculture

The development of agriculture sector has been aimed at by mainly pushing up the productivity levels of the major crops *viz.,* Rice, Millets, Pulses, Oilseed, Oil palm, Cotton, Sugarcane, Coconut and others interventions like training, infrastructure development, soil health management, rainfed area development, integrated pest management, farm mechanization, state seed farms and agricultural information technology in the district. Activities planned for and the costs involved under each crop are detailed below.

4.1.1. Enhancing the Paddy productivity in Cuddalore District

In the recent years, while the area under paddy had declined, the productivity has become almost stagnant. Therefore, there is a need to increase the productivity of rice to feed the growing population. The aim must be to raise the productivity level in paddy to the extent of 3 to 5 per cent, by making the farmers aware of the available improved production technologies and adopt the same for increasing productivity in paddy.

Project components

- ✓ Promotion of SRI and Direct sown paddy with seed drill has to implement in all the blocks of Cuddalore district.
- ✓ Distribution of MN mixture, biofertilizer, zinc sulphate and Polyvinyl coated tarpaulin have to implement in all blocks.
- ✓ Distribution of certified seeds covering all blocks.
- ✓ Certified seed production and incentives for paddy machine planting have to implement in all blocks except Nallur.
- ✓ Distribution of herbicide in all blocks except Kammapuram, Keerapalayam, Kumaratchi and Mel bhuvanagiri.

- ✓ Distribution of hybrid seeds has to implement in Cuddalore, Kattumannarkoil, Kurinjipadi, Mangalur, Parangipettai and Vridhachalam blocks.

Budget

The budget requirement for fulfilling the various interventions is **₹ 13661.75 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in Table 4.1.

Expected outcome

Supply of quality seeds of certified varieties will certainly increase the production and productivity. Reduction in cost of cultivation of crops due to supply of fertilizers and plant protection chemicals at a cost lower than market price. Assured supply of fertilizers and plant protection chemicals even in the condition of shortage of supply in market.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.1 Budget Requirement for Rice Crop in Cuddalore District

(₹. in lakhs)

Sl. No	Interventions	Unit	Unit Cost (in Rs.)	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Promotion of SRI	Ha	15000	All Blocks	2810	421.50	3270	490.50	3770	565.50	4120	618.00	4470	670.50	18440	2766.00
2	Distribution of High Yielding Varieties	MT	35000	All Blocks	565	197.75	570	199.50	592	207.20	585	204.75	417	145.95	2729	955.15
3	Distribution of Foundation seeds	MT	40000	All Blocks	119	47.44	119	47.44	120	48.04	122	48.64	122	48.64	601	240.20
4	seed production - Foundation	MT	32000	All Blocks except B1, B11, B12	246	78.72	246	78.72	252	80.64	255	81.60	261	83.52	1260	403.20
5	seed production - Certified class	MT	26000	All Blocks	515	133.90	567	147.42	580	150.80	582	151.32	585	152.10	2829	735.54
6	Incentives for paddy machine planting	Ha	10000	All Blocks except B10	9600	960.00	9850	985.00	10200	1020.00	10350	1035.00	10950	1095.00	50950	5095.00
7	Distribution of Protray	No	80	All Blocks	7300	5.84	10300	8.24	12600	10.08	12900	10.32	13200	10.56	56300	45.04
8	Distribution of MN mixture/ Copper Sulphate	Ha	1000	All Blocks	7400	74.00	7650	76.50	7800	78.00	7950	79.50	8100	81.00	38900	389.00
9	Distribution of biofertilizer / PPFM / bioinputs / plant nutrient mobilizing bacteria	Ha	300	All Blocks	4770	14.31	6500	19.50	6650	19.95	6800	20.40	6950	20.85	31670	95.01
10	Distribution of Zinc sulphate (Soil application & foliar)	Ha.	1000	All Blocks	4710	47.10	5700	57.00	5850	58.50	6000	60.00	6150	61.50	28410	284.10
11	Distribution of biocontrol agents/biopestici	Ha..	1000	All Blocks	2050	20.50	3100	31.00	3250	32.50	3400	34.00	3550	35.50	15350	153.50

Sl. No	Interventions	Unit	Unit Cost (in Rs.)	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	des															
12	Gypsum application	Ha.	1500	All Blocks	5300	79.50	5450	81.75	5600	84.00	5750	86.25	5900	88.50	28000	420.00
13	Distribution of herbicides	Ha.	1000	All blocks except B3, B5, B6, B9	2250	22.50	2300	23.00	2375	23.75	2450	24.50	2450	24.50	11825	118.25
14	Hybrid Rice seed distribution	Ha	4000	B2, B4, B7, B8, B12, B13	81	3.24	111	4.44	156	6.24	171	6.84	231	9.24	750	30.00
15	Polyvinyl coated Tarpaulin (6m x 5m)	No.	2000	All Blocks	290	5.80	375	7.50	385	7.70	390	7.80	390	7.80	1830	36.60
16	Direct sown paddy with seed drill	Ha	7000	All Blocks	3098	216.86	5630	394.10	5660	396.20	5470	382.90	5430	380.10	25288	1770.16
17	Establishment of community paddy nursery	ha	0.25	All Blocks	20	5.00	20	5.00	20	5.00	20	5.00	20	5.00	20	25.00
18	Demonstration of drip irrigation	ha	100000	All Blocks	20	20.00	20	20.00	20	20.00	20	20.00	20	20.00	100	100.00
	Total					**2353.96**		**2676.61**		**2814.10**		**2876.82**		**2940.26**		**13661.75**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.2. Enhancing the millets productivity in Cuddalore District

Declining trends in area and production of major and minor millets are observed in the recent years. On the other hand, the nutritive value of these millets are well recognized by the consumers, particularly at the mid and high income brackets in the recent times. The aim must be to grow millets especially minor ones under larger area including sub marginal lands, so as to meet the growing demand. The strategies are by utilizing the sub-marginal and relatively waste lands and with the application of latest production technologies, the production of millets (major and minor) would be increased.

Project components

- ✓ Demonstration (supply of seed, seed treatment & MN mixture) has to implement in all blocks.
- ✓ Distribution of biofertilizers Liquid / Carrier have to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Distribution of herbicides has to implement in Cuddalore, Kammapuram, Kurinjipadi, Mangalur, Nallur, Panruti and Vridhachalam blocks.
- ✓ Drip irrigation for maize have to implement in Nallur block.
- ✓ Distribution of LPG operated Bird Scarer for Millets have to implement in Cuddalore, Kammapuram, Mangalur, Kurinjipadi, Nallur and Vridhachalam Blocks.
- ✓ Formation of Small Millet group has to implement in Mangalur Block.
- ✓ Distribution of Maize Maxim has to implement in Cuddlaore, Kammapuram, Kurinjipadi, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Distribution of Maize hybrid has to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi, Mangalur, Panruti and Vridhachalam blocks.
- ✓ Distribution of Cumbu hybrid seeds have to implement in Annagramam, Cuddalore, Kurinjipadi and Panruti Blocks.

Budget

The total cost of the project for five years works to **₹ 54915.52 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.2**.

Expected outcome

There is a scope to increase the area under millets in Cuddalore district. By distributing improved varieties / hybrids of millets will certainly improve the living standard of the farmers of this tract. Supply of quality seeds of newly released varieties will certainly increase the production and productivity.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.2 Budget Requirement for Millets in Cuddalore District

(₹. in lakhs)

Sl. No.	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Millets															
1	Distribution of LPG operated Bird Scarrer	Nos.	0.1	B2, B4, B7, B8, B10, B13	8	0.80	8	0.80	8	0.80	11	1.10	11	1.10	46	4.60
2	Distribution on biofertilizer - Liquid / Carrier	Ha	0.003	B2, B4, B7, B8, B10, B13	550	1.65	625	1.88	625	1.88	700	2.10	700	2.10	3200	9.60
3	Expansion of area under Minor Millets (Demo - supply of seed, seed treatment, MN mixture & Organic package)	Ha	0.05	All Blocks except B1	244	12.20	279	13.95	314	15.70	344	17.20	409	20.45	1590	79.50
4	Formation of small millet groups	Nos.	0.2	B8	1	0.20	1	0.20	1	0.20	1	0.20	1	0.20	5	1.00
5	Millet Processing unit - Minor millet	Nos.	2.5		0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6	Seed Production / Incentives for quality seed	MT	0.63	B7, B11	2	1.26	2	1.26	2	1.26	2	1.26	2	1.26	10	6.30
7	Initiative for Nutritional Security through Intensive Millet Promotion (INSIMP)	ha	0.04	All Blocks	300	12.00	300	12.00	300	12.00	300	12.00	300	12.00	1500	60.00
	Maize															
8	Demonstration (Supply of seed, seed treatment & MN mixture, organic package)	Ha	0.05	B2, B4, B7, B8, B10, B13	280	14.00	380	19.00	440	22.00	530	26.50	580	29.00	2210	110.50

Sl. No.	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
9	Distribution of biofertilizers - Liquid / Carrier	Ha	0.003	B1, B2, B4, B7, B8, B10, B11, B13	1020	3.06	1200	3.60	1260	3.78	1420	4.26	1470	4.41	6370	19.11
10	Distribution of herbicides	Ha	0.008	B2, B4, B7, B8, B10, B13	240	1.92	240	1.92	290	2.32	340	2.72	390	3.12	1500	12.00
11	Distribution of Maize maxim (15 kg/ha)	Ha	0.045	B2, B4, B7, B8, B10, B13	190	8.55	210	9.45	260	11.70	260	11.70	310	13.95	1230	55.35
12	Drip irrigation for maize	Ha	1	B10	1	1.00	1	1.00	1	1.00	1	1.00	1	1.00	5	5.00
13	Seed Distribution	MT	0.4	B2, B4, B7, B8, B10, B13	41	16.40	41	16.40	41	16.40	41	16.40	41	16.40	205	82.00
14	Seed Distribution Hybrid seeds for maize	MT	1.8	B1, B2, B4, B7, B8, B10, B11, B13	5577	10038.60	5782	10407.60	5857	10542.60	5924	10663.20	6047	10884.60	29187	52536.60
	Cumbu															
15	Demonstration (Supply of seed, seed treatment & MN mixture, organic package)	Ha	0.05	B2, B4, B7, B13	10	0.50	610	30.50	810	40.50	910	45.50	1010	50.50	3350	167.50
16	Distribution of biofertilizers Liquid / Carrier	Ha	0.003	B1, B2, B4, B7, B11, B13	120	0.36	420	1.26	470	1.41	520	1.56	620	1.86	2150	6.45
17	Distribution of cumbu hybrid seed	MT	2.6	B1, B2, B7, B11	101	261.30	102	263.90	103	266.50	104	269.10	105	271.70	513	1332.50
18	Distribution of MN mixture (12.5kg/ha)	Ha	0.007	B2, B4, B7, B13	20	0.14	420	2.94	520	3.64	620	4.34	720	5.04	2300	16.10

Sl. No.	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
19	Seed Distribution	MT	0.53	B1, B2, B4, B7, B11, B13	140	74.20	140	74.20	140	74.20	140	74.20	140	74.20	700	371.00
	Ragi															
20	Demonstration (supply of seed, seed treatment, MN mixture & organic package)	Ha	0.05	B2, B7	10	0.50	10	0.50	10	0.50	10	0.50	10	0.50	50	2.50
21	Distribution of biofertilizers - Liquid / Carrier	Ha	0.003	B1, B2, B7, B11	60	0.18	60	0.18	60	0.18	60	0.18	60	0.18	300	0.90
22	Distribution of MN mixture	Ha	0.007	B2, B7	20	0.14	20	0.14	20	0.14	20	0.14	20	0.14	100	0.70
23	Seed Distribution	MT	0.66	B1, B2, B7, B11	11	7.26	11	7.26	11	7.26	11	7.26	11	7.26	55	36.30
	Total					**10456.22**		**10869.94**		**11025.97**		**11162.42**		**11400.97**		**54915.52**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.3. Enhancing the pulses productivity in Cuddalore District

Pulses are in short supply with sky rocketing prices as compared to the growing demand. Hence, there is a need for increasing pulses in the near future. The targets are aimed to increase pulses production by increasing area and productivity through the adoption of appropriate technologies. The strategy must be through area expansion and increased productivity in the rice fallows of all river basins as well as in the non - ayacut areas as a pure crop.

Project components

- ✓ Promotion of breeder seeds in Melbhuvanagiri block.
- ✓ Production and Distribution of foundation/certified pulses seeds have to implement in all blocks.
- ✓ Distribution of certified seeds, weedicide and plant protection chemicals covering all blocks except Kammapuram, Keerapalayam, Kumaratchi and Melbhuvanagiri blocks.
- ✓ Distribution of biofertilizer (Rhizobium + Phosphobacteria) - liquid / carrier covering all blocks except Kammapuram and Melbhuvanagiri blocks.
- ✓ Cropping system based demonstration have to be provide for all blocks.
- ✓ Pure crop demonstration - black gram and green gram covering all blocks except Keerapalayam, Kumaratchi and Melbhuvanagiri blocks.
- ✓ Promotion of redgram transplantation for nursery preparation have to implement in Kattumanarkoil, Mangalur and Vridhachalam blocks.
- ✓ Demonostration on Intercropping of pulses with other crops have to be provide in all blocks except Kattumannarkoil, Melbhuvanagiri and Parangipettai blocks.
- ✓ Demonstration through NGO have to be given in all blocks except Kattumannarkoi, Keerapalayam, Kumaratchi, Melbhuvanagiri and Nallur blocks.
- ✓ DAP spray and distribution of gypsum have to implement in all Blocks.
- ✓ Pulse wonder have to implement in all blocks except Kattumannarkoil, Keerapalayam, Kumaratchi and Melbhuvanagiri blocks.
- ✓ Supply of plant protection chemicals have to be provide in all blocks except Kattumannarkoil, Keerapalayam, Kumaratchi and Melbhuvanagiri.
- ✓ Seed treatment and Soil application with T.Viride/Pseudomonas fluorescens have to be distribute in all blocks except Keerapalayam, Kumaratchi and Melbhuvanagiri.

Budget

The total budget for the proposed intervention is **₹ 4644.06 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.3**.

Expected outcome

The timely supply of seed material of ruling varieties and distribution of machineries through Department of Agriculture at block level will facilitate the farmers to adopt high yielding varieties in turn to get higher income.

Implementing agency

The projects will be implemented by the Department of Agriculture

Table 4.3. Budget Requirement for Pulses in Cuddalore District

(₹. in lakhs)

Sl. No.	Interventions	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Purchase of breeder seeds	MT	250000	B9	3	7.50	3	7.50	3	7.50	3	7.50	3	7.50	15	37.50
2	Production of Foundation/ Certified pulses seeds	MT	86000	All Blocks	280	240.80	257	221.02	270	232.20	285	245.10	285	245.10	1377	1184.22
3	Distribution of Certified Seeds	MT	100000	All Blocks except B3, B5, B6, B9	200	200.00	182	182.00	161	161.00	230	230.00	230	230.00	1003	1003.00
4	Distribution of Gypsum	ha	400	All Blocks	3800	15.20	5050	20.20	5300	21.20	5350	21.40	5550	22.20	25050	100.20
5	Distribution of Biofertilizer (Rhizobium + Phosphobacteria) - Liquid / Carrier	Ha	600	All Blocks except B3, B9	2850	17.10	2500	15.00	2750	16.50	2800	16.80	2800	16.80	13700	82.20
6	Distribution of Micro Nutrients(5 kgs/ Ha)	Ha	350	All Blocks except B3, B9	1750	6.13	2300	8.05	2550	8.93	2600	9.10	2600	9.10	11800	41.31
7	DAP Spray	Ha	700	All Blocks	6900	48.30	7900	55.30	8100	56.70	8500	59.50	9000	63.00	40400	282.80
8	Pulse wonder - 5 kg/ha	Ha	1000	All Blocks except B3, B5, B6, B9	1000	10.00	2100	21.00	2300	23.00	2500	25.00	2700	27.00	10600	106.00
9	Bund Cropping	Ha	300	All Blocks	1900	5.70	2250	6.75	2300	6.90	2400	7.20	2400	7.20	11250	33.75

Sl. No.	Interventions	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
10	Line sowing	Ha	2250	All Blocks except B3, B5, B6, B9, B10	500	11.25	850	19.13	900	20.25	950	21.38	1000	22.50	4200	94.51
11	Distribution of Yellow sticky trap /pheromone trap	ha	1000	All Blocks except B3, B5, B6, B10	130	1.30	780	7.80	830	8.30	880	8.80	930	9.30	3550	35.50
12	Cropping system based demonstration	Ha	12500	All Blocks	670	83.75	826	103.25	830	103.75	836	104.50	840	105.00	4002	500.25
13	Distribution of weedicide	Ha	1000	All Blocks except B3, B5, B6,B9	540	5.40	754	7.54	840	8.40	890	8.90	990	9.90	4014	40.14
14	Plant Protection Chemicals	Ha	1000	All Blocks except B3, B5, B6, B9	790	7.90	1040	10.40	1090	10.90	1140	11.40	1240	12.40	5300	53.00
15	Seed treatment and soil application with Trichoderma viride	Ha	700	All Blocks except B5, B6, B9	530	3.71	1930	13.51	1980	13.86	2030	14.21	2130	14.91	8600	60.20
16	Pure crop demonstration - Black gram and green gram	Ha	6300	All Blocks except B5, B6, B9	745	46.94	995	62.69	1045	65.84	1095	68.99	1195	75.29	5075	319.75

Sl. No.	Interventions	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
17	Demonstration on intercropping of pulses with other crops	Ha	8300	All Blocks except B3, B9, B12	375	31.13	1425	118.28	1475	122.43	1525	126.58	1575	130.73	6375	529.15
18	Demonstration on pulses production	Ha	8250	All Blocks except B3, B5, B6, B9 B10	594	49.01	110	9.08	130	10.73	150	12.38	150	12.38	1134	93.58
19	Promotion of Redgram Transplantation for nursery preparation	Ha	5000	B4, B8, B13	35	1.75	45	2.25	55	2.75	65	3.25	65	3.25	265	13.25
20	Seed treatment with chemicals	Ha	250	All Blocks except B6, B9	2700	6.75	2700	6.75	2700	6.75	2700	6.75	2700	6.75	13500	33.75
	Total					**799.62**		**897.50**		**907.89**		**1008.74**		**1030.31**		**4644.06**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.4. Enhancing the oilseeds productivity in Cuddalore District

In the recent past, the down-trend in the area under groundnut and sesame was observed. The area expansion under sunflower in the recent time is quite encouraging. It should be aimed to increase production of oilseeds through area expansion and productivity increase. And the strategy should be in increasing the area coverage and productivity through improved crop production technologies.

Project components

- ✓ Certified seed and foundation seed production have to implement in all blocks except Kattumanrakoil, Keerapalyayam, Kumaratchi and Melbhuvanagiri.
- ✓ Promotions of breeder seeds have to implement in Annagramam, Cuddalore and Panruti blocks.
- ✓ Polythene mulch inclusive of erection hve to implement in Annagramam, Cuddalore, Kammapuram, Mangalur, Nallur, Panruti and Vridhachalam blocks.
- ✓ Distribution of certified seeds, MN mixture, gypsum and liquid biofertilizer have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi and Melbhuvanagiri.
- ✓ Application of herbicide, bio pesticide/fungicide has to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi and Melbhuvanagiri.
- ✓ Bund cropping - castor have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi and Melbhuvanagiri.
- ✓ CBD – groundnut, Gingelly,Sunflower and Castor have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi and Melbhuvanagiri.

Budget

The total cost of the project for five years works to **₹. 5523.42 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.4**.

Expected outcome

The supply of good quality seeds, planting materials, and distribution of micronutrients, gypsum and bio-fertilizers will enhance the production and productivity of oilseeds.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.4 Budget Requirement for Oilseeds in Cuddalore District

(₹. in lakhs)

Sl. No	Components	Unit	Unit Cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
I	**OILSEEDS**															
1	Purchase of Breeder seed	Mt	1.50	B1, B2, B11	6.00	9.00	6.00	9.00	6.00	9.00	6.00	9.00	6.00	9.00	30.00	45.00
2	Polythene mulch Inclusive of erection	Ha	0.50	B1, B2, B4, B8, B10, B11, B13	17.00	8.50	21.00	10.50	27.00	13.50	27.00	13.50	27.00	13.50	119.00	59.50
3	Herbicide	Ha	0.01	B1, B2, B4, B8, B10, B11, B13	375.00	3.75	445.00	4.45	495.00	4.95	545.00	5.45	595.00	5.95	2455.00	24.55
4	Light trap (NCIPM) / Pink Boll	Nos.	0.01	B1, B2, B4, B8, B10, B11,	190.00	1.90	340.00	3.40	340.00	3.40	360.00	3.60	390.00	3.90	1620.00	16.20
5	Bio pesticide/fungicide	Ha	0.01	B1, B2, B4, B8, B10, B11, B13	240.00	2.40	340.00	3.40	390.00	3.90	440.00	4.40	490.00	4.90	1900.00	19.00
6	Compact Block Demonstration - Groundnut	Ha	0.20	B1, B2, B4, B8, B10, B13	265.00	53.00	275.00	55.00	295.00	59.00	315.00	63.00	315.00	63.00	1465.00	293.00
7	Compact Block Demonstration - Gingelly / Castor	Ha	0.06	B1, B2, B4, B8, B11, B13	50.00	3.00	70.00	4.20	90.00	5.40	110.00	6.60	130.00	7.80	450.00	27.00
8	Microirrigation (Raingun / Microsprinkler)	Ha	0.55	All Blocks	50.00	27.50	50.00	27.50	50.00	27.50	50.00	27.50	50.00	27.50	250.00	137.50
9	Distribution of IPM kit	Nos.	0.10	All Blocks	1000.00	100.00	1000.00	100.00	500.00	50.00	500.00	50.00	500.00	50.00	3500.00	350.00

Sl. No	Components	Unit	Unit Cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
10	Growth regulator / DAP	ha	0.01	All Blocks	500.00	2.50	100.00	0.50	100.00	0.50	250.00	1.25	250.00	1.25	1200.00	6.00
	GROUNDNUT															
11	Strengthening seed chain by foundation seed production	Mt	0.76	B1, B2, B4, B7, B8, B10, B11, B12, B13	118.00	89.68	94.40	71.74	94.40	71.74	94.40	71.74	94.40	71.74	495.60	376.64
12	Strengthening seed chain by certified seed production	Mt	0.73	B1, B2, B4, B7, B8, B10, B11, B12, B13	479.00	349.67	251.00	183.23	251.00	183.23	251.00	183.23	251.00	183.23	1483.00	1082.59
13	Distribution of Certified seeds	Mt	0.84	B1, B2, B4, B7, B8, B10, B11, B12, B13	630.00	529.20	456.00	383.04	456.00	383.04	456.00	383.04	456.00	383.04	2454.00	2061.36
14	Distribution of Seed Treatment Chemicals and Bioagents (T.Viride)	Kg	0.00	B1, B2, B4, B7, B8, B10, B11,B13	450.00	0.68	1050.00	1.58	1050.00	1.58	1050.00	1.58	1050.00	1.58	4650.00	7.00
15	Application of Gypsum to Groundnut Crop	Ha	0.02	B1, B2, B4, B7, B8, B10, B11, B12, B13	1290.00	20.64	2350.00	37.60	2550.00	40.80	2750.00	44.00	2750.00	44.00	11690.00	187.04
16	Distribution of Micro Nutrient Mixture	Ha	0.02	B1, B2, B4, B7, B8, B10, B11, B12, B13	2200.00	33.00	2700.00	40.50	2750.00	41.25	2800.00	42.00	2900.00	43.50	13350.00	200.25

Sl. No	Components	Unit	Unit Cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
17	Distribution of Biofertilizer	Ha	0.01	B1, B2, B4, B7, B8, B10, B11, B12, B13	1046.00	6.28	1450.00	8.70	1550.00	9.30	1650.00	9.90	1850.00	11.10	7546.00	45.28
18	Distribution of Liquid Biofertilizer	Ha	0.01	B1, B2, B4, B7, B8, B10, B11, B12, B13	1250.00	7.50	1550.00	9.30	1650.00	9.90	1750.00	10.50	1850.00	11.10	8050.00	48.30
19	Distribution of Rhizobium/ PSB Culture	Ha	0.01	B1, B2, B7, B10, B12	350.00	2.10	350.00	2.10	350.00	2.10	350.00	2.10	350.00	2.10	1750.00	10.50
20	Distribution of Pheromone Traps	Nos.	0.02	B1, B2, B4, B7, B8, B10, B11, B12, B13	195.00	3.90	305.00	6.10	325.00	6.50	345.00	6.90	345.00	6.90	1515.00	30.30
21	Distribution of Light Traps	Nos.	0.02	B1, B2, B4, B7, B8, B10, B11, B12, B13	195.00	3.90	305.00	6.10	325.00	6.50	345.00	6.90	345.00	6.90	1515.00	30.30
22	Castor as Bund crop	Ha	0.01	B1, B2, B4, B7, B8, B10, B11, B12, B13	45.00	0.27	245.00	1.47	249.00	1.49	255.00	1.53	255.00	1.53	1049.00	6.29
23	Combined Nutrient Spray	Ha	0.02	B1, B2, B4, B7, B8, B10, B11, B12, B13	335.00	5.03	635.00	9.53	685.00	10.28	735.00	11.03	735.00	11.03	3125.00	46.88
24	Seed Drill Sowing / Line sowing of Groundnut with Pulses as intercrop (hiring	Ha	0.03	B1, B2, B4, B7, B8, B10, B11, B12, B13	270.00	8.10	470.00	14.10	520.00	15.60	720.00	21.60	770.00	23.10	2750.00	82.50

Sl. No	Components	Unit	Unit Cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	charges only)															
25	Production of Foundation Seeds	Mt	1.13	B1, B2, B4, B7, B8, B10, B11, B13	12.60	14.24	11.60	13.11	11.80	13.33	12.00	13.56	12.20	13.79	60.20	68.03
26	Production of Certified Seeds	Mt	1.09	B1, B2, B4, B7, B8, B10, B11, B13	14.40	15.70	14.80	16.13	14.80	16.13	14.80	16.13	14.80	16.13	73.60	80.22
27	Distribution of certified seeds	Mt	1.25	B1, B2, B4, B7, B8, B10, B11, B13	25.00	31.25	25.40	31.75	25.60	32.00	25.80	32.25	26.00	32.50	127.80	159.75
28	Distribution of Micro nutrients (Manganese sulphate/ Zinc sulphate)	Ha	0.00	B1, B2, B4, B7, B8, B10, B11, B13	495.00	1.98	725.00	2.90	745.00	2.98	795.00	3.18	845.00	3.38	3605.00	14.42
	CASTOR															
29	Production of Foundation Seeds	Mt	0.52	B10	1.00	0.52	1.00	0.52	1.00	0.52	1.00	0.52	1.00	0.52	5.00	2.60
30	Production of Certified Seeds	Mt	0.50	B10	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50	5.00	2.50
31	Distribution of certified seeds	Mt	0.58	B10	1.00	0.58	1.00	0.58	1.00	0.58	1.00	0.58	1.00	0.58	5.00	2.90
	Total					**1336.27**		**1058.53**		**1026.50**		**1047.07**		**1055.05**		**5523.42**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.5. Enhancing the oil palm productivity in Cuddalore District

India is the largest consumer of palm oil in the world, consuming around 17 per cent of total world consumption. India is also the largest importer of palm oil amounting to 44 per cent of world imports. Palm Oil contains an equal proportion of saturated and unsaturated fatty acid containing about 40 per cent oleic acid, 10 per cent linoleic acid, 44 per cent palmitic acid and 5 per cent stearic acid. The unprocessed palm oil is used for cooking in various countries. Palm Oil is a very rich source of Beta Carotene, an important source of Vitamin A and it contains Tecopherols and Tocotrienols, a natural source of Vitamin E. Vitamin A and Vitamin E contents are the highest in palm oil in comparison with any other types of oil and hence consumption of the same boosts health. By virtue of the high vitamin contents the Red Palm Oil is a nature's gift for the human beings. In view of the rich content of vitamins, palm oil can be utilized for the preparation of cosmetics as well there is a need to promote oil palm by the way of area expansion and better cultivation practices, it is equally important to focus on innovative growth strategies through National Mission on Oilseeds and Oil Palm (NMOOP) has been launched in which Mini Mission-II (MM-II) is dedicated to oil palm area expansion and productivity increases. MM-II of NMOOP and MM-III of NMOOP is being implemented in 13 States *viz,* Tamil Nadu, Andhra Pradesh, Assam, Arunachal Pradesh, Chhattisgarh, Gujarat, Karnataka, Kerala, Mizoram, Nagaland, Odisha, Telangana, and West Bengal.

Project components

- ✓ Oil palm area expansion programme and construction of bore wells have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi, Parangipetai and Melbhuvanagiri.
- ✓ Inputs for intercropping and Cultivation maintenance have to implement in all blocks.
- ✓ Supply of diesel pumps have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi, Parangipettai and Melbhuvanagiri.
- ✓ Supply of aluminium ladder, wire mesh and oil palm cuter have to implement in all blocks except Kattumannarkoil, Keerapalaym, Kumaratchi, Parangipettai and Melbhuvanagiri.
- ✓ NMOOP-Mini mission III (Neem/ Pungam Area Expansion Programme, Cultivation maintenance, and Inputs for Inter cropping) Covering all blocks.

Budget

It is proposed to incur **₹ 325.39 Lakhs** over a period of five years **(Table 4.5)** with the finance facilities under the NADP and other sources.

Expected outcome

The expected outcome of the project will result in an increase in the production of oil palm for producing oil and major supply of quality raw material to the oilseed industry which will improve the income of the farmers and requirement of oilseeds.

Implementing agency

Department of Agriculture will implement the project

Table 4.5 Budget Requirement for Oil palm in Cuddalore District

(₹ in lakhs)

Sl. No	Components	Unit	Unit Cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	NMOOP -Mini Mission -II (Oilpalm)															
2	Oilpalm Area Expansion Programme	Ha	0.14	B1, B2, B4, B7, B8, B10, B11, B13	110	15.40	80	11.20	90	12.60	90	12.60	90	12.60	460	64.40
3	Cultivation maintenance	Ha	0.1	All Blocks	153	15.30	103	10.30	103	10.30	113	11.30	113	11.30	585	58.50
4	Inputs for Intercropping	Ha	0.1	All Blocks	161	16.10	111	11.10	111	11.10	121	12.10	121	12.10	625	62.50
5	Supply of Diesel pumps	No	0.3	B1, B2, B4, B7, B8, B10, B11, B13	12	3.60	12	3.60	12	3.60	12	3.60	12	3.60	60	18.00
6	Construction of Borewells	No	1	B1, B2, B4, B7, B8, B10, B11, B13	5	5.00	5	5.00	5	5.00	7	7.00	5	5.00	27	27.00
7	Motorised Chisel	No	0.2	B1, B2, B4, B7, B8, B10, B11, B13	8	1.60	12	2.40	12	2.40	12	2.40	12	2.40	56	11.20
8	Alumium portable ladder	No	0.06	B1, B2, B4, B7, B8, B10, B11, B13	16	0.96	18	1.08	20	1.20	20	1.20	20	1.20	94	5.64
9	Wire mesh	No	0.1	B1, B2, B4, B7, B8, B10, B11, B13	17	1.70	27	2.70	27	2.70	27	2.70	27	2.70	125	12.50
10	Oilpalm Cutter	No	0.03	B1, B2, B4, B7, B8, B10, B11, B13	10	0.30	20	0.60	20	0.60	20	0.60	20	0.60	90	2.70
11	NMOOP -Mini Mission -III (Tree Borne Oilseeds)															
12	Neem/ Pungam Area Expansion Programme	Ha	0.2	All Blocks	44	8.80	44	8.80	44	8.80	44	8.80	44	8.80	220	44.00
13	Cultivation maintenance	Ha	0.05	All Blocks	10	0.50	41	2.05	41	2.05	41	2.05	41	2.05	174	8.70
14	Inputs for Intercropping	Ha	0.05	All Blocks	41	2.05	41	2.05	41	2.05	41	2.05	41	2.05	205	10.25
	Total					**71.31**		**60.88**		**62.4**		**66.4**		**64.4**		**325.39**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.6. Enhancing the cotton productivity in Cuddalore District

Cotton is produced on a limited area in this district (6886.33 ha). In the blocks of Vriddhachalam, Nallur, Mangalore cotton is raised in garden land area. Cotton is also raised in rice fallow in a few pockets of Coleroon ayacut. Therefore to increase the area and production in Cuddalore district, steps should be taken to encourage the farmers of garden land tract and rice fallow areas to grow cotton on more area with application of latest technologies.

Project components

- ✓ Distribution of MN mixture and biofertilizer has to implement in Kammapuram, Keerapalayam, Kumaratchi, Mangalur and Nallur blocks.
- ✓ Soil reclamation with gypsum have to implement in Nallur block.
- ✓ Distribution of PP chemicals, IPT, Biopesticides, Pheromne traps have to implement in Kammapuram, Keerapalayam, Kumaratchi, Mangalur and Nallur blocks.
- ✓ Distribution of Yellow sticky trap have to implement in Kammapuram, Keerapalayam, Kumaratchi, Mangalur and Nallur blocks.
- ✓ Application of weedicide and growth regulator covering Mangalur, Kammapuram and Nallur blocks.
- ✓ Frontline demo on ICM, Desi and ELS in cotton covering Mangalur, Kammapuram and Nallur blocks.
- ✓ Exposure visit, field days and Training have to conduct in Mangalur, Kammapuram and Nallur blocks.
- ✓ TNAU cotton plus have to distribute in Mangalur, Kammapuram and Nallur blocks.
- ✓ Intercropping with pulses have to practice at Mangalur, Kammapuram and Nallur blocks.
- ✓ Trails on High density planting system and Topping in cotton have to implement in Kammapuram and Mangalur blocks.
- ✓ Distribution of cotton picking machine have to implement in Kammapuram, Keerapalayam, Kumaratchi, Mangalur and Nallur blocks.

Budget

The total cost of the project for five years works to **₹ 1851.23 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.6**.

Expected outcome

The timely supply of inputs like MN mixture, biofertilizer, PP chemicals, weedicide and machineries will certainly increase the production and productivity of cotton.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.6 Budget Requirement for Cotton in Cuddalore District

(₹. in lakhs)

Sl. No	Components	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Cotton seed treatment	Ha	300	B4, B8, B10	100	0.30	350	1.05	500	1.50	600	1.80	700	2.10	2250	6.75
2	Demonstration of IPT	Ha	15000	B4, B5, B6, B8, B10	11	1.65	26	3.90	31	4.65	36	5.40	46	6.90	150	22.50
3	Distribution of biofertilizer	Ha	300	B4, B5, B6, B8, B10	600	1.80	750	2.25	850	2.55	950	2.85	1050	3.15	4200	12.60
4	Distribution of bio pesticides / Bio agents	Ha	1000	B4, B5, B6, B8, B10	400	4.00	550	5.50	625	6.25	700	7.00	800	8.00	3075	30.75
5	Distribution of cotton picking machine	No	5000	B4, B5, B6, B8, B10	3	0.15	8	0.40	8	0.40	13	0.65	12	0.60	44	2.20
6	Distribution of MN Mixture	Ha	1000	B4, B5, B6, B8, B10	500	5.00	800	8.00	900	9.00	1000	10.00	1100	11.00	4300	43.00
7	Distribution of Pheromone trap	No	6000	B4, B5, B6, B8, B10	150	9.00	250	15.00	300	18.00	350	21.00	400	24.00	1450	87.00
8	Distribution of PP chemicals	Ha	1000	B4, B5, B6, B8, B10	251	2.51	326	3.26	381	3.81	451	4.51	501	5.01	1910	19.10
9	Distribution of Yellow Sticky trap	No	3000	B4, B5, B6, B8, B10	30	0.90	75	2.25	90	2.70	130	3.90	135	4.05	460	13.80
10	Exposure visits	No	40000	B4, B8, B10	2	0.80	4	1.60	2	0.80	4	1.60	2	0.80	14	5.60
11	Farmers training	No	20000	B4, B8, B10	1	0.20	2	0.40	2	0.40	2	0.40	2	0.40	9	1.80
12	Field days	No	10000	B4, B8, B10	11	1.10	14	1.40	14	1.40	14	1.40	14	1.40	67	6.70
13	Intercropping with pulses	Ha	10000	B4, B8, B10	21	2.10	101	10.10	151	15.10	201	20.10	251	25.10	725	72.50
14	Soil reclamation with gypsum	Ha	1000	B10	100	1.00	100	1.00	100	1.00	100	1.00	100	1.00	500	5.00
15	TNAU Cotton plus distribution (6 Kg./ Ha)	Ha	1200	B4, B8, B10	0	0.00	100	1.20	150	1.80	200	2.40	250	3.00	700	8.40

Sl. No	Components	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
16	Frontline demo on ICM in cotton	Ha	7000	B4, B8, B10	1	0.07	9	0.63	16	1.12	16	1.12	26	1.82	68	4.76
17	Frontline Demo on Desi and ELS cotton seed production	Ha	8000	B4, B8, B10	0	0.00	4	0.32	4	0.32	4	0.32	4	0.32	16	1.28
18	Trials on High Density Planting system in cotton	Ha	9000	B4, B8	0	0.00	7	0.63	14	1.26	25	2.25	30	2.70	76	6.84
19	Application of weedicide	Ha	3000	B4, B8	0	0.00	225	6.75	310	9.30	400	12.00	475	14.25	1410	42.30
20	Spraying of growth regulator	Ha	3000	B4, B8, B10	1	0.03	171	5.13	231	6.93	291	8.73	351	10.53	1045	31.35
21	Topping of cotton	Ha	1000	B4, B8	300	3.00	500	5.00	600	6.00	800	8.00	1000	10.00	3200	32.00
22	Summer ploughing	Ha	7500	B4, B8, B10	200	15.00	4300	322.50	4550	341.25	4700	352.50	4850	363.75	18600	1395.00
	Grand total					**48.61**		**398.27**		**435.54**		**468.93**		**499.88**		**1851.23**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.7. Enhancing the sugarcane productivity in Cuddalore District

Sugarcane is one of the important cash crop and a perfect gift to mankind. The demand for sugarcane in the country is mainly for the purpose for which they are utilized in the various form for consumption. There exist wide variations in the productivity of sugarcane in Cuddalore district. In areas between Cuddalore and Neyveli, the yield levels are comparable with very good yield per hectare, while in other areas, the yield levels are considerably lower. The low yield per hectare in most of the areas in the district needs the application of science – based production technologies. So, the strategy must be to increase the yield per hectare, by the application of latest technologies and through infrastructure developments.

Project components

- ✓ Sustainable Sugarcane Initiative (Shade net establishment and distribution of single bud seedling), Trash mulching and Demo on intercropping in sugarcane covering all blocks.
- ✓ Distribution of micro nutrient mixture, biofertilizer, Trichogramma, Chip cutter, Feso4, Sugarcane booster has to implement in all blocks.
- ✓ Micro-irrigation – drip have to implement in all blocks.
- ✓ State level training in sugarcane cultivation has to conduct in Cuddalore and Kurinjipadi blocks.
- ✓ Distribution of weedicide and water soluble fertilizer has to implement in all blocks except Annagramam, Mangalur and Panruti.
- ✓ Distribution of zinc sulphate sprays in all blocks except Annagramam and Panruti.

Budget

The total cost of the project for five years works to **₹ 11891.96 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.7**.

Expected outcome

Fertility status of the soil will be improved by application of micronutrient mixture and biofertilizers. Hence assurance of nutritional sustainability will be kept. The timely supply of inputs will increase the production and productivity of sugarcane. Minimum of 5 to 10 tonnes increase in cane production per hectare could be achieved.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.7 Budget Requirement for Sugarcane in Cuddalore District

(₹. in lakhs)

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Distribution of Gypsum (500 Kg/Ha)	Ha	0.02	All blocks	210	4.20	1360	27.20	1360	27.20	1610	32.20	1860	37.20	6400	128.00
2	Distri. of biofertilizer (Ha)	Ha	0.006	All blocks	1100	6.60	1750	10.50	1750	10.50	2000	12.00	2250	13.50	8850	53.10
3	Distri. of weedicide (Ha)	Ha	0.01	All Blocks except B1, B8, B11	300	3.00	1050	10.50	1050	10.50	1300	13.00	1550	15.50	5250	52.50
4	Distribution of Chip Cutter	Nos	0.05	All blocks	21	1.05	86	4.30	81	4.05	86	4.30	86	4.30	360	18.00
5	Distribution of FeSO4 Spray	Ha	0.005	All blocks	1450	7.25	2100	10.50	2350	11.75	870	4.35	3100	15.50	9870	49.35
6	Distribution of ZnSO4 Spray	Ha	0.005	All Blocks except B1, B11	800	4.00	1050	5.25	1050	5.25	1300	6.50	1550	7.75	5750	28.75
7	Distribution of Micro Nutrient Mixture	Ha	0.02	All blocks	1050	21.00	1575	31.50	1575	31.50	1825	36.50	2075	41.50	8100	162.00
8	Distribution of Parasite Trichogramma	Ha	0.125	All blocks	650	0.81	1300	1.63	1300	1.63	1550	1.94	1800	2.25	6600	8.26
9	Distribution of Protray (2500 nos/ha)	Nos	0.008	All Blocks except B1, B10, B11	30100	24.08	30100	24.08	55100	44.08	55100	44.08	55100	44.08	225500	180.40
10	Distribution of Sugarcane Booster (10 Kg/Ha)	Ha	0.035	All blocks	640	22.40	990	34.65	990	34.65	1240	43.40	1490	52.15	5350	187.25
11	Distribution of Water Soluble Fertiliers	Ha	0.25	All Blocks except B1, B8, B11	41	10.25	541	135.25	666	166.50	791	197.75	1041	260.25	3080	770.00

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
12	Micro irrigation - Drip (1.2x0.6)	Ha	1.24	All blocks	1075	1333.0	900	1116.00	1050	1302.00	1150	1426.00	1150	1426.00	5325	6603.00
	Sustainable Sugarcane Initiative (SSI)															
13	A. Establishment of Shadenet	Nos	1.5	All blocks	66	99.00	45	67.50	45	67.50	55	82.50	55	82.50	266	399.00
14	B. Distribution of Single Bud Seedling	Ha	0.225	All blocks	1105	248.63	2605	586.13	2605	586.13	2605	586.13	2605	586.13	11525	2593.15
15	Trash Mulching	Ha	0.04	All blocks	1400	56.00	4750	190.00	2300	92.00	2550	102.00	2800	112.00	13800	552.00
16	Demonstration on intercropping in Sugarcane	Ha	0.08	All blocks	47	3.76	237	18.96	272	21.76	317	25.36	417	33.36	1290	103.20
17	State Level training in Sugarcane cultivation	No	0.4	B2, B7	2	0.80	2	0.80	2	0.80	2	0.80	2	0.80	10	4.00
						1845.83		**2274.75**		**2417.80**		**2618.81**		**2734.77**		**11891.96**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.8. Enhancing the coconut productivity in Cuddalore District

In Cuddalore, coconut occupies an area of 1881 ha. Yield decline due to old varieties causes economic loss to the farmers. Distribution of high yielding coconut seedlings from the State Horticulture Farm and Research Stations, Training and demonstrations on package of practices on coconut cultivation are essential to increase the coconut production in this district.

Project components

- ✓ Distribution of T × D hybrid seedlings and tall seedlings have to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi, Mangalur, Panruti, Parangipettai and Vridhachalam blocks.
- ✓ Training on neera production have to conduct in Annagramam, Cuddalore, Kurijipadi and Panruti blocks
- ✓ Distribution of solar copra drier and tree climbers have to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi and Panruti blocks.
- ✓ Collective farming - corpus fund release for FPG covering all blocks.
- ✓ Distribution of boom sprayer, power operated coconut leaf shedder have to implement in Cuddalore, Kammapuram and Kurinjipadi blocks.
- ✓ Control of Eriophid mite has to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi and Panruti blocks.
- ✓ Control of slug caterpillar has to implement in Cuddalore and Kurinjipadi blocks.
- ✓ Distributions of DXT hybrid seedling have to implement in Cuddalore and Kurinjipadi blocks.
- ✓ Distribution of MN mixture, Pheromone traps for red palm weevil/ Rhinocerous beetles covering Annagramam, Cuddalore, Kammapuram, Kurijipadi and Panruti blocks.
- ✓ Promotion of Drip irrigation and Intercropping with green manures has to implement in Annagramam, Cuddalore, Kammapuram, Kurijipadi and Panruti blocks.
- ✓ Management of Black headed caterpillar, Replanting and rejunavation of coconut garden have to implement in Annagramam, Cuddalore, Kammapuram, Kurinjipadi, Panruti and Parangipettai blocks.
- ✓ Thanjavur wilt management have to practice at Cuudalore and Kurinjipadi blocks.
- ✓ Distribution of coconut seedlings to school children’s have to implement in all blocks except Kattumannarkoil, Keerapalayam, Kumaratchi, Melbhuvanagiri and Nallur.
- ✓

Budget

The total cost of the project for five years works to **₹. 2151.53 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.8**.

Expected outcome

The implementation of the project will result in a minimum increase of coconut planting. This will help the coconut growing farmers to increase the area and productivity. This will help the employment opportunity and income of the farming community.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.8 Budget Requirement for Coconut in Cuddalore District **(₹. in lakhs)**

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Distribution of T x D hybrid seedlings	No	0.0006	B1, B2, B4, B7, B8, B11, B12, B13	2220	1.33	2320	1.39	2420	1.45	2520	1.51	2720	1.63	12200	7.31
2	Distribution of Tall Seedlings	No	0.0004	B1, B2, B4, B7, B8, B11, B12, B13	8000	3.20	7400	2.96	7600	3.04	7600	3.04	8000	3.20	38600	15.44
3	Boom sprayer	No	0.2000	B2, B4, B7, B8	11	2.20	11	2.20	12	2.40	11	2.20	12	2.40	57	11.40
4	Distribution of D x T hybrid Seedlings	No	0.0015	B2, B7	200	0.30	200	0.30	200	0.30	200	0.30	200	0.30	1000	1.50
5	Distribution of power operated coconut leaf shredder	No	0.6000	B2, B7	20	12.00	20	12.00	20	12.00	20	12.00	20	12.00	100	60.00
6	Distribution of MN mixture	Ha	0.1000	B1, B2, B4, B7, B11	55	5.50	155	15.50	155	15.50	160	16.00	160	16.00	685	68.50
7	Distribution of Pheromone traps for Red palm weevil/ Rhinocerous beetle	Ha	0.0160	B1, B2, B4, B7, B11	135	2.16	135	2.16	135	2.16	135	2.16	135	2.16	675	10.80
8	Distribution of power operated rocker sprayer	No	0.1000	B2, B4, B7	21	2.10	20	2.00	20	2.00	21	2.10	20	2.00	102	10.20
9	Distribution of Solar copra drier	No	0.2000	B2, B7	2	0.40	2	0.40	2	0.40	2	0.40	2	0.40	10	2.00
10	Distribution of tree climbers	No	0.1500	B1, B2, B4, B7, B11	22	3.30	22	3.30	24	3.60	25	3.75	25	3.75	118	17.70
11	Drip irrigation	Ha	0.3500	B1, B2, B4, B7, B11	20	7.00	30	10.50	30	10.50	30	10.50	30	10.50	140	49.00
12	Intercropping	Ha	0.0300	B1, B2,	100	3.00	200	6.00	200	6.00	200	6.00	200	6.00	900	27.00

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	with green manures			B4, B7, B11												
13	Management of Black headed caterpillar	Ha	0.0500	B1, B2, B4, B7, B11	100	5.00	120	6.00	120	6.00	120	6.00	120	6.00	580	29.00
14	Replanting and Rejunation of coconut gardens	Ha	0.4500	B1, B2, B4, B7, B11, B12	1	0.45	81	36.45	81	36.45	81	36.45	81	36.45	325	146.25
15	Thanjavur wilt management (root feeding /soil application)	Ha	0.0300	B2, B7	50	1.50	50	1.50	50	1.50	50	1.50	50	1.50	250	7.50
16	Demonstration on Integrated fertilizer management	Ha	0.7500	B1, B2, B4, B7, B8, B11, B12, B13	18	13.50	38	28.50	38	28.50	38	28.50	38	28.50	170	127.50
17	Distribution of coconut seedlings to school children	No	0.0004	B1, B2, B4, B7, B8, B11, B12, B13	1000	0.40	1300	0.52	1300	0.52	1500	0.60	1500	0.60	6600	2.64
18	Control of Eriophid mite	No. of tree	0.0002	B1, B2, B4, B7, B11	70	0.01	135	0.03	160	0.03	160	0.03	185	0.04	710	0.14
19	Control of slug caterpillar	No. of tree	0.0003	B2, B7	100	0.03	100	0.03	100	0.03	100	0.03	100	0.03	500	0.15
20	Training on neera production	Batches	0.2500	B1, B2, B7, B11	2	0.50	2	0.50	2	0.50	2	0.50	2	0.50	10	2.50
21	corpus fund release for FPG (2000 nos.)	No	5.0000	All Blocks	79	395.00	58	290.00	58	290.00	58	290.00	58	290.00	311	1555.00
	Grand Total					**458.88**		**422.24**		**422.88**		**423.57**		**423.96**		**2151.53**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.9. Enhancing the livelihood of farmers through training in Cuddalore District

Agricultural extension is being provided at the Block level and below, under the Extension Reforms scheme being implemented. Contact them or any other functionary of the State Government in Agriculture and allied departments to get answers for the queries, information about any Programme / Scheme and appropriate technologies for the area or individual farmer. The new information that farmers gain through these training sessions makes their daily farming activities much easier. It also leads to an increase in productivity and bigger profits in the long run.

Project components

- ✓ Exposure visit of farmers towards Within State and District, and Organization of Kisan gosthies on Soil test based nutrient application (Campaign) have to Organize in all blocks
- ✓ Interstate training of farmers has to implement in all blocks except Kammapuram block.
- ✓ Training of 536 Groups of Seed Village Farmers in quality Seed Production technology and Training of Farmers under Mission Soil Health Card have to implement in all blocks
- ✓ Awareness campaigns within district for Cotton, Groundnut, IFS, Major & Minor Millets, Moisture conservation practices oil Palm, Organic cultivation practices, Paddy, Pulses, Sugarcane and Value addition training have to conduct in all blocks

Budget

It is proposed to incur **₹ 714.76 Lakhs** over a period of five years **(Table 4.9)** with the finance facilities under the NADP and other sources.

Expected outcome

The project will result in better income to farmers. They may learn many things to update their knowledge of cultivation if they attend this programme which will further improve the income of the farmers.

Implementing agency

Department of Agriculture will implement the project and report the progress to the District-level officials.

Table 4.9 Budget Requirement for Training of Farmers in Cuddalore District

(₹ in lakhs)

Sl. No	Cafeteria of Activities	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Training of Farmers															
1	Inter State Training of Farmers	Nos.	1.75	All Blocks Except B4	14	17.5	14	17.50	14	17.50	14	17.50	14	17.50	70	87.50
2	Inter State Training of Farmers	Nos.	0.1	B2,B7,B10,B12	6	10.5	6	10.50	6	10.50	6	10.50	6	10.50	30	52.50
3	Training of 536 Groups of Seed Village Farmers in quality Seed Production technology.	Nos.	0.15	All Blocks	38	3.80	38	3.80	38	3.80	38	3.80	38	3.80	190	19.00
4	Training of Farmers under Mission Soil Health Card	Nos.	0.1	All Blocks	13	1.95	13	1.95	13	1.95	13	1.95	13	1.95	65	9.75
5	With in the district training of Farmers	Nos.	1.2	All Blocks	38	3.80	38	3.80	38	3.80	38	3.80	38	3.80	190	19.00
6	With in the State training of Farmers	1.2	14	All Blocks	16.8	14.00	16.8	14.00	16.8	14.00	16.8	14.00	16.8	70.00	84	126
	Training of Farmers With in the district															
7	Awareness campaigns	Nos.	0.1	All Blocks	258	25.80	260	26.00	260	26.00	262	26.20	265	26.50	1305	130.5
8	Cotton	Nos.	0.1	All Blocks	5	0.50	6	0.60	6	0.60	7	0.70	7	0.70	31	3.10
9	Groundnut	Nos.	0.1	All Blocks	19	1.90	19	1.90	19	1.90	19	1.90	19	1.90	95	9.50
10	IFS	Nos.	0.1	All Blocks	17	1.70	17	1.70	17	1.70	17	1.70	17	1.70	85	8.50
11	Major & Minor Millets	Nos.	0.1	All Blocks	22	2.20	22	2.20	22	2.20	22	2.20	22	2.20	110	11.00
12	Moisture conservation practices	Nos.	0.1	All Blocks	11	1.10	13	1.30	14	1.40	16	1.60	16	1.60	70	7.00

Sl. No	Cafeteria of Activities	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
13	oil Palm	Nos.	0.1	All Blocks	12	1.20	12	1.20	12	1.20	12	1.20	12	1.20	60	6.00
14	Organic cultivation practices	Nos.	0.1	All Blocks	17	1.7	19	1.9	22	2.20	22	2.20	22	2.20	102	10.20
15	Paddy	Nos.	0.1	All Blocks	27	2.70	27	2.70	27	2.70	27	2.70	27	2.70	135	13.50
16	Pulses	Nos.	0.1	All Blocks	27	2.70	27	2.70	27	2.70	27	2.70	27	2.70	135	13.50
17	Sugarcane	Nos.	0.1	All Blocks	17	1.70	17	1.70	17	1.70	17	1.70	17	1.70	85	8.50
18	Value addition training	Nos	0.4	All Blocks	17	1.70	27	2.70	32	3.20	37	3.70	27	2.70	140	14.00
	Exposure visit of Farmers															
19	Within State Exposure visit	Nos.	0.4	All Blocks	221	8.84	222	8.88	227	9.08	232	9.28	227	9.08	1129	45.16
20	Organization of Kisangosthies on Soil test based nutrient application (Campaign)	Nos.	0.15	All Blocks	17	6.80	17	6.80	17	6.80	17	6.80	17	6.80	85	34.00
21	Organization of Kisangosthies on Soil test based nutrient application (Campaign)	Nos.	0.15	All Blocks	84	12.60	85	12.75	86	12.90	86	12.90	86	12.90	427	64.05
22	Within the district exposure visit			All Blocks	28	4.20	29	4.35	30	4.50	31	4.65	32	4.80	150	22.50
	TOTAL					**128.89**		**130.93**		**132.33**		**133.68**		**188.93**		**714.76**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.10. Infrastructure Development in Cuddalore District

Quality control is the process of checking the quality of the material against the standard set by the organizations and if the material does not match with the standards, then such material is said to be substandard. Quality control laboratories are being established by the Government with an intention to supply quality inputs *viz.,* seed, fertilizers and pesticide and services like soil testing to the farmers. Storage Godown, Seed Processing Unit Machineries, Construction of Uzhavar Maiyam/Farmers Hub, IAEC and Sub-AEC, Strengthening of STL, MSTL, FCL, CCL, BFQCL, PTL, Organic Fertlizer Testing Lab and Bio-fertilizer production unit operating in the State are doing yeomen services to the farming community and public by providing technical advices and expertise for the holistic development of the farmers. They also prioritize their actions so as to ensuring food and nutritional security. However, they are not endeavored with adequate infrastructure, which is absolutely essential for growth and development. Strengthening the existing and creating new assets/amenities would bring profound influence on the constructive and technical services effectively.

Project components

- ✓ Additional Seed godown has to construct at Annagramam and Nallur blocks.
- ✓ Establishment of Threshing floor/drying yard, distribution of Dunnage, Moisture meter, Bag closure, Electronic platform balance, Seed rack, Tarpaulin, Office Furnishings and other amenities have to implement in all blocks.
- ✓ Construction of IAEC (383 Nos.) with vehicle shed and compound wall in Parangipettai block.
- ✓ Strengthening of STL in Kammapuram, Kurinjipadi and Vridhachalam Blocks.
- ✓ Construction of Sub AEC 498 no's at Annagramam, Cuddlaore, Kammapuram, Kurinjipadi, Nallur, Panruti, Parangeipettai and Vridhachalam blocks.

Budget

It is proposed to incur **₹ 4254.15 Lakhs** over a period of five years **(Table 4.10)** with the finance facilities under the NADP and other sources.

Expected outcome

The implementation of the above project will result in better activities which in turn results in better infrastructure facilities and higher agricultural production.

Implementing agency

Department of Agriculture will implement the project and report the progress to the District-level officials.

Table 4.10 Budget Requirement for Infrastructure Development in Cuddalore District

(₹ in lakhs)

Sl. No	Components	Unit	Unit Cost (in Rs.)	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Additional Seed Godown	Nos.	1250000	B1, B10	0	0.00	4	50.00	0	0.00	0	0.00	0	0.00	4	50.00
2	Construction of Integrated Agricultural Extension Centre with vehicle shed and compound wall	Nos.	25000000	B12	1	250.00	1	250.00	1	250.00	1	250.00	1	250.00	5	1250.00
3	Construction of Sub-Agricultural Extension Centre (498 Nos.)	Nos.	3000000	B1, B2, B4, B7, B10, B11, B12, B13	1	30.00	8	240.00	5	150.00	1	30.00	1	30.00	16	480.00
4	Strengthening of Soil Testing Laboratory	Nos.	6000000	B4, B7, B13	4	240.00	0	0.00	0	0.00	0	0.00	0	0.00	4	240.00
5	Establishment of Threshing floor/drying yard	Nos.	500000	All Blocks	0	0.00	60	300.00	60	300.00	60	300.00	60	300.00	240	1200.00
6	Dunnage	Nos.	7500	All Blocks	650	48.75	650	48.75	650	48.75	650	48.75	650	48.75	3250	243.75
7	Moisture meter	Nos.	25000	All Blocks	0	0.00	13	3.25	0	0.00	0	0.00	13	3.25	26	6.50
8	Bag closure	Nos.	10000	All Blocks	0	0.00	13	1.30	0	0.00	0	0.00	13	1.30	26	2.60
9	Electronic platform balance	Nos.	150000	All Blocks	0	0.00	13	19.50	0	0.00	0	0.00	13	19.50	26	39.00
10	Seed rack	Nos.	30000	All Blocks	0	0.00	13	3.90	0	0.00	0	0.00	13	3.90	26	7.80
11	Tarpaulin	Nos.	25000	All Blocks	0	0.00	65	16.25	0	0.00	0	0.00	65	16.25	130	32.50

Sl. No	Components	Unit	Unit Cost (in Rs.)	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
12	Office Furnishings and other amenities	Nos.	200000	All Blocks	0	0.00	13	26.00	0	0.00	0	0.00	13	26.00	26	52.00
13	Establishing state seed seed farm as model farm and technology demonstratin centres	Nos.	10000000	All Blocks	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	1	100.00
14	Strengthening of training institute / nursery / FTC / KVK	Nos.	50000000	B2	0	0.00	0	0.00	1	500.00	0	0.00	0	0.00	1	500.00
15	Infrastructure for empowerment of coconut nurseries	Nos.	5000000	All Blocks	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00	1	50.00
	Grand total					**568.75**		**1108.95**		**1248.75**		**628.75**		**698.95**		**4254.15**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.11. Soil Health Management in Cuddalore District

It has been observed that the average productivity of major crops in Tamil Nadu is only about 60 per cent of the potential yield. The reason may be due to decline in organic matter content of the soil of the State leading to low soil fertility. The availability of organic manures to farmers has become scanty and costly. The importance of FYM/Green manuring in maintaining the organic matter status of the soil has to be educated to the farmers. The total production of bio-fertilizers has to be stepped up to meet the growing demand. Similarly, crop based micronutrient mixtures need to be promoted. Soil amendments *viz.,* gypsum and lime have to be provided at a subsidized rate as a reclamation measure for the cultivable acid and alkali soils. Besides, efficient earthworm cultures should be provided for vermicompost unit by providing subsidy for establishment of vermicompost units with training in vermicompost.

Project component

- ✓ Reclamation of Acid and Alkali Soil in Annagramam, Cuddalore, Kammapuram, Kurinjipadi, Mangalur and Nallur blocks.
- ✓ Green manuring covering Cuddalore and Kurinjipadi blocks
- ✓ Adoption of PGS certification through cluster in Cuddalore and Kurinjipadi blocks.
- ✓ Model organic Villages have to implement in all blocks
- ✓ Establishment of permanent and HDPE vermicompost units have to implement in Cuddalore, Kammapuram, Kurinjipadi, Mangalur and Nallur blocks.
- ✓ Distribution of soil health card have to implement in Annagramam, Cuddalore, Kurunjipadi and Panruti blocks.
- ✓ Strengthening of Four Soil survey and Land Use Organization Units at Kammapuram, Mangalur and Nallur blocks.
- ✓ Production of Enriched FYM have to implement in Kammapuram, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Composting of Farm Waste Through Pluerotus (Production and Distribution of Kits) have to implement in Kammapuram, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Distribution of Enriched Press have to implement in Cuddlaore and Kurunjipadi blocks.

Budget

Enhancing soil health by distributing enriched farm yard manure, micro-nutrient mixture, gypsum, bio-fertilizers, *etc.* is essential to maximize profitability. The overall budget to undertake the various interventions in Cuddalore district is **₹ 1154.29 Lakhs (Table 4.11)**.

Expected outcome

Healthy soils are the foundation for profitable, productive and environmentally sound agricultural systems. In an agricultural context, it refers to the ability of the soil to sustain agricultural productivity and protect environmental resources. The proposed soil health management practices will improve soil health by increasing productivity and profitability immediately and into the future.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.11 Budget Requirement for Soil Health Management in Cuddalore District (₹. in lakhs)

Sl. No	Components	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	HDPE Vermi compost units	Kit Nos	12000	B2, B4, B7, B8, B10,	29	14.50	39	19.50	39	19.50	49	24.50	49	24.50	205	102.50
2	Reclamation of Alkali Soil	MT	50000	B1, B2, B4, B7, B8, B10,	30	3.60	50	6.00	60	7.20	60	7.20	70	8.40	270	32.40
3	Reclamation of Acid Soil	L. No.	6000	B1, B2, B7, B8, B10,	20	10.00	120	60.00	120	60.00	120	60.00	120	60.00	500	250.00
4	Green Manuring	Nos	4000	B2, B7	20	1.20	20	1.20	20	1.20	20	1.20	20	1.20	100	6.00
5	Establishment of Model organic villages	Ha	1000000	All Blocks	1800	72.00	2900	116.00	3100	124.00	3200	128.00	3300	132.00	14300	572.00
6	Adoption of PGS certification through cluster	Nos	1495000	B2, B7	2	20.00	2	20.00	2	20.00	2	20.00	2	20.00	10	100.00
7	Production of Enriched FYM	MT	2500	B4,B8, B10,B13	9	0.23	9	0.23	10	0.25	14	0.35	14	0.35	56	1.41
8	Composting of Farm Waste Through Pluerotus (Production and	MT	200	B4, B8, B10, B13	10	0.25	10	0.25	12	0.30	14	0.35	14	0.35	60	1.50
9	Strengthening of Four Soil survey and Land Use Organization Units Vellore, Coimbatore, Tirunelveli and Thanjavur	Ha	1125000	B4, B8, B10	90	0.18	120	0.24	160	0.32	200	0.40	240	0.48	810	1.62
10	Distribution of Soil Health Card	Ha	300	B1, B2, B7, B11	23186	69.56	5432	16.30	0	0.00	0	0.00	0	0.00	28618	85.86
11	Distribution of Enriched Press	units	1000	B2, B7	20	0.20	20	0.20	20	0.20	20	0.20	20	0.20	100	1.00
	Total					**191.72**		**239.92**		**232.97**		**242.20**		**247.48**		**1154.29**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.12. Rainfed Area Development in Cuddalore District

Rainfed areas account for nearly 57 per cent of the agricultural land in India. Rainfed areas if managed properly have the potential to contribute a larger share in the food grain production. These high potential rainfed areas provide us with opportunities for faster agricultural growth compared to irrigated areas that have reached a plateau in-fact the potential is such that there is more opportunity for faster agricultural growth here than in irrigated areas. With proper management, rainfed areas have the potential of contributing a larger share to food grain production. Increasing agricultural productivity of rainfed areas in a sustainable manner by adopting appropriate farming system based approaches through restoration of confidence in rainfed agriculture by creating sustained employment opportunities through improved on-farm technologies and cultivation practices. Livelihood support to farmers of rainfed areas through poverty reduction.

Project components

- ✓ Milch Animal (1 no) + 1 ha cropping system with inter crop & border plantation like castor/sesbania *etc*. have to implement in Annagramam, Kammapuram, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Small ruminant (9+1)+ 1 ha Tree based farming system (Cropping system with inter crop & border plantation like castor/sesbania etc.) @ Rs.23500/ as subsidy per Unit have to implement in Annagramam, Kammapuram, Mangalur, Nallur and Vridhachalam blocks.
- ✓ Promotion of Farmers club for Sustainable Dryland Agriculture covering all blocks.

Budget

It is proposed to incur **₹ 7300.00 Lakhs** over a period of five years **(Table 4.12)** with the finance facilities under the NADP and other sources.

Expected outcome

The expected outcome of the project will result in an increase in the production of the rainfed crops which will improve the income of the farmers.

Implementing agency

Department of Agriculture will implement the project and report the progress to the District-level officials.

Table 4.12 Budget Requirement for Rainfed Area Development in Cuddalore District

(₹. in lakhs)

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Milch Animal (1 no) + 1 ha cropping farming system (Cropping system with inter crop & border plantation like castor/sesbania etc.) @ Rs.27500/ as subsidy per Unit	Ha	0.55	B1, B4, B8, B10, B13	800	440.00	800	440.00	800	440	800	440.00	800	440.00	4000	2200.00
2	Small ruminant (9+1)+ 1 ha Tree based farming system (Cropping system with inter crop & border plantation like castor/sesbania etc.) @ Rs.23500/ as subsidy per Unit	Ha	0.47	B1, B4, B8, B10, B13	400	188.00	400	188.00	400	188	400	188.00	400	188.00	2000	940.00
3	Promotion of Farmers club for Sustainable Dryland Agriculture	Cluster	84.9415	All Blocks	14	1189.00	12	1019.00	9	764	7	594.00	7	594.00	49	4160.00
	Grand Total					**1817.00**		**1647.00**		**1392.00**		**1222.00**		**1222.00**		**7300.00**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.13. Integrated Pest Management in Cuddalore District

Integrated Pest Management also known as integrated pest control is a broad based approach that integrates practices for economic control of pests. IPM aims to suppress pest populations below the economic injury level. IPM used in agriculture, horticulture, forestry, human habitations, preventive conservation and general pest control, including structural pest management. The principle is on control not eradication. IPM holds that wiping out an entire pest population is often impossible, and the attempt can be expensive and unsafe. IPM programmes first work to establish acceptable pest levels, called action thresholds, and apply controls if those thresholds are crossed. The IPM process starts with monitoring, which includes inspection and identification, followed by the establishment of economic injury levels. Integrated pets management employ a variety of actions including cultural controls, including physical barriers, biological controls, including adding and conserving natural predators and enemies to the pest and finally chemical controls or pesticides.

Interventions

- ✓ Farmers Field Schools (FFS) covering all blocks.
- ✓ Field days covering all blocks.
- ✓ Integrated Pest Management Villages have to implement in Cuddalore and Kurunjipadi blocks
- ✓ IPM School have to organize at Kattumannarkoil, Keerapalayam, Kumaratchi and Melbhuvanagiri blocks.

Budget

It is proposed to incur **₹ 93.20 Lakhs** over a period of five years **(Table 4.13)** with the finance facilities under the NADP and other sources.

Expected outcome

Farmers Field Schools (FFS) is group based learning process that has been used by a governments to promote Integrated Pest Management (IPM). The FFS is a form of adult education, which evolved from the concept that farmers learn optimally from field observation and experimentation. It was developed to help farmers tailor their IPM practices to diverse and dynamic ecological conditions.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.13 Budget Requirement for Integrated Pest Management in Cuddalore District

(₹. in lakhs)

Sl. No	Components	Unit	Unit Cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Farmers Field Schools (FFS)	Nos.	0.20	All Blocks	19	3.80	36	7.20	36	7.20	36	7.20	36	7.20	163	32.60
2	Field days	No.	0.20	All Blocks	19	3.80	36	7.20	36	7.20	36	7.20	36	7.20	163	32.60
3	Integrated Pest Management Villages	Nos.	1.00	B2, B7	4	4.00	4	4.00	4	4.00	4	4.00	4	4.00	20	20.00
4	IPM School	Nos.	0.40	B3, B5, B6, B9	4	1.60	4	1.60	4	1.60	4	1.60	4	1.60	20	8.00
	Total					**13.20**		**20.00**		**20.00**		**20.00**		**20.00**		**93.20**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.14. Farm Mechanization in Cuddalore District

Agricultural mechanization is the need of the hour to meet out the growing shortage of labour workforce in Agriculture. It has been identified as one of the critical inputs for increasing production in time. The labour intensive crops need high man power requirement, which is fast depleting and posing a big challenge to crop productivity. Agricultural labour wages are increasing at an alarming rate in Tamil Nadu resulting in shifting from labour intensive to mechanization intensive techniques. The farm machinery for land preparations, land development, seeding, planting, transplanting, weeding and intercultural operations, harvesting and threshing which are predominantly used in other parts of the country / other countries are proposed for introduction in the farmers field of Cuddalore district.

Project component

- ✓ Distribution of Tractor, Rotavator, Power tiller, Tarpaulins, Solar light trap and Handy operated sprayer have to implement in all blocks.
- ✓ Distribution of pump set and PVC pipes to carry irrigation water from source to field covering all blocks
- ✓ Distributions of power operated sprayers have to implement in all blocks except Kattumannarkoil, Keerapalayam and Kumaratchi.
- ✓ Distribution of Tractor drawn seed drawn seed cum fertilizer drill have to implement in Kammapuram and Vridhachalam blocks.
- ✓ Distribution of mini tractor and paddy transplanter have to implement in Cuddlaore, Kurinjipadi and Parangeipettai blocks
- ✓ Distribution of Baler has to implement in Cuddalore, Kattumannarkoil, Keerapalyam and Melbhuvanagiri blocks.
- ✓ Distribution of chaff cutter in Annagramam, Cuddalore, Kurinjipadi, Mangalur and Panruti blocks.
- ✓ Distribution of combine harvester in Annagramam, Cuddalore, Kurinjipadi and Mangalur blocks.
- ✓ Distribution of cono weeder has to implement in Annagramam, Cuddalore, Kattumannarkoil, Kumaratchi, Melbhuvanagiri and Parangeipettai blocks.
- ✓ Distribution of Laser leveller in Kammapuram, Parangeipettai, and Vridhachalam blocks.
- ✓ Distribution of Manual Weeder, Rotar weeder and Multicrop thresher have to implement in Cuddalore and Kurunjipadi blocks

- ✓ Distribution of oil engine Pumpset have to implement in Cuddalore, Kurunjipadi, and Nallur blocks.

Budget

Agricultural mechanization programs are proposed to implement in a big way to increase the agricultural production and to popularize the agricultural machinery among the farmers of this district with a budget of **₹ 8552.74 Lakhs (Table 4.14)**.

Expected outcome

Distribution of farm machinery / implements to farmers will increase the farm power. All the proposed agricultural machinery / implements will be put into use by the farmers. The acute agricultural labour scarcity will be reduced. The benefit of agricultural mechanization is to be extended to all categories of farmers with due consideration to small, marginal, scheduled caste, scheduled tribes and women farmers.

Implementing agency

The projects will be implemented by the Department of Agriculture.

Table 4.14 Budget Requirement for Farm Mechanization in Cuddalore District

(₹ in lakhs)

Sl. No	Components	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Solar light trap	No.	4000	All Blocks	466	18.64	480	19.20	480	19.20	480	19.20	480	19.20	2386	95.44
2	Battery operated sprayer	Nos.	4000	B1, B2, B4,B7, B8,B12, B13	190	7.60	330	13.20	350	14.00	350	14.00	370	14.80	1590	63.60
3	Power operated sprayer	Nos.	8000	All Blocks except B3, B5, B6,	240	19.20	340	27.20	340	27.20	340	27.20	340	27.20	1600	128.00
4	Hand operated sprayer	0	0	All Blocks	330	4.95	400	6.00	410	6.15	410	6.15	410	6.15	1960	29.40
5	Distribution of Baler	Nos	350000	B2, B3, B5,B9	8	28.00	8	28.00	4	14.00	4	14.00	4	14.00	28	98.00
6	Distribution of chaff cutter	Nos	25000	B1, B2, B7, B8, B11	4	1.00	22	5.50	30	7.50	30	7.50	30	7.50	116	29.00
7	Distribution of combine harvester	Nos	1700000	B1, B2, B7, B8	2	34.00	2	34.00	4	68.00	4	68.00	4	68.00	16	272.00
8	Distribution of cono weeder	Nos	2000	B1, B2, B3, B6, B7, B9, B12	70	1.40	70	1.40	70	1.40	70	1.40	70	1.40	350	7.00
9	Distribution of Laser leveller	Nos	380000	B4, B12, B13	30	114.00	40	152.00	50	190.00	50	190.00	50	190.00	220	836.00
10	Distribution of Manual Weeder	Nos	2000	B2, B7	2	0.04	2	0.04	2	0.04	2	0.04	2	0.04	10	0.20
11	Distribution of Mini Tractor	Nos	300000	B2, B7, B12	15	45.00	39	117.00	31	93.00	31	93.00	31	93.00	147	441.00
12	Distribution of Mobile Sprinklers	Ha	30000	All Blocks except B3, B6, B9	200	60.00	236	70.80	246	73.80	256	76.80	296	88.80	1234	370.20
13	Distribution of multicrop thrasher	Nos	400000	B2, B7	2	8.00	2	8.00	2	8.00	2	8.00	2	8.00	10	40.00

Sl. No	Components	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
14	Distribution of Paddy transplanter	Nos	1200000	B2, B7, B12	13	156.00	13	156.00	13	156.00	13	156.00	13	156.00	65	780.00
15	Distribution of Power Weeder	Nos	65000	B1, B2, B7, B8, B10, B11, B12	2	1.30	50	32.50	50	32.50	50	32.50	50	32.50	202	131.30
16	Distribution of Power tiller	Nos	150000	All Blocks	138	207.00	192	288.00	192	288.00	192	288.00	192	288.00	906	1359.00
17	Distribution of Rain guns	Ha	40000	B1, B2, B4, B7, B8, B10, B11, B12, B13	100	40.00	127	50.80	127	50.80	137	54.80	137	54.80	628	251.20
18	Distribution of Rotary Power weeder	Nos	70000	B2, B7	4	2.80	4	2.80	4	2.80	4	2.80	4	2.80	20	14.00
19	Distribution of Rotavator	Nos	80000	All Blocks	95	76.00	195	156.00	205	164.00	205	164.00	205	164.00	905	724.00
20	Distribution of Tarpaulins	Nos	8000	All Blocks	340	27.20	440	35.20	450	36.00	450	36.00	450	36.00	2130	170.40
21	Distribution of Tractor	Nos	600000	All Blocks except B4, B13	40	240.00	52	312.00	52	312.00	52	312.00	52	312.00	248	1488.00
22	Distribution of Tractor Drawn Seed cum Fertilizer Drill	Nos	70000	B4, B13	50	35.00	60	42.00	80	56.00	100	70.00	0	0.00	290	203.00
23	PVC Pipes to carry Irrigation water from source to field	Unit	40000	All Blocks	350	140.00	470	188.00	490	196.00	510	204.00	510	204.00	2330	932.00
24	Solar power pump system	Nos	600000	B10	2	12.00	2	12.00	2	12.00	2	12.00	2	12.00	10	60.00
25	Distribution Oil Engine Pump set			B2, B7, B10	20	6.00	20	6.00	20	6.00	20	6.00	20	6.00	100	30.00
	Total					**1285.13**		**1763.64**		**1834.39**		**1863.39**		**1806.19**		**8552.74**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.15. State Seed Farms in Cuddalore District

Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15–20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. The total seed requirement of the country amounts to 2.56 lakh tonnes. However, about 20 per cent of the total seed requirement is met as quality seeds, while the rest is managed by farm saved seeds. Hence, high emphasis has to be given for the production and supply of quality seeds of pulses and oilseeds to farmers and increase the Seed Replacement Rate. Therefore, the infrastructure facilities at the SSFs like levelled land, more area, assured irrigation, thrashing floor, drying yard, processing units, storage *etc*., are essential to produce, process and pack quality seeds. Therefore, the strengthening of state seed farms is aimed for quality seed production in Tamil Nadu.

Project components

- ✓ Soil Fertility Improvement and Land development works have to implement in Melbhuvanagiri block.
- ✓ Provision of Irrigation facilities *viz.,* Solar pump sets, Laying of pipelines, Rain gun, Mobile sprinkler and Farm Pond have to implement in Melbhuvanagirir block.
- ✓ Supply of machineries (Dunnage (Poly Pallets), Seed grading machine, Paddy Transplanter, Power Tiller, Tarpaulin and Generator) has to implement in Melbhuvanagiri block.
- ✓ Infrastructure development for seed production (New Threshing floor, seed godown, Farm office, Farm office renovation and Farm connectivity) has to implement in Mel bhuvanagiri block.

Budget

It is proposed to incur **₹ 396.08 Lakhs** over a period of five years **(Table 4.15)** with the finance facilities under the NADP and other sources.

Expected outcome

The expected outcome of the project will result it will Enhance production of quality seeds of Crop varieties and Ensure timely delivery of seeds to farmers and it will increase supply of good quality seed which increase the production of the crops and the income of the farmers of Tamil Nadu.

Implementing Agency

Department of Agriculture will implement the project and report the progress to the District-level officials.

Table 4.15 Budget Requirement for State Seed Farms in Cuddalore District

(₹. in lakhs)

Sl. No	Components	unit	unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
I	**Soil Fertility Improvement and Land development works in SSF**	ac	2	B9	45	90	34.64	69.28	0	0	0	0	0	0	**79.64**	**159.28**
II	**Irrigation Component**															
1	Solar pumpsets	nos	6	B9	2	12	0	0	0	0	0	0	0	0	**2**	**12**
2	Laying of pipelines	mt	0.05	B9	500	25	50	2.5	0	0	0	0	0	0	**550**	**27.5**
3	Rain gun	nos	0.4	B9	0	0	8	3.2	0	0	0	0	0	0	**8**	**3.2**
4	Mobile sprinkler	nos	0.3	B9	0	0	7	2.1	0	0	0	0	0	0	**7**	**2.1**
5	Farm Pond	nos	1	B9	2	2	0	0	0	0	0	0	1	1	**3**	**3**
III	**Machineries**															
6	Dunnage (Poly Pallets)	nos	0.075	B9	150	11.25	150	11.25	0	0	100	7.5	100	7.5	**500**	**37.5**
7	Seed grading machine	nos	20	B9	1	20	0	0	0	0	0	0	0	0	**1**	**20**
8	Paddy Transplanter	nos	5	B9	2	10	0	0	0	0	0	0	0	0	**2**	**10**
9	Power Tiller	nos	3	B9	2	6	0	0	1	3	0	0	0	0	**3**	**9**
10	Tarpaulin	nos	0.1	B9	15	1.5	5	0.5	5	0.5	0	0	5	0.5	**30**	**3**
11	Generator	nos	7	B9	2	14	0	0	0	0	0	0	0	0	**2**	**14**

Sl. No	Components	unit	unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Civil Works															
12	New Threshing floor	nos	5	B9	1	5	0	0	1	5	0	0	0	0	**2**	**10**
13	seed godown	nos	25	B9	1	25	0	0	0	0	0	0	0	0	**1**	**25**
14	Farm office	nos	8	B9	4	32	0	0	0	0	0	0	0	0	**4**	**32**
15	Farm office renovation	nos	3	B9	0	0	2	6	0	0	0	0	0	0	**2**	**6**
16	Farm connectivity	Meter	0.015	B9	1500	22.5	0	0	0	0	0	0	0	0	**1500**	**22.5**
	Total					**276.25**		**94.83**		**8.50**		**7.50**		**9.00**		**396.08**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.1.16. Agricultural Information Technology in Cuddalore District

Agriculture is a major sector which is vital for the survival of modern man. The produce from agriculture drives trade from one country to another, brings income for farmers, makes productive use of otherwise idle land, and brings food on the table. It is such an important part of everyone's daily life, although it may not be seen as a direct factor since the produce goes a long way before reaching the hands of everyone who benefits from it. Because of its importance to society, it's must to evolve with the times and adjust to meet the needs of modern people. By adapting and making use of IT to help improve agricultural progress, everyone benefits from the union of these sectors.

In the context of agriculture, the potential of information technology (IT) can be assessed broadly under two heads: (a) as a tool for direct contribution to agricultural productivity and (b) as an indirect tool for empowering farmers to take informed and quality decisions which will have positive impact on the way agriculture and allied activities are conducted. The indirect benefits of IT in empowering farmer are significant and remain to be exploited. The farmer urgently requires timely and reliable sources of information inputs for taking decisions. At present, the farmer depends on trickling down of decision inputs from conventional sources which are slow and unreliable. The changing environment faced by farmers makes information not merely useful, but necessary to remain competitive.

Components include supply of Printer cum Scanner, UPS and Electrical Accessories, Xerox machine, Laptop/Desktop, Anti -virus software, Colour printer and 4G Internet – Dongle covering all blocks and supply of Television in all blocks except Annagramam, Cuddalore, Kattumannarkoil, Kammapuram and Melbhuvanagiri blocks.

Budget

It is proposed to incur **₹ 158.62** over a period of five years **(Table 4.16)** with the finance facilities under the NADP and other sources.

Expected outcome

The expected outcome of the project will result in an increase in the adoption of technologies for production of the crops which will improve the income of the farmers

Implementing Agency

Department of Agriculture will implement the project and report the progress to the District-level officials.

Table 4.16 Budget Requirement for Information Technology in Cuddalore District

(₹ in lakhs)

Sl. No	Components	Unit	Unit Cost	Block Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Printer cum Scanner	Nos	20000	All Blocks	0	0.00	13	2.60	0	0.00	0	0.00	13	2.60	26	5.20
2	UPS and Electrical Accessories	Nos	35000	All Blocks	0	0.00	26	9.10	0	0.00	0	0.00	26	9.10	52	18.20
3	Xerox machine	Nos	75000	All Blocks	0	0.00	13	9.75	0	0.00	0	0.00	13	9.75	26	19.50
4	Laptop/Desktop	Nos	50000	All Blocks	0	0.00	26	13.00	0	0.00	0	0.00	26	13.00	52	26.00
5	Anti -virus software	Nos	2500	All Blocks	0	0.00	65	1.63	0	0.00	0	0.00	65	1.63	130	3.26
6	Television	Nos	100000	B5, B6, B7, B8, B10, B11, B12, B13	0	0.00	13	13.00	0	0.00	0	0.00	13	13.00	26	26.00
7	Colour printer	Nos	15000	All Blocks	0	0.00	13	1.95	0	0.00	0	0.00	13	1.95	26	3.90
8	4G Internet - Dongle	Nos	2500	All Blocks	0	0.00	65	1.63	0	0.00	0	0.00	65	1.63	130	3.26
	Equipments for Documentation															
a	Handycam	Nos	30000	All Blocks	0	0.00	13	3.90	0	0.00	0	0.00	13	3.90	26	7.80
b	Camera	Nos	25000	All Blocks	0	0.00	13	3.25	0	0.00	0	0.00	13	3.25	26	6.50
c	GPS instrument	Nos	20000	All Blocks	0	0.00	13	2.60	0	0.00	0	0.00	13	2.60	26	5.20
d	Android mobile	Nos	15000	All Blocks	0	0.00	26	3.90	0	0.00	0	0.00	26	3.90	52	7.80
e	External Hard disk	Nos	5000	All Blocks	0	0.00	65	3.25	0	0.00	0	0.00	65	3.25	130	6.50
	LCD projector	Nos	75000	All Blocks	0	0.00	13	9.75	0	0.00	0	0.00	13	9.75	26	19.50
	Total					**0.00**		**79.31**		**0.00**		**0.00**		**79.31**		**158.62**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

Table 4.17 Consolidated Agriculture Budget for Cuddalore District

(₹ in lakhs)

Sl. No.	Interventions	2017-18	2018-19	2019-20	2020-21	2021-22	Total
1	Rice	2353.96	2676.61	2814.10	2876.82	2940.26	13661.75
2	Millets	10456.22	10869.94	11025.97	11162.42	11400.97	54915.52
3	Pulses	799.62	897.50	907.89	1008.74	1030.31	4644.06
4	Oilseeds	1336.27	1058.53	1026.50	1047.07	1055.05	5523.42
5	Oilpalm	71.31	60.88	62.40	66.40	64.40	325.39
6	Cotton	48.61	398.27	435.54	468.93	499.88	1851.23
7	Sugarcane	1845.83	2274.75	2417.80	2618.81	2734.77	11891.96
8	Coconut	458.88	422.24	422.88	423.57	423.96	2151.53
9	Training	128.89	130.93	132.33	133.68	188.93	714.76
10	Infrastructure	568.75	1108.95	1248.75	628.75	698.95	4254.15
11	Soil Health Management	191.72	239.92	232.97	242.20	247.48	1154.29
12	Rainfed Area Development	1817.00	1647.00	1392.00	1222.00	1222.00	7300
13	Integrated Pest Management	13.20	20.00	20.00	20.00	20.00	93.2
14	Farm Mechanization	1285.13	1763.64	1834.39	1863.39	1806.19	8552.74
15	Strengthening of State Farm	276.25	94.83	8.50	7.50	9.00	396.08
16	Agriculture Information Technology	0.00	79.31	0.00	0.00	79.31	158.62
	Total	**21651.64**	**23743.30**	**23982.02**	**23790.28**	**24421.46**	**117588.70**

4.2. Agricultural Research

Cultivation of field crops and vegetables are the most preferred crops by the farmers of Cuddalore district having areas with medium drainage, above medium soil depth and moderate quality of irrigation water. Vegetable Research Station, Palur should be strengthened for infrastructure facilities with model mechanized farm mainly will focus on crop improvement in fruits and vegetables with enhanced yield potential for the sustainable livelihood of farming community in the North Eastern Zone of Tamil Nadu. On a verge of development in the agriculture system, the government should open linkage and infrastructure that can help in better functioning of the procedure and help in rural development. Therefore in context to this and provide linkage between research and farm activities, the government is all set to construct permanent infrastructure for Agriculture Technology Park .It aims to cover rural women, farmers, unemployed youths, field-level agriculture personnel and rural volunteers on scientific farming to boost socio-economic condition of rural areas.

The most damaging ecological disturbance of injudicious use of pesticides in the existence of high concentration of pesticide residues in food chain including vegetables and other crops. To produce pesticide free agricultural produce, it is highly necessary to introduce bio control as one of the major tool for pest management in vegetable crops. Training and demonstrations on precision water and nutrient usage, INM, IPM, use of natural plant enemies, cultivation under protected structures etc. imparts confidence with in the farmers in agriculture and make them to adopt to harvest bumper crop and to get triple the income. In this regard, setting up of training institute will be off immense use in changing the economic and social status of the farmers, skilled workers, rural women and self-entrepreneurship development among the stake holders.

Establishing organic jaggery processing unit at Melalathur will help the sugarcane jaggery farmer by way of disseminating improved post-harvest technique in view to avoid the quality loss of jaggery during processing and storage. Jaggery is best when consumed as organic. Organic Jaggery retains not only all the sucrose but all the other natural nutrients like calcium, phosphorous, magnesium and potassium. Therefore the establishment of Chewing Cane Production and Organic Jaggerry Processing Unit at Cuddalore is essential. These problems all necessitate the need for making them aware of good farming practices from research infrastructure which may provide better infrastructure

facilities and higher agricultural production by adopting the following research infrastructure facilities so they can be getting a better knowledge on crops for getting higher agricultural production at Cuddalore district.

Project components

- ✓ Strengthening of infrastructural facilities for vegetable seed production at Vegetable Research Station, Palur covering Annagramam block.
- ✓ Establishment of Model mechanized research farm covering Vridhachalam block
- ✓ Establishment of Advanced grain quality analysis laboratory covering Vridhachalam block
- ✓ Construction of Farmers Trainees Hostel covering Vridhachalam block
- ✓ Construction of Technology park covering Vridhachalam block
- ✓ Establishment of biocontrol laboratory covering Vridhachalam block
- ✓ Establishment of shade net house covering Vridhachalam block

Budget

The budget requirement for the above research and development activities is estimated at **₹ 1008.00 lakhs** over a period of five years **(Table 4.18)**.

Implementing agency

Tamil Nadu Agricultural University will be implementing the project.

Expected outcome

The implementation of the above project will result in better research activities and trainings on latest technologies for higher agricultural production.

Table 4.18 Budget Requirement for Agricultural Research Infrastructure in Cuddalore District

(₹ in lakhs)

Sl. No.	Interventions	Blocks Covered	Unit Cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
				Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
I	**Research Infrastructure**														
1	Strengthening of infrastructural facilities for vegetable seed production at Vegetable Research Station, Palur	Annagramam	652	0	0.00	0	0.00	1	652.00	0	0.00	0	0.00	**1**	**652.00**
2	Establishment of Model mechanized research farm / Popularization of MGR 100 rice	Vridhachalam	20	0	0.00	0	0.00	0	0.00	1	20.00	0	0.00	**1**	**20.00**
3	Establishment of Advanced grain quality analysis laboratory	Vridhachalam	50	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00	**1**	**50.00**
4	Construction of Farmers Trainees Hostel	Vridhachalam	100	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	**1**	**100.00**
5	Construction of Technology park	Vridhachalam	100	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	**1**	**100.00**
6	Establishment of biocontrol laboratory /Organic vegetable production	Vridhachalam	80	0	0.00	0	0.00	1	80.00	0	0.00	0	0.00	**1**	**80.00**
7	Establishment of shade net house/ gardens/farms	Vridhachalam	6	1	6.00	0	0.00	0	0.00	0	0.00	0	0.00	**1**	**6.00**
	Total				**56.00**		**100.00**		**732.00**		**20.00**		**100.00**		**1008.00**

4.3. Horticulture

4.2.1 Enhancing the productivity of horticultural crops

Horticulture plays a vital role in the food and nutritional security of the people as well as in earning foreign exchange through export of raw and value added horticultural crops. The farmers are ready to go in for the cultivation of horticultural crops which prove remunerative. The challenge lies in taking the technologies to 90 per cent of farmers who are small and marginal farmers. In all, horticulture crops are grown in 10.01 lakh hectares, of which vegetables, spices, plantation crops, flowers and medicinal plants are the major crops cultivated in the State. Totally, 86 horticultural crops are grown in the State which clearly indicates the crop diversity and also the possibility of augmenting the income of farmers. The major strategies suggested are as follows:

Area expansion of Horticultural crops

a. Fruit Crops

Today's changing food pattern enhances the area expansion under fruits. The preferable choices of fruits are Mango, Apple, Banana, Grapes, Orange, Guava, Pomegranate, Sapota *etc*. Fruits are rich in fiber which is very essential for the smooth movement of the digestive system. There are some fruits that give body energy as they contain carbohydrates which are the main source of energy. Carbohydrates in fruits are mainly sugar which actually breaks down easily and make a quick source of energy. They also contain minerals, vitamins and nutrients that are useful for a healthy life. Considering the importance of fruits, the productivity can be increased by promotion of cultivation of fruit crops in the potential areas such as

1. Area expansion of Banana / Hill Banana sucker & Pine apple sucker have to increase in all blocks except Melbhuvanagiri block.
2. Area expansion fruits with traditional varieties have to increase in Annagramama, Kattumannar koil, Keerapalayam, Kumaratchi, Mangalur, Melbhuvanagirir, Nallur, Panruti and Vridhachalam.
3. Area expansions in Banana for leaf production have to implement in all blocks except Cuddalore, Melbhuvanagiri, Nallur and Vridhachalam.
4. Area expansion of Commercial production of Traditional fruits (Woodapple, Manila Tamarind, Jamun, Ber, Karonda, Annona, Egg fruit, etc.,) have to increase in all blocks Cuddalore, Keerapalayam, Kumaratchi, Kurunjipadi and Vridhachalam.

b. Vegetable crops

Vegetables are the store houses of most of the vitamins and minerals and also proteins. In order to ensure continuous supply of fresh vegetables to the burgeoning urban markets, it is absolutely necessary to create forward linkages from rural to urban areas. This will also ensure assured income to farmers in the rural areas adjoining the cities. Cultivation of vegetables, formation of farmer clusters, formation of farmers society, collection centers, reefer vans, retail outlets, mobile stores are the components to be promoted for increasing the productivity and marketing of vegetables.

1. Area expansion of Brinjal, Bhendi, Green Chillies and Annual Moringa have to increase in all blocks
2. Area expansion of Gourds including pumpkin and tinda has to increase in all blocks except Kumaratchi, Kurunjipadi, Melbhuvanagiri, Nallur and Parangeipettai.
3. Area expansion of Greens has to increase in Annagramam, Kattumannarkoil, Mangalur, Melbhuvanagiri, Panruti and Vridhachalam.
4. Area expansion of Small Onion have to increase in all blocks except Kumaratchi
5. Area expansion of Bellary Onion has to increase in all blocks except Cuddalore, Keerapalyam, Kumaratchi, Kurunjipadi and Parangeipettai.
6. Area expansion of Cauliflower have increase in Annagramam
7. Area expansion of Tapioca have to increase in all blocks except Cuddalore
8. Area expansion of Yams and colacassia has to increase in Melbhuvanagiri and Nallur blocks.
9. Area expansion of Commercial production of location specific traditional vegetables (Athalakkai, PaluPavakkai, Mullukathiri, Poiyurkathiri, Kottapattikathiri etc.,) have to increase in Annagramam, Kattumannarkoil, Kammapuram, Mangalur, Melbhuvanagiri and Panruti blocks.

c. Flower crops

The major flowers grown are Gundumalli, Mullai, Rose, Crossandra, Chrysanthemum, Marigold, Tuberose, Arali, Jathimalli *etc.* Floriculture activity has evolved as a viable and profitable alternative, with a potential to generate remunerative self-employment among small & marginal farmers. The flower crops require lots of manpower for picking flowers and perform other operations, hence providing opportunity to marginal and small farmers for generating more income, employment and promote greater

involvement of women work force. Keeping this in mind, the promotion area of cultivation of traditional and cut flowers are planned for different flower crops such as,

1. Area expansion of Loose flowers - Jasminumsp, Crossandra, Marigold, Rose, Chrysanthemum, Nerium, Torenia have to increase in all blocks.
2. Area expansion of Bulbous flowers - Tube rose, Gladioli, Dahlia, Bird of paradise, Heliconia, Tulip have to increase in all blocks.

d. Spice crops

Spice crops play a unique role in India's economy by improving the income of the rural people. Cultivation of spices is labor intensive so it can generate lot of employment opportunities for the rural population. The demand of Indian spice is very much in other countries. Hence production of spices has very much scope to meet that demand by huge production. The major interventions are,

1. Area expansion of Seed and Rhizomatic spices (Coriander, Turmeric, Ginger, Dry Chilly, Cumin, Fennel, Fenugreek, Dil, Cardamom etc.,) have to increase in all blocks
2. Area expansion of Perennial spices (Pepper, Curry leaf, All spice, Cinnamon, Clove, Tamarind, Nut meg etc.,) have to increase in Annagramam, Kattumannarkoil, Kammapuram, Mangalur, Melbhuvanagiri, Nallur and Vridhachalam blocks.

e. Plantation crops

Plantation crops are high value commercial crops of greater economic importance and play a vital role in our Indian economy. These crops help to conserve the soil and ecosystem. The crops include tea, coffee, rubber, cocoa, coconut, arecanut, oil palm, palmyrah, cashew, cinchona *etc*. So the promotion of cultivation of plantation crops in the potential districts will increase the economy of the farmer and also Indian economy. The major intervention is,

1. Area expansion of Cocoa has to increase in all blocks except Kammapuram, Melbhuvanagiri, Nallur and Vridhachalam.
2. Area expansion of Cashew have to increase in all blocks except Cuddalore and Melbhuvanagiri
3. Area expansion of Betelvine has to increase in Keerapalayam block.

4. Area expansion of Coconut have to increase in all blocks except Kumaratchi, Melbhuvanagiri, Nallur and Vridhachalam
5. Area expansion of Bamboo and Other crops have to increase in all blocks except Vridhachalam.

f. Medicinal and Aromatic plants

Medicinal and Aromatic plants form a numerically large group of economically important plants which provide basic raw materials for medicines, perfumes, flavors and cosmetics. These plants and their products not only serve as valuable source of income for small holders and entrepreneurs but also help the country to earn valuable foreign exchange by way of export. Therefore, the vast scope for expansion of medicinal and aromatic plants in this district. The major interventions are,

1. Area expansion in Neem has to increase in Kattumannarkoil, Kammapuram, Melbhuvanagiri and Nallur blocks.
2. Area expansion of Amla has to increase in all blocks except Keerapalyam, Kumaratchi, Kurunjipadi and Parangepettai.
3. Area expansions of Coleus have to increase in Melbhuvanagiri and Nallur block.
4. Area expansions of Vettiver have to increase in Kattumannarkoil, Mangalur and Parengeipettai blocks.

g. Area expansion by high density planting

By adopting high density planting in mango, guava and sapota, the area under fruit trees could be increased. This includes supply of pedigree planting materials, integrated nutrient management and integrated pest management. In this district, Promotion of HDP in Mango, Guava, Litchi, Pomegranate have to implement in all blocks except Nallur.

h. Area expansion by Normal Planting

Besides precision farming and high density planting, the area could be increased by normal planting as well by using pedigree planting materials in fruits crops. In this district,

1. Area expansion normal Planting in lime / lemons have to increase in all blocks except Cuddalore, Kumaratchi, Kurunjipettai and Parangeipettai blocks.

2. Area expansion of Normal planting in Papaya has to increase in all blocks except Cuddalore.

3. Area expansions of Normal planting in Jack have to increase in all blocks except Cuddalore, Kumaratchi, Kurunjipettai and Parangeipettai blocks.

Rejuvenation of Old Orchards – Mango and Guava

In general, 40-45 years old mango trees exhibit decline in fruit yield because of dense and overcrowded canopy. The trees do not get proper sunlight resulting in decreased production of shoots. New emerging shoots are weak and are unsuitable for flowering and fruiting. The population of insects and pests builds up and the incidence of diseases increases in such orchards. These unproductive trees can be converted into productive ones by pruning with the techniques developed. Similarly, a procedure to rejuvenate and restore the production potential of old unproductive and wilt affected guava orchards has been developed, which employs pruning of branches at different periodicity and at different severities. Crowding and encroachment of guava trees with subsequent inefficient light utilization is an obvious problem with older orchards, if trees are not well managed. The internal bearing capacity of guava trees also decreases with time, due to overshadowing of internal bearing wood. The Major interventions are,

1. Mango/Cashew – Rejuvenation have to implement in all blocks except Cuddalore and Melbhuvanagiri

2. INM/IPM for Horticultural crops and Mulching have to implement in all blocks

Pollination support

Pollination of fruits, vegetables, spices and plantation crops would be enhanced through the establishment of bee hives and colonies covering all blocks.

Organic farming

Organic farming is an alternative agricultural system which originated early in the 20th Century in reaction to rapidly changing farming practices. It relies on fertilizers of organic origin such as compost, manure, green manure, and bone meal and places emphasis on techniques such as crop rotation, companion planting. Biological pest control, mixed cropping and fostering of insect predators are encouraged. Since 1990, the market for organic food and other products has grown rapidly, reaching $63 billion worldwide in 2012. This demand has driven a similar increase in organically managed farmland that grew from 2001 to 2011 at a compounding rate of 8.9 per cent per annum. As of 2011, approximately 3.70 lakh hectares worldwide were farmed organically, representing

approximately 0.9 per cent of total world farmland. Organic farming encourages crop diversity. The science of agro ecology has revealed the benefits of polyculture (multiple crops in the same space), which is often employed in organic farming. Planting a variety of vegetable crops supports a wider range of beneficial insects, soil microorganisms, and other factors that add up to overall farm health. Crop diversity helps environments thrive and protects species from going extinct. The profitability of organic agriculture can be attributed to a number of factors. First, organic farmers do not rely on synthetic fertilizer and pesticide inputs, which can be costly. In addition, organic foods currently enjoy a price premium over conventionally produced foods, meaning that organic farmers can often get more for their yield. The price premium for organic food is an important factor in the economic viability of organic farming. Organic agriculture can contribute to ecologically sustainable, socio-economic development, especially in poorer countries. The application of organic principles enables employment of local resources (*e.g.,* local seed varieties, manure, *etc.*) and therefore cost-effectiveness. Local and international markets for organic products show tremendous growth prospects and offer creative producers and exporter's excellent opportunities to improve their income and living conditions. The major interventions are,

1. Organic farming and PGS certification in 50acre cluster have to implement in Annagramam, Kattumannarkoil, Mangalur and Vridhachalam blocks.
2. HDPE Vermibed has to establish in all blocks.

Rainfed Area Development Programme (RADP)

Rainfed areas assume special significance in terms of ecology, agricultural productivity and livelihood for millions of rural households in India. To ensure agriculture growth in the rainfed areas, the Government of India launched a new scheme "Rainfed Area Development Programme (RADP)" in the year 2011-12 as a sub-scheme under Rashtriya Krishi Vikas Yojana (RKVY). It aims at improving quality of life of farmers especially, small and marginal farmers by offering a complete package of activities to maximize farm returns. RADP focuses on Integrated Farming System (IFS) for enhancing productivity and minimizing risks associated with climatic variabilities. The major interventions are,

1. Integrated farming system - Horticulture Based farming, Green manuring and Moisture stress management - Minimum irrigation gurantee by PUSA hydrogel have to implement in Melbhuvanagiri and Nallur blocks

Infra structures and Assets

Protected cultivation

Precision Farming through Hi tech cultivation Practices It is proposed to plan for increasing the production of crops by adopting advanced technology like high tech cultivation practices which includes high density planting, use of quality planting materials, tissue culture planting materials, canopy management, micro irrigation fertigation, mulching, use of bunch sleeves for banana, protected cultivation, shade net nursery and mechanization in horticulture crop cultivation by popularizing the same among the growers to enhance productivity. It is proposed to adopt high density planting in mango, guava and sapota in select districts of the State by providing subsidy. The Major interventions are,

1. Establishment of Poly Green House and Shade net have to implement in Annagramam, Kattumannrkoil, Mangalur and Melbhuvanagiri blocks.

Mushroom production

Commercial production of edible Mushrooms converts the agricultural, industrial, forestry and household wastes into nutritious food (Mushroom). Indoor cultivation of oyster mushrooms utilizes the vertical space and is regarded as the highest protein producer per unit area and time – almost 100 times more than the conventional agriculture and animal husbandry. The Cottage mushroom unit have to establish in Kattumannarkoil block.

Vermicompost unit

Earthworms are often referred to as farmer's friend s and nature's ploughmen. Earthworms are extremely important in soil formation, principally through their activities in consuming organic matter, fragmenting and mixing it intimately with mineral particles to form aggregates. During their feeding, earthworms promote microbial activity greatly, which in turn accelerates the breakdown of organic matter and stabilization of soil aggregates. The end product, commonly termed vermicompost and obtained as the organic wastes pass through the earthworm gut, is quite different from the parent waste material. Therefore it's necessary to establish a permanent vermicompost unit in Annagramam, Kattumannarkoil, Mangalur and Melbhuvanagiri blocks.

Special Interventions

a. Off-season Moringa Production – Pods and Leaves

Extremes of weather conditions that prevail in Northern States during Kariff as well as Rabi seasons do not favour the cultivation of Moringa. Hence truckloads of drumsticks are being transported from TN, AP and Karnataka to Northern States. Though the moringa pod is demanded throughout the year, the production is meager during winter and rainy seasons owing to the inadequate thermal requirements of the crop. Various systems of cultivation are in vogue to produce moringa round the year production. Commercial cultivation of annual moringa PKM-1 can fit into any crop rotation. Though it is annual, it is amenable for rationing twice. The major interventions are,

1. Offseason Annual Moringa production – Pod have to implement in all blocks except Nallur.

2. Offseason Annual Moringa production –Leaf and Farm deficiency correction have to implement in all blocks

b. Pandal / Trellis cultivation, Propping / Support / Staking

Pandal vegetables being short duration crops fit very well in the cropping system by offering viable option to the growers to get increased income per unit area. However, the cultivation of vegetables is too constrained due to high initial investment cost. With the objective of enhancing area under pandal vegetables and encouraging farmers to realize increased income, this project is proposed by popularizing high yielding/hybrid seed materials and dissemination of improved method of cultivation to farmers. It is proposed to cover at least 500 hectares in crops like bitter gourd, ribbed gourd, snake gourd, pandal beans *etc*. The major interventions are,

1. Promotion of Roof top Garden/ Potager garden Kit have to implement in all blocks
2. Promotion of Roof top Garden/ Potager garden Kit with shadenet have to implement in all blocks except Kumaratchi, Kurunjipadi, Nallur and Parangeipettai.

c. Banana Bunch Sleeve

'Bunch care techniques' are to be followed in banana cultivation to achieve the best quality. Transparent polyethylene sleeves are recommended to cover the bunch immediately after opening of the last hand. Using of opaque polythene covers / sleeves gauge (during winter) and paper bags (to avoid chilling injury at frost conditions and sun scrotch). The bunch will be free from insect bites, fungi, bacteria attacks and physical injuries. The cover will also improve bunch appeal and maturity of bunch will be advanced

by 7 to 10 days. It would have to implement in all blocks except Cuddalore, Melbhuvanagiri and Nallur.

d. Agro Ecosystem Analysis (AESA) based IPM

The IPM has been evolving over the decades to address the deleterious impacts of synthetic chemical pesticides on environment ultimately affecting the interests of the farmers. The economic threshold level (ETL) was the basis for several decades but in modern IPM (FAO 2002) emphasis is given to AESA where farmers take decisions based on larger range of field observations. Decision making in pest management requires a thorough analysis of the agro-ecosystem. Farmer has to learn how to observe the crop, how to analyze the field situation and how to make proper decisions for their crop management. This process is called the AESA. In AESA based IPM emphasis is given to natural enemies, plant compensation ability, abiotic factors and P:D ratio. The major interventions are,

1. AESA based IPM in fruits and vegetables Pheramone trap, Yellow sticky trap and Light trap have to implement in all blocks.
2. Coastal area development programme – Public have to implement in Mangalur block.

e. Computerization and Governance

As per the Stated policy under the scheme of E-governance and computerization of the various Development Departments, desktop computers and associated equipments had been contemplated. In order to ensure effective implementation of E-Governance, computer equipments (such as laptops, personal computers, Tablets *etc*) are essential. It would have to implement in Annagramam, Kattumannarkoil, Mangalur, Melbhuvanagiri and Panruti blocks.

Crop Insurance

Crop Insurance coverage has to be done for major crops like paddy, millets, pulses, oilseeds, sugarcane, cotton, cash crops and all Horticulture crops in the notified areas covering all blocks.

Post-Harvest Management

In agriculture, postharvest handling is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. Postharvest treatment

largely determines final quality, whether a crop is sold for fresh consumption, or used as an ingredient in a processed food product. The most important goals of post-harvest handling is to avoid moisture loss and slow down undesirable chemical changes, and avoiding physical damage such as bruising, to delay spoilage. Sanitation is also an important factor, to reduce the possibility of pathogens that could be carried by fresh produce, for example, as residue from contaminated washing water. The major interventions are,

1. Pack house (9m X 6m) have to establish in all blocks except Kammapuram, Keerapalyam, Kumaratchi, Nallur, Parangeipettai and Vridhachalam.
2. Low cost onion structure 25 mt have to establish in Kattumannarkoil and Mangalur blocks.
3. Pre cooling unit 6 mt have to implement in Kattumannarkoil block.
4. Mobile pre cooling unit have to implement in Annagramam and Kattumannarkoil blocks.
5. Retail outlet have to establish at Kattumannarkoil and Panruti blocks
6. Market intervention -Mobile venindg cart have to implement in all blocks except Cuddalore, Kumaratchi and Nallur.

Modernization of State Horticulture Farms

In Tamil Nadu, there are 52 State Horticulture Farms including six parks and garden. The prime objectives of these farms are to produce pedigree planting materials of fruits, flowers, spices and vegetables. The quality planting materials produced in these farms are distributed to the farmers directly and through various schemes of the department. The parks and garden serve as study centre to the students apart from educating the public on Eco preservation. It is programmed to expand the production of planting materials of various kinds of fruits viz., mango, guava, sapota and flowers like rose, jasmine and ornamental plants and avenue trees by modernizing the nurseries, developing the farms as demonstration centres for the latest techniques in horticulture, enhancing the productivity and augmenting farm mechanization for increasing the efficiency. Developmental activities in new/ existing state Horticultural farm have to implement in Kattumannar koil, Kammapuram, Mangalur and Melbhuvanagirir blocks.

Horticultural mechanization

With increasing agricultural labour Shortage in India, a calculated shift to mechanization is imperative. Not only does mechanization provide for optimal utilization of

factor resources (*viz.,* land, labour, water, capital and expensive farm inputs), it also helps farmers to save valuable time and effort. Judicious use of time, labour and resources helps facilitate sustainable intensification (multi-cropping) and timely planting of crops and towards giving crops more time to mature, leading to improved productivity. The major interventions are,

1. Supply of Power tiller/Tractor/ Minitractor have to implement in Annagramam, Cuddalore, Kattumannrkoil, Kammapuram, Kumaratchi, Mangalur, Panruti and Parengeipettai blocks.
2. Land development, tillage and seed bed preparation equipments have to supply in Annagramam and Melbhuvanagiri blocks.
3. Tractor Mounted / Operated Sprayer (Below 20HP) have to supply in Panruti block.
4. Fruit Plucker, Tree pruners, Fruit Harvester, Fruit Graders, Track Trolley, Nursery Media Filling Machine, Power operated horticulture tools for pruning, budding, grating, shearing etc. have to implement in Annagramam, Kattumannrkoil, Mangalur, Panruti and Vridhachalam blocks.
5. Hand operated sprayer with face mask have to supply in all blocks except Cuddalore.
6. Power operated sprayer has to supply in all blocks.
7. Plastic crates for vegetable & fruits handling have to supply in all blocks.
8. Turmeric Boiler and Turmeric Polishing Machine have to supply in Melbhuvanagirir block.
9. 5 layered Polythene spread sheets for drying horticulture produce have to supply in all blocks.

Micro Irrigation, Water harvesting and Management

With increasing demand on water from various sectors, the availability of water is under severe stress. Agriculture sector is the largest use of water. While irrigation projects (Major and medium) have contributed to the development of water resources, conventional methods of irrigation are inefficient and lead to wastage of water. It has been recognized that the use of modern irrigation methods like drip and sprinkler irrigation are the ways for the efficient use of surface as well as ground water resources. Majority of fruit trees / orchards are under rainfed cultivation. It is advisable to bring a minimum percentage of the area under irrigation by providing and strengthening the water harvesting system. This includes provision of drip irrigation facilities wherever possible, recharge of defunct bore

wells, provision of pipes and protected distribution system, provision of water lifting devices, Insitu water conservation and the like. The major interventions are,

1. Micro Irrigation – Drip have to supply in all blocks
2. Rain gun have to supply in all blocks except Annagramam,Cuddalore, Keerapalyam, Kurunjipadi and Panruti blocks.
3. Sprinkler have to supply of all blocks except Kattumannarkoil and Panruti.
4. Water harvesting system for individuals have to implement in Melbhuvanagiri blocks.

Capacity building of Horticultural Officers and Farmers

In service training of horticultural officers regularly would help them to update the modern technologies in production, marketing and value addition of horticultural crops including organic farming. Similarly, exposure visits to farmers to nearby districts / States and even foreign countries would help them aware and adopt new innovative technologies. The Major interventions are,

1. Training to farmers within the State have to implement in all blocks
2. Training to farmers outside the state have to implement in all blocks
3. Exposure visit to farmers for 5 days have to implement in all blocks
4. District level seminar have to conduct in Annagramam, Kattumannarkoil, Mangalur and Vridhachalam blocks.
5. Publicity and Documentation have to implement in all blocks except Keerapalyam, Kurunjipadi, Nallur and Panruti.

Budget

The budget requirement for fulfilling the various interventions is **₹ 24623.91 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.19**

Implementing agency

The projects will be implemented by the Department of Horticulture.

Table 4.19 Budget Requirement for Horticulture in Cuddalore District

(₹ in lakhs)

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
A	**Production Growth**															
I	**Area expansion of fruit crops**															
1	Banana / Hill Banana sucker & Pine apple sucker	Ha	0.875	All Blocks except B9	2000	1750.00	2000	1750.00	2000	1750.00	2000	1750.00	2000	1750.00	10000	8750.00
2	HDP in Mango, Guava, Litchi, Pomegranate	Ha	1	All Blocks except B10	30	30.00	30	30.00	30	30.00	30	30.00	30	30.00	150	150.00
3	Area expansion of fruits with traditional varieties	Ha	0.6	All Blocks except B2,B4,B7,B12	10	6.00	10	6.00	10	6.00	10	6.00	10	6.00	50	30.00
4	Normal Planting in lime / lemons	Ha	0.6	B1,B3,B4,B5,B8, B9,B10,B11,B13	20	12.00	20	12.00	20	12.00	20	12.00	20	12.00	100	60.00
5	Normal planting in Papaya	Ha	0.6	All Blocks except B2	50	30.00	50	30.00	50	30.00	50	30.00	50	30.00	250	150.00
6	Normal planting in Jack	Ha	0.6	B1,B3,B4,B8, B11,B12,B13	25	15.00	25	15.00	25	15.00	25	15.00	25	15.00	125	75.00
7	Banana for leaf production	Ha	0.6	All Blocks except B2,B9,B10,B13	100	60.00	100	60.00	100	60.00	100	60.00	100	60.00	500	300.00
8	Commercial production of Traditional fruits (Woodapple, Manila Tamarind, Jamun, Ber, Karonda, Annona, Egg fruit, etc.,)	Ha	0.6	All Blocks except B2,B5,B6,B7,B13	5	3.00	5	3.00	5	3.00	5	3.00	5	3.00	25	15.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
II	**Area expansion of vegetable crops**															
9	Brinjal	Ha	0.5	All Blocks	30	15.00	30	15.00	30	15.00	30	15.00	30	15.00	150	75.00
10	Bhendi	Ha	0.5	All Blocks	25	12.50	25	12.50	25	12.50	25	12.50	25	12.50	125	62.50
11	Green Chillies	Ha	0.5	All Blocks	150	75.00	175	87.50	175	87.50	175	87.50	175	87.50	850	425.00
12	Gourds including pumpkin and tinda	Ha	0.5	All Blocks except B6,B7,B9,B10, B12	5	2.50	5	2.50	5	2.50	5	2.50	5	2.50	25	12.50
13	Greens	Ha	0.5	B1,B3,B8,B9, B11,B13	10	5.00	10	5.00	10	5.00	10	5.00	10	5.00	50	25.00
14	Small Onion	Ha	0.5	All Blocks except B6	15	7.50	15	7.50	15	7.50	15	7.50	15	7.50	75	37.50
15	Bellary Onion	Ha	0.5	All Blocks except B2,B5,B6,B7,B12	5	2.50	5	2.50	5	2.50	5	2.50	5	2.50	25	12.50
16	Cauliflower	Ha	0.5	B1	10	5.00	15	7.50	15	7.50	15	7.50	15	7.50	70	35.00
17	Annual Moringa	Ha	0.5	All Blocks	5	2.50	10	5.00	10	5.00	10	5.00	10	5.00	45	22.50
18	Tapioca	Ha	0.5	All Blocks except B2	1500	750.00	1500	750.00	1500	750.00	1500	750.00	1500	750.00	7500	3750.00
19	Yams and colacassia	Ha	0.5	B9,B10	5	2.50	5	2.50	5	2.50	5	2.50	5	2.50	25	12.50
20	Commercial production of location specific traditional vegetables (Athalakkai, PaluPavakkai, Mullukathiri, Poiyurkathiri, Kottapattikathiri etc.,)	Ha	0.5	B1,B3,B4,B8, B9,B11	10	5.00	10	5.00	10	5.00	10	5.00	10	5.00	50	25.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
III	**Area expansion of Medicinal and Aromatic plants**															
21	Neem	Ha	0.4483	B3,B4,B9,B10	2	0.90	2	0.90	2	0.90	2	0.90	2	0.90	10	4.5
22	Amla	Ha	0.7771	All Blocks except B5,B6,B7,B12	10	7.77	10	7.77	10	7.77	10	7.77	10	7.77	50	38.85
23	Coleus	Ha	0.5141	B9,B10	100	51.41	100	51.41	100	51.41	100	51.41	100	51.41	500	257.05
24	Vettiver	Ha	0.3	B3,B8,B12	100	30.00	100	30.00	150	45.00	100	30.00	100	30.00	550	165.00
IV	**Area expansion of Spices crops**															
25	Seed and Rhizomatic spices (Coriander, Turmeric, Ginger, Dry Chilly, Cumin, Fennel, Fenugreek, Dil, Cardamom etc.,)	Ha	0.3	All Blocks	50	15.00	50	15.00	50	15.00	75	22.50	50	15.00	275	82.50
26	Perennial spices (Pepper, Curry leaf, All spice, Cinnamon, Clove, Tamarind, Nut	Ha	0.5	B1,B3,B4,B8,B9, B10,B13	10	5.00	10	5.00	10	5.00	10	5.00	10	5.00	50	25.00
V	**Area expansion of Flower crops**															
27	Loose flowers – Jasminum sp, Crossandra, Marigold, Rose, Chrysanthemum , Nerium, Torenia	Ha	0.4	All Blocks	100	40.00	100	40.00	100	40.00	100	40.00	100	40.00	500	200.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
28	Bulbous flowers - Tube rose, Gladioli, Dahlia, Bird of paradise, Heliconia, Tulip	Ha	1.5	All Blocks	25	37.50	25	37.50	25	37.50	25	37.50	25	37.50	125	187.50
VI	**Area expansion /Gap filling of Plantation crops**															
29	Cocoa	Ha	0.5	All Blocks except B4,B9,B10,B13	10	5.00	10	5.00	10	5.00	10	5.00	10	5.00	50	25.00
30	Cashew	Ha	0.5	All Blocks except B2,B9	200	100.00	250	125.00	250	125.00	250	125.00	250	125.00	1200	600.00
31	Betelvine	Ha	0.5	B5	5	2.50	5	2.50	5	2.50	5	2.50	5	2.50	25	12.50
32	Coconut	Ha	0.5	All Blocks except B6,B9,B10,B13	10	5.00	10	5.00	10	5.00	10	5.00	10	5.00	50	25.00
33	Bamboo and Other crops	Ha	0.6	All Blocks except B13	10	6.00	10	6.00	10	6.00	10	6.00	10	6.00	50	30.00
VII	**Rejuvenation/INM-IPM/Mulching/Anti bird net**															
34	Mango/Cashew - Rejuvenation	Ha	0.4	All Blocks except B2,B9	650	260.00	650	260.00	650	260.00	650	260.00	650	260.00	3250	1300.00
35	INM/IPM for Horticultural crops	Ha	0.04	All Blocks	100	4.00	100	4.00	100	4.00	100	4.00	100	4.00	500	20.00
36	Mulching	Ha	0.32	All Blocks	50	16.00	50	16.00	50	16.00	50	16.00	50	16.00	250	80.00
VIII	**Pollination Support through Bee Keeping**															
37	Bee hive & Colony	No	0.04	All Blocks	300	12.00	300	12.00	300	12.00	300	12.00	300	12.00	1500	60.00
38	Honey Extractor	No	0.2	All Blocks	30	6.00	30	6.00	30	6.00	30	6.00	30	6.00	150	30.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
IX	**Organic Farming**															
39	Organic farming and PGS certification in 50 acre cluster	1 cluster	14.95	B1,B3,B8,B11, B13	1	14.95	1	14.95	1	14.95	1	14.95	1	14.95	5	74.75
40	HDPE Vermibed	No	0.16	All Blocks	50	8.00	50	8.00	50	8.00	50	8.00	50	8.00	250	40.00
X	**Rainfed Area development**															
41	Integrated farming system - Horticulture Based farming	Ha	0.5	B9,B10	150	75.00	150	75.00	150	75.00	150	75.00	150	75.00	750	375.00
42	Green manuring	Ha	0.04	B9,B10	20	0.80	20	0.80	20	0.80	20	0.80	20	0.80	100	4.00
43	Moisture stress management - Minimum irrigation gurantee by PUSA hydrogel	Ha	0.1	B9,B10	25	2.50	25	2.50	25	2.50	25	2.50	25	2.50	125	12.50
B	**Infra structures and Assets creation**															
44	Poly Green House	1000 Sq.m	9.35	B1,B3,B8,B11	1	9.35	1	9.35	1	9.35	1	9.35	1	9.35	5	46.75
45	Shade net	1000 Sq.m	7.1	B1,B3,B8,B11	1	7.10	1	7.10	1	7.10	1	7.10	1	7.10	5	35.50
II	**Mushroom production**															
46	Cottage mushroom unit	1 No.	1	B3	0	0.00	0	0.00	0	0.00	1	1.00	1	1.00	2	2.00
III	**Vermic compost unit**															
47	Permanent Vermicompost Unit	600 cu.ft	1	B1,B3,B8, B9	5	5.00	5	5.00	5	5.00	5	5.00	5	5.00	25	25.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
V	**District Horticulture information and training centre**															
VI	**Community seed bank**															
C	**Special interventions**															
48	Offseason Annual Moringa production - Pod	Ha	1.25	All Blocks except B10	20	25.00	20	25.00	20	25.00	25	31.25	25	31.25	110	137.50
49	Offseason Annual Moringa production -Leaf	Ha	2	All Blocks	10	20.00	10	20.00	10	20.00	10	20.00	9.5	19.00	49.5	99.00
50	Farm deficiency correction	Ha	0.04	All Blocks	150	6.00	150	6.00	150	6.00	150	6.00	150	6.00	750	30.00
51	Promotion of Roof top Garden/ Potager garden Kit	No	0.005	All Blocks	200	1.00	200	1.00	200	1.00	200	1.00	200	1.00	1000	5.00
52	Promotion of Roof top Garden/ Potager garden Kit with shadenet	No	0.0735	All Blocks except B6,B7,B10,B12	10	0.74	10	0.74	10	0.74	10	0.74	10	0.74	50	3.70
53	Banana Bunch Sleeve	Ha	0.25	All Blocks except B2,B9,B10	200	50.00	200	50.00	200	50.00	200	50.00	200	50.00	1000	250.00
54	AESA based IPM in fruits and vegetables Pheramone trap	Ha	0.04	All Blocks	100	4.00	100	4.00	100	4.00	100	4.00	100	4.00	500	20.00
55	AESA Based IPM in fruits and vegetables Yellow sticky trap	Ha	0.04	All Blocks	100	4.00	100	4.00	100	4.00	100	4.00	100	4.00	500	20.00
56	AESA Based IPM in fruits and	Ha	0.08	All Blocks	100	8.00	100	8.00	100	8.00	100	8.00	100	8.00	500	40.00

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
	vegetables Light trap															
57	Coastal area development programme - Public	Per village	1	B8	1	1.00	0	0.00	0	0.00	1	1.00	0	0.00	2	2.00
D	**Post Harvest Management**															
58	Pack house (9m X 6m)	1 No	4	All Blocks except B4,B5,B6,B10, B12,B13	5	20.00	2	8.00	5	20.00	5	20.00	2	8.00	19	76.00
59	Low cost onion structure 25 mt	1 No	1.75	B3,B8	2	3.50	2	3.50	2	3.50	2	3.50	2	3.50	10	17.50
60	Pre cooling unit 6 mt	1 No	25	B3	1	25.00	0	0.00	1	25.00	0	0.00	1	25.00	3	75.00
61	Mobile pre cooling unit	1 No	25	B1,B3	0	0.00	1	25.00	0	0.00	1	25.00	0	0.00	2	50.00
62	Retail outlet	1 No	15	B3,B11	0	0.00	1	15.00	0	0.00	1	15.00	0	0.00	2	30.00
63	Market intervention - Mobile vending cart	1 No	0.3	All Blocks except B2,B6,B10	10	3.00	10	3.00	10	3.00	10	3.00	10	3.00	50	15.00
E	**Development of Farms, Nurseries and Parks**															
64	Developmental activities in new/ existing state Horticultural farm, Keelapalur	No	25	B3,B4,B8,B9	1	25.00	0	0.00	1	25.00	0	0.00	2	50.00	4	100.00
F	**Mechanization - Machineries, Equipments & Tools**															

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
65	Power tiller/Tractor/ Minitractor	Nos	1	All Blocks except B5,B7,B9,B10,B13	5	5.00	5	5.00	5	5.00	5	5.00	5	5.00	25	25.00
66	Land development, tillage and seed bed preparation equipments	Nos	0.3	B1,B9	2	0.60	2	0.60	2	0.60	2	0.60	2	0.60	10	3.00
67	Tractor Mounted / Operated Sprayer (Below 20HP)	Nos	0.2	B11	2	0.40	2	0.40	2	0.40	2	0.40	2	0.40	10	2.00
68	Fruit Plucker, Tree pruners, Fruit Harvester, Fruit Graders, Track Trolley, Nursery Media Filling Machine, Power operated horticulture tools for pruning, budding, grating, shearing etc.	No	2.5	B1,B3,B8,B11, B13	5	12.50	5	12.50	5	12.50	5	12.50	5	12.50	25	62.50
69	Hand operated sprayer with face mask	Nos	0.025	All Blocks except B2	10	0.25	10	0.25	10	0.25	10	0.25	10	0.25	50	1.25
70	Power operated sprayer	Nos	0.05	All Blocks	50	2.50	50	2.50	50	2.50	50	2.50	50	2.50	250	12.50
71	Plastic crates for vegetable & fruits handling	No of sets containing 10crates	0.075	All Blocks	100	7.50	100	7.50	100	7.50	100	7.50	100	7.50	500	37.50

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
72	Turmeric Boiler		2.5	B9	0	0.00	0	0.00	1	2.50	0	0.00	1	2.50	2	5.00
73	Turmeric Polishing Machine		0.88	B9	0	0.00	0	0.00	1	0.88	0	0.00	1	0.88	2	1.76
74	5 layered Polythene spread sheets for drying horticulture produce	No	0.16	All Blocks	100	16.00	100	16.00	100	16.00	100	16.00	100	16.00	500	80.00
G	**Water / Irrigation Management**															
75	Micro Irrigation - Drip	Ha	1.12	All Blocks	750	840.00	750	840.00	750	840.00	750	840.00	750	840.00	3750	4200.00
76	Rain gun	Ha	0.34	All Blocks except B1,B2,B5,B7,B11	75	25.50	75	25.50	75	25.50	75	25.50	75	25.50	375	127.50
77	Sprinkler	No	0.195	All Blocks except B3,B11	25	4.88	25	4.88	25	4.88	25	4.88	25	4.88	125	24.40
78	Water harvesting system for individuals	No	1.5	B9	0	0.00	1	1.50	0	0.00	1	1.50	0	0.00	2	3.00
H	**Capacity Building**															
79	Training to farmers within the State. 2 days Rs.1000/farmer/ day	No	0.02	All Blocks	100	2.00	100	2.00	100	2.00	100	2.00	100	2.00	500	10.00
80	Training to farmers outside the state. 30 farmers/Batch	No	0.105	All Blocks	5	0.53	5	0.53	5	0.53	5	0.53	5	0.53	25	2.65
81	Exposure visit to	No	0.05	All Blocks	7	0.35	7	0.35	7	0.35	7	0.35	7	0.35	35	1.75

Sl. No.	Interventions	Unit	Unit cost	Blocks covered	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
	farmers for 5 days. Rs.1000/farmer/ day															
82	District level seminar	No	2	B1,B3,B8,B13	1	2.00	1	2.00	1	2.00	1	2.00	1	2.00	5	10.00
83	Computerization & governance	No	1	B1,B3,B8,B9,B11	1	1.00	1	1.00	1	1.00	1	1.00	1	1.00	5	5.00
84	Publicity and Documentation	No	0.5	All Blocks except B5,B7,B10,B11	2	1.00	2	1.00	2	1.00	2	1.00	2	1.00	10	5.00
I	**Crop Insurance and Risk Mitigating schemes**															
85	Crop Insurance	Ha	0.025	All Blocks	10000	250.00	10000	250.00	10000	250.00	10000	250.00	10000	250.00	50000	1250.00
	Grand Total					**4886.03**		**4907.03**		**4945.91**		**4934.78**		**4950.16**		**24623.91**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.3. Agricultural Engineering

Agricultural mechanization is the process whereby equipments, machineries and implements are utilized to boost agricultural and food production. It is the application of machineries, equipments and implements in the day to day farm activities to increase marginal output in food production and poverty eradication. It increases productivity of land and labour by meeting timeliness of farm operations and increase work out-put per unit time. Besides its paramount contribution to the multiple cropping and diversification of agriculture, mechanization also enables efficient utilisation of inputs such as seeds, fertilisers, and irrigation water. The agricultural mechanization is the only way out to face the challenge of farm worker's shortage. Thus the ultimate objective of Agricultural Mechanization Strategies in developing countries is to help increase the welfare of farm households and create positive dynamics and opportunities for economic growth in rural areas.

Strategies:

- ✓ Promotion and strengthening of Agricultural Mechanization through training, Testing and Demonstration in order to ensure performance testing of agricultural machinery and equipment, capacity building of farmers and end users and promoting farm mechanization through demonstrations covering all blocks.
- ✓ Training of rural youth in workshops has to be implemented in all blocks except Kattumannarkoil, Kammapuram and Parangeipettai.
- ✓ Financial assistance for post harvest equipments have to implement in Annagramam, Cuddalore, Kumaratchi, Melbhuvanagiri and Panruti blocks.
- ✓ Promotion of ownership to small and marginal farmers for various agricultural machinery and equipments such as Tractors, Power tillers, Rice transplanter, Self-propelled machinery, Tractor/Power tiller drawn equipments (MB Plough, Disc plough, Cultivator, Harrow, Leveler Blade, Ridger, Laser Land Leveller, Reversible Mechanical Plough, Rotavator, Rotopuddler, Reversible Hydraulic Plough, Post hole digger, Reaper, Seed driller, Balers, Coconut thrash cutter, coconut frond chopper, Multi crop thresher, Paddy thresher, Brush cutter, Chaff cutter, Drum Seeder) and Plant protection equipments covering all blocks.
- ✓ Provision of suitable financial assistance to establish farm machinery banks for custom hiring for appropriate locations and crops covering all blocks except Annagramam, Kammapuram, Kurunjipadi and Mangalur blocks

- ✓ Establishment of Hi-tech, high productive equipments hub for custom hiring in all blocks except Parangeipettai.
- ✓ Tractor hiring scheme for purchase of tractor have to implement in all blocks except Kattumannarkoil, Kurunjipadi and Mangalur.
- ✓ Minor Irrigation scheme have to implement in all blocks.
- ✓ Introduction of renewable energy in the villages which would replace other fuels. Also attractive for water pumping applications in remote areas. Hence solar operated photovoltaic water pumping system provides better sustainable alternative option to fulfill irrigation requirement of agriculture.
- ✓ Strengthening of communication and information facilities in order to disseminate the information in rural areas covering all blocks.
- ✓ Awareness to be created towards the usage of Sugarcane infielder and self-propelled horticultural machinery which indirectly increase the production covering all blocks.
- ✓ Promotion of agro-processing and management machinery at community level through supply of post-harvest machinery such as self-propelled/other driven horticultural machinery (Chain saw/ wheel barrow/ Mango grader/ planter and other suitable self-propelled machineries and equipments), Manual horticultural equipments (Aluminium ladder/ Ladder, Aluminium pole, Plucker), Post-harvest equipments for grains, oil seeds and Horticultural crops (Mini Rice mill, Mini Dhall mill, Millet Mill, Oil mill with filters, Extractor, pomegranate air extractor, Custard apple pulper, Dehydration unit, Pricking Machine, Humidifier, Packing machine, power driven dehusker, thresher, Harvester, De-spiking, Deconing, Peeler, Splitter, Stripper, Boiler, Steamer, Dryer solar, Washing Machine, Grinder, Pulveriser, Polisher, Cleaner cum grader, gradient separator, Specific gravity separator) this would make sure that more value is added to farm outputs locally covering all blocks.
- ✓ Establishment of Agricultural Engineering Extension centres in order to collect information related to Government subsidy on agricultural / machineries / equipment / irrigation systems etc., compilation of latest technologies related to Agricultural Engineering and Development of video cassettes library related to Processing of agricultural products, Working of important agricultural machines and equipment and Repair, maintenance and proper setting of the different agricultural Machines / and equipment covering all blocks.
- ✓ Promotion of training to AED engineers on post-harvest techniques and bio energy.

- ✓ Prevention of sea water intrusion through construction of subsurface dyke, Village pond, Community pond, Weir/ bed and reclamation of problem soil have to implement in all blocks.

Expected outcome

Implementation of the above strategies such as supply of farm implements to carry out mechanised cultivation operations and demonstration to farmers the advantage of using Agricultural implements and machinery would increase the production and productivity. Post- Harvest Technologies to farmers would prevent loss of food grains during harvest and storage and Preserve the quality of produce in respect of perishable commodities. Disseminated technologies on renewable energies, in particular, solar energy for agricultural activities in respect of pumping with solar powered pumps, drying farm produce for enhancement of quality to fetch reasonable market price.

Budget

The overall budget requirement for implementation of above interventions is **₹ 14300.41 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.20**.

Implementing agency

The projects will be implemented by the Department of Agricultural Engineering.

Table 4.20 Budget Requirement for Agricultural Engineering in Cuddalore District

(₹ in lakhs)

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Capacity Building															
1	Demonstration of Agricultural Machinery	No's/Ha	0.04	All Blocks	26	1.04	26	1.04	26	1.04	26	1.04	26	1.04	130	5.20
2	Training of farmers	No's/Ha	0.04	All Blocks	50	2.00	100	4.00	100	4.00	50	2.00	50	2.00	350	14.00
3	Training of Rural Youth in workshops	No's/Ha	0.04	All Blocks Except B4, B3 , B12	20	0.80	20	0.80	20	0.80	20	0.80	20	0.80	100	4.00
4	Demonstration of Post Harvest Technologies	No's/Ha	0.04	All Blocks	13	0.52	13	0.52	13	0.52	13	0.52	13	0.52	65	2.60
5	Financial assistance for Post Harvest Equipment	No's/Ha	4	B1,B2,B6 ,B9,B11	5	20.00	10	40.00	5	20.00	10	40.00	5	20.00	35	140.00
	Tractors															
6	Tractor (15-20 PTO HP)	No's/Ha	4	All Blocks	125	500.00	125	500.00	100	400.00	100	400.00	100	400.00	550	2200.00
7	Tractor (40-70 PTO HP)	No's/Ha	8.5	All Blocks	60	510.00	60	510.00	50	425.00	40	340.00	30	255.00	240	2040.00
	Power Tillers															
8	Power Tiller (8 BHP & above)	No's/Ha	1.75	All Blocks	300	525.00	240	420.00	240	420.00	220	385.00	200	350.00	1200	2100.00
	Rice Transplanter															
9	Self Propelled Rice Transplanter (4 rows)	No's/Ha	2.5	All Blocks	60	150.00	60	150.00	50	125.00	40	100.00	30	75.00	240	600.00
10	Self Propelled Rice Transplanter (Above 4-8 rows)	No's/Ha	16	B2, B3, B7, B9, B11	2	32.00	2	32.00	2	32.00	2	32.00	2	32.00	10	160.00
	Land Development, tillage and seed															

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	bed preparation equipments															
11	Cultivator	No's/Ha	0.3	All Blocks	30	9.00	30	9.00	30	9.00	30	9.00	30	9.00	150	45.00
12	Rotavator	No's/Ha	0.95	All Blocks	20	19.00	20	19.00	20	19.00	20	19.00	20	19.00	100	95.00
13	Rotopuddler	No's/Ha	1.4	All Blocks	150	210.00	150	210.00	150	210.00	150	210.00	150	210.00	750	1050.00
	Equipments for Residue management/Hay and Forage Equipments															
14	Balers (Round)	No's/Ha	3.5	All Blocks	20	70.00	20	70.00	20	70.00	15	52.50	15	52.50	90	315.00
	All Manual/animal drawn equipment/implements / Tools															
15	Drum Seeder (Above 4 Row)	No's/Ha	0.15	All Blocks	10	1.50	10	1.50	10	1.50	10	1.50	10	1.50	50	7.50
	Plant protection equipments															
16	Manual sprayer: Knapsack/foot operated sprayer	No's/Ha	0.01	All Blocks	600	9.00	600	9.00	600	9.00	600	9.00	600	9.00	3000	45.00
17	Powered Knapsack Sprayer/Power operated Taiwan sprayer (capacity 8-12 lts)	No's/Ha	0.06	All Blocks	30	1.80	30	1.80	30	1.80	30	1.80	30	1.80	150	9.00
18	Establishment of Farm Machinery Banks for Custom Hiring	No's/Ha	28	All Blocks Except B1 , B4, B7, B8	8	224.00	0	0.00	0	0.00	0	0.00	0	0.00	8	224.00
19	Establishment of Hi-Tech, High Productive Equipment Hub for Custom Hiring	No's/Ha	112	All Blocks Except B12	3	336.00	3	336.00	3	336.00	3	336.00	3	336.00	15	1680.00

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Tractor Hiring Scheme															
20	Purchase of Tractors for AED	No's/Ha	8	All Blocks Except B3,B7,B8	5	40.00	5	40.00	0	0.00	0	0.00	0	0.00	10	80.00
21	Purchase of Tractor drawn implemnets for AED	No's/Ha	0.5	All Blocks Except B1,B2,B7	15	7.50	15	7.50	0	0.00	0	0.00	0	0.00	30	15.00
22	Purchase of Balers for AED	No's/Ha	4.5	All Blocks	3	13.50	3	13.50	0	0.00	0	0.00	0	0.00	6	27.00
	Minor Irrigation Scheme															
23	Purchase of Rotary Drill for AED	No's/Ha	72	All Blocks	3	216.00	2	144.00	0	0.00	0	0.00	0	0.00	5	360.00
24	Purchase of Air Compressor 750 cfm for AED	No's/Ha	25	All Blocks	1	25.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
25	**Solar pump 7.5 hp**	No's/Ha	5.3	All Blocks	1	5.30	0	0.00	0	0.00	0	0.00	0	0.00	1	5.30
	Any other innovative schemes of AED with Components & its unit cost															
26	Infrastructure like packing unit,godown,cattle shed and Threshing floor	No's/Ha	1	All Blocks	3	3.00	0	0.00	0	0.00	0	0.00	0	0.00	3	3.00
	Information Technology (IT) related items															
27	Computer & its accessories	No's/Ha	0.8	All Blocks	4	3.20	0	0.00	0	0.00	4	3.20	0	0.00	8	6.40
28	Tablet (Tab)	No's/Ha	0.25	All Blocks	2	0.50	0	0.00	0	0.00	2	0.50	0	0.00	4	1.00

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
29	Xerox machine	No's/Ha	1.5	All Blocks	4	6.00	0	0.00	0	0.00	4	6.00	0	0.00	8	12.00
30	**Sugarcane Infielder**	No's/Ha	7	All Blocks	1	7.00	1	7.00	1	7.00	1	7.00	1	7.00	5	35.00
	Self propelled / other power driven Horticultural Machinery															
31	Chain saw/ Wheel barrow/ Mango grader/ planter and other suitable self propelled machineries and equipments for horticulture Crops	No's/Ha	1	All Blocks	15	15.00	12	12.00	15	15.00	15	15.00	15	15.00	72	72.00
	Manual Horticultural Equipments	No's/Ha														
32	Aluminium Ladder/ Ladder	No's/Ha	0.2	All Blocks	15	3.00	12	2.40	0	0.00	15	3.00	15	3.00	57	11.40
33	Aluminium pole	No's/Ha	0.03	All Blocks	12	0.36	0	0.00	0	0.00	0	0.00	0	0.00	12	0.36
34	Plucker	No's/Ha	0.02	All Blocks	15	0.30	15	0.30	15	0.30	15	0.30	15	0.30	75	1.50
	Post HarvestEquipments for food grains, oil seeds and Horticultural Equipments															
36	Mini Rice Mill	No's/Ha	1.5	All Blocks	3	4.50	3	4.50	3	4.50	3	4.50	3	4.50	15	22.50
37	Mini Dal Mill	No's/Ha	1.7	All Blocks	3	5.10	3	5.10	3	5.10	3	5.10	3	5.10	15	25.50
38	Millet Mill	No's/Ha	1.5	All Blocks	1	1.50	1	1.50	1	1.50	1	1.50	1	1.50	5	7.50
39	Oil mill with filter press (for all type of Horticulture / Food	No's/Ha	1.2	All Blocks	1	1.20	1	1.20	1	1.20	1	1.20	1	1.20	5	6.00

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	grain / Oil seeds crop)															
40	Extractor (for all type of Horticulture / Food grain / Oil seeds crop)	No's/Ha	1	All Blocks	1	1.00	1	1.00	1	1.00	1	1.00	1	1.00	5	5.00
41	Packing Machines (for all types of Horticulture / Food grain / Oil seeds crop)	No's/Ha	3	All Blocks	15	45.00	15	45.00	15	45.00	15	45.00	15	45.00	75	225.00
42	All types of Power driven Dehusker/ sheller/ Threshers/ Harvesters/ De-spiking/ Deconing Machine/ Peeler/ Splitter/ Stripper (for all type of Horticulture / Food grain / Oil seeds crop)	No's/Ha	1.2	All Blocks	3	3.60	3	3.60	3	3.60	3	3.60	3	3.60	15	18.00
43	All types of Washing Machines (for all type of Horticulture / Food grain / Oil seed crop)	No's/Ha	1.5	All Blocks	3	4.50	3	4.50	3	4.50	3	4.50	3	4.50	15	22.50
44	All types of Grinder/ Pulveriser/ Polisher (for all type of Horticulture / Food grain / Oil seed crop)	No's/Ha	0.3	All Blocks	12	3.60	12	3.60	12	3.60	12	3.60	12	3.60	60	18.00
45	All types of Cleaner cum grader/ Gradient separator/ Specific gravity separator	No's/Ha	0.75	All Blocks	15	11.25	15	11.25	15	11.25	15	11.25	15	11.25	75	56.25

Sl. No	Interventions	Unit	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	(for all types of Horticulture / Food grain / Oil seed crop)															
46	Construction of Agricultural Engineering Extension centres (AEECs)	No's/Ha	75	All Blocks	2	150.00	2	150.00	0	0.00	0	0.00	0	0.00	4	300.00
47	Training of AED Engineers on " Agricultural Processing" and " Bio- Energy"	No's/Ha	0.04	All Blocks	2	0.08	2	0.08	2	0.08	2	0.08	2	0.08	10	0.40
	Prevention of sea water intrusion	No's/Ha														
48	Subsurface dyke	No's/Ha	15	All Blocks	0	0.00	3	45.00	3	45.00	4	60.00	4	60.00	14	210.00
49	Village pond/community pond	No's/Ha	5.5	All Blocks	0	0.00	40	220.00	45	247.50	45	247.50	45	247.50	175	962.50
50	Farm Pond	No's/Ha	1	All Blocks	0	0.00	10	10.00	10	10.00	10	10.00	10	10.00	40	40.00
51	Weir/ Bed Dam	No's/Ha	30	All Blocks	5	150.00	0	0.00	0	0.00	0	0.00	0	0.00	5	150.00
52	Reclamation of Problem(Alkaline & Saline) soils	No's/Ha	0.6	All Blocks	1100	660.00	150	90.00	150	90.00	0	0.00	0	0.00	1400	840.00
	Total					**4008.65**		**3137.69**		**2580.79**		**2373.99**		**2199.29**		**14300.41**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.5. Agricultural Marketing

The Government is taking every effort to attain sustainable agricultural development by transforming agriculture into a commercial venture, by switching over to new scientific methods of cultivation so as to increase the productivity manifold. Besides, through value addition, processing and utilization of the marketing opportunities, the incremental output can be ensured. To further improve the marketing opportunities and to reduce the loss of agricultural produces, several measures have to be taken up by way of interventions like promotion of commodity groups and market information, strengthening of Uzhavar shandies and regulated markets, construction of storage godown, provision of market access and market activities, supply chain and post-harvest management, infrastructure and assets, and capacity building of farmers.

The core problem however in Agribusiness development is the general failure in coordinating the decisions of the private stake holders *viz.,* farmers, traders and agricultural processors and service providers by the government and non-governmental sectors. In fact farmers fail to link themselves through effective producer-organizations to undertake joint decisions in production and marketing as well. Such weak linkages also due to limited access to relevant market intelligence and inadequate market infrastructure. Farmers are also poorly linked to research and extension service providers to address their specific technology and knowledge needs that would enable them into high-value production systems.

Entrepreneurs also have weak linkages with the farmers through contracts and vertical integration arrangements and are away from consumers because of absence of organized retail chains. Linkage with service providers are characterized by lack of confidence. The inadequacy in certification, quality assurance systems and inadequate infrastructure continues to limit the integration of production and international markets.

Agricultural produce are seasonal and perishable in nature. In a good season there may be a local glut, but because of insufficient transport facilities, lack of good roads and poor availability of packaging materials, the surplus cannot be taken quickly enough to the natural markets in urban areas. Moreover, the surplus often cannot be stored for sale in the off-season because of inadequate local storage facility; the farmers are often forced to market their produce at low price. Thus, the cultivars do not get a good price for their produce because of the glut, and some of it is spoiled resulting in complete loss. Currently

pulses are processed manually using thirugu, ural, chakki, *etc.*, which is laborious and time consuming. Due to existing problems in processing of pulses and millets, their market is not profitable for the farmers growing pulses. To reduce the loss of agricultural produce which are up to 30 per cent, necessary provisions are needed to ensure remunerative price to the produce, encourage processing from the present level of 10 per cent of the total.

So, to accelerate the growth substantially, a new way of linking of Agricultural produce and marketing and promoting Agribusiness are focused. Promotion of commodity groups, farmer producer agencies, marketing organization and market linkage, encouraging of private players in marketing, value addition, crop specific supply chain management, more infrastructural facilities for processing and sensitizing the farmers for market-led agriculture by rendering crop advisory and market information are focused. Agri-business also contributes to the production of higher-value products and diversification away from the staple foods. Through this diversification and the development of the value chain between producers and consumers, the rural economy benefits from innovation and the creation of non-farm employment.

Project components

- ✓ Promotion of commodity groups and market information through Establishment of Training Centre in Neyveli in Kattumannarkoil block
- ✓ Provision of Agmark Lab equipments in Panruti block
- ✓ Construction of Storage godown for commodity groups, drying yard and have to implement in all blocks
- ✓ Strengthening of RM at Kammapuram and Melbhuvanagirir block.
- ✓ Upgradation of Ulvazhar shandies in Cuddalore, Kattumannarkoil, Kammapuram and Vridhachalam blocks.
- ✓ Formation of commodity groups at Cuddalore block
- ✓ Provision of Machineries in Annagramam, Cuddalore, Kurunjipadi and Panruti blocks.
- ✓ Provision of plastic crates in all blocks except Annagramam, Cuddalore, Kumaratchi, Kurunjipadi and Panruti blocks.
- ✓ Supply power sprayers in Kurunjipadi block.
- ✓ Supply of Tarpaulins in all blocks.

- ✓ Supply of Travelling Microscope in Annagramam, Cuddalor, Kattumannarkoil, Kurunjipadi and Panruti blocks.
- ✓ Formation of Farmer Producer Organizations (FPO) in Annagramam, Kurunjipadi and Panruti blocks.
- ✓ Post-harvest Infrastructure and Machineries to minimize post-harvest losses in Annagramam, Cuddalore, Kattumannarkoil, Kurunjipadi, Mangalur, Nallur, Panruti and Vridhachalam blocks.
- ✓ Exposure visit (within state & outside state) for commodity group farmers to acquire value addition technologies covering all blocks

Budget

The district plan proposes an outlay of **₹ 5199.68 Lakhs** over a period of five years for Cuddalore district. The details of budget requirement for each intervention across the blocks are shown in **Table 4.21**.

Expected Outcome

The expected impact of the intervention will be increasingly competitive agribusiness sector leading to diversification, higher-value added products and higher incomes for farmers, farm workers and entrepreneurs and reduced rural poverty. The interventions will facilitate the development of a competitive agriculture sector, promoting diversification and contributing to the transformation of agriculture into a system producing higher value produces. The interventions will also provide higher-value for consumers, value that will be shared as distributed benefits to value chain stakeholders including farmers, entrepreneurs and workers.

Implementing Agency

The Block-level officials of the Department of Agricultural Marketing and Agri-Business will implement the programs

.

Table 4.21 Budget for Strengthening of Agricultural Marketing and Agri-Business in Cuddalore District

(₹ in lakhs)

Sl. No	Intervention	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Promotion of Commodity Groups and Market Information															
1	Establishment of Training Centre in Neyveli	1	320	B3	0	0.00	1	320.00	0	0.00	0	0.00	0	0.00	1	320.00
2	Provision of Agmark Lab equipments	1	0.05	B11	4	0.20	3	0.15		0.00		0.00		0.00	7	0.35
	Strengthening of UzhavarSandhai and Regulated Market															
3	Drying Yard	1	5	All Blocks	44	220.00	45	225.00	40	200.00	46	230.00	47	235.00	222	1110.00
4	Storage godown	1	15	All Blocks	9	135.00	13	195.00	18	270.00	23	345.00	23	345.00	86	1290.00
5	Strengthening of RM	Nos	275	B4, B9	2	550.00	0	0.00	0	0.00	0	0.00	0	0.00	2	550.00
6	Upgradation of UzhavarShadhais	1	1.5	B2, B3, B4, B13	1	1.50	60	90.00	0	0.00	0	0.00	0	0.00	61	91.50
	Formation of FPO / Strengthening of Existing Commodity Groups															
7	FPO	1	0.25	B1, B7, B11	30	7.50	30	7.50	30	7.50	30	7.50	30	7.50	150	37.50
8	Commodity Group	1	0.25	B2	10	2.50	10	2.50	10	2.50	10	2.50	10	2.50	50	12.50
	Provision of Market Access and Market Activities															

Sl. No	Intervention	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
9	Plastic crates	50	0.075	All Blccks except B1, B2, B6, B7, B11	900	67.50	1000	75.00	1000	75.00	1000	75.00	1000	75.00	4900	367.50
10	Power sprayer for 100 FIG groups(2 per FIG)	1	35.778	B7	1	35.78	0	0.00	0	0.00	0	0.00	0	0.00	1	35.78
11	Tarpaulin	1	0.08	All Blocks	300	24.00	300	24.00	330	26.40	340	27.20	340	27.20	1610	128.80
12	Travelling Microscope.	1	5	B1, B2, B3, B7, B11	4	20.00	4	20.00	2	10.00	1	5.00	0	0.00	11	55.00
	Post Harvest Infrastructure and Machinaries															
13	Minimizing Post Harvest Losses & Value addition	1	3	B1, B2, B3, B7, B8, B10, B11, B13	8	24.00	8	24.00	3	9.00	2	6.00	2	6.00	23	69.00
14	Animal Feed Production Unit	1	5	B8	1	5.00	0	0.00	0	0.00	0	0.00	0	0.00	1	5.00
15	Coconut Ladder	1	0.1	B1, B2, B7, B11	14	1.40	14	1.40	4	0.40	4	0.40	4	0.40	40	4.00
16	Csassava chipper	1	0.15	B8	2	0.30	2	0.30	1	0.15	0	0.00	0	0.00	5	0.75
17	Cocnut peeling Machine	1	2.5	B1, B2, B7, B11	3	7.50	3	7.50	1	2.50	1	2.50	1	2.50	9	22.50
18	Dhal processing Unit	1	0.3	B4, B5, B6, B12, B13	7	2.10	2	0.60	1	0.30	0	0.00	0	0.00	10	3.00
19	Groundnut decorticator (power)	1	0.45	B1, B2, B7, B8, B10, B11, B13	9	4.05	6	2.70	6	2.70	6	2.70	6	2.70	33	14.85
20	Groundnut Harvestor	1	1.5	B1, B2, B7, B11	4	6.00	3	4.50	1	1.50	1	1.50	1	1.50	10	15.00
21	Jack Fruit Pulvariser	1	2	B11	1	2.00	1	2.00	0	0.00	0	0.00	0	0.00	2	4.00
22	Maize Market Promotion Centre	1	360	B8	1	360.00	0	0.00	0	0.00	0	0.00	0	0.00	1	360.00

Sl. No	Intervention	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
23	Millet processing unit	1	4	B8, B10	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00	2	8.00
24	Mini combine harvester for paddy	1	0.15	B3, B8, B10, B13	5	0.75	5	0.75	0	0.00	0	0.00	0	0.00	10	1.50
25	Pop corn making machine	1	4	B8, B10	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00	2	8.00
26	Provision of turmeric post harvestmachinaries	2	25.05	All blocks	4	100.20	0	0.00	0	0.00	0	0.00	0	0.00	4	100.20
27	Solar Dryer	1	4	B8	1	4.00	1	4.00	0	0.00	0	0.00	0	0.00	2	8.00
28	Turmeric Solar dryer	1	5	B1, B2, B3, B7, B11	4	20.00	4	20.00	2	10.00	1	5.00	0	0.00	11	55.00
29	Supply chain Management-Upgradation of existing regulated market(Ripening chamber,Controlled atmosphere with conventional bin storage,Packhouse,ColdStorage,IQF,Collectionvan,E Auction Hall,Refeer van, Collection van}	1	68.5	B7	0	0.00	0	0.00	1	68.50	0	0.00	0	0.00	1	68.50
30	Turmeric boiler	1	0.1	B8	1	0.10	1	0.10	0	0.00	0	0.00	0	0.00	2	0.20
31	country chekku (Power)	3	48	B8	1	48.00	1	48.00	1	48.00	1	48.00	1	48.00	5	240.00
32	Wooden Oil Expeller	1	2	B8	1	2.00	1	2.00	1	2.00	1	2.00	1	2.00	5	10.00
	Capacity building Programme															

Sl. No	Intervention	Unit	Unit cost	Block covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
33	Exposure Visits - within state	1	0.75	All Blocks	13	9.75	13	9.75	13	9.75	13	9.75	13	9.75	65	48.75
34	Exposure Visits - outside state - 3 days	1	1.5	All Blocks	13	19.50	13	19.50	13	19.50	13	19.50	13	19.50	65	97.50
35	Training on Market led Extension, Agmarkgrading&Food safety, post harvest technology, Supply Chain Management, Grading-sorting-packing, Market linkages & Exports, Food processing and value addition at district level	1	0.3	All Blocks	38	11.40	38	11.40	38	11.40	38	11.40	38	11.40	190	57.00
	Total					**1708.03**		**1117.65**		**777.10**		**800.95**		**795.95**		**5199.68**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.6. Seed and Organic Certification

Seed is a critical input for long-term sustained growth of agriculture. Timely availability of certified quality seeds with good yield potential continues to be a decisive factor in agricultural production. Farmers in Tamil nadu state are well aware of the benefits of using quality seeds which include foundation, certified and truthfully labelled seeds. In our State, the seed replacement rate is being adopted as per the guidelines of Government of India. In order to achieve the target of doubling the income of farmers, timely availability of quality seeds is given utmost importance. Concerted efforts are essential in ensuring timely availability of seeds as well as increasing the Seed Replacement Rate (SRR). The National Mission on Seeds has been formulated with a view to upgrade the quality of farm saved seeds and also to enhance Seed Replacement Rate. The Department of Seed Certification & Organic Certification plays the supporting role in the enhancement of Seed Replacement Rate by certifying quality seeds in an increasing trend over the years.

Seed certification is a legally sanctioned system for quality control of seed multiplication and production. The immediate objective of seed certification is to supply high quality seed to farmers and other growers, which is true to identity, high in purity and germination capacity and free from certain pests and diseases. Seed quality is most important in crop production, as high quality seed is essential for good crop yields and good returns, and minimize the likelihood of crop failure. Moreover, growing consciousness of health hazards due to possible contamination of farm products from use of chemicals have immensely contributed to the revival of organic agriculture. Organic certification is a certification body for organic production which was established as a government department on 17 of May 2007. Thus the major focus of the department will be creation of new facilities for better certification by strengthening the lab facilities, and infrastructure, create more awareness on quality seed and organic agriculture through capacity building, expanding communication and networking facilities in order to enhance the activities on seed and organic certification.

Project components

- **Strengthening of Seed Testing laboratories**

Samples received in a seed testing laboratory should be processed through various stages in the laboratory as quickly as possible so that result may be sent to sender promptly. The space provided for seed testing, the arrangement of that space and furnishing available would contribute greatly in the efficient functioning of the laboratory. In order to carry out seed quality tests and maintaining the purity in the seed

testing laboratory the equipments such as Conductivity Meter, Dehuller/Scarifier, Blower, Hot Air oven, Incubator and Miscellaneous are required in all blocks.

- **Strengthening of communication and networking facilities**

Information on quality seed production techniques would be disseminating among the farmers and seed growers of all blocks.

Expected outcome

Enhancement of infrastructure facilities, capacity building, communication and networking would promote the quality of seed and organic certification.

Budget

The overall budget requirement for implementation of above interventions is **₹ 31.72 Lakhs**. The details of budget requirement for each intervention across the blocks are shown in **Table 4.22.**

Implementing agency

The projects will be implemented by the Directorate of seed and organic certification.

Table 4.22 Budget for Seed and Organic Certification in Cuddalore District

(₹ in lakhs)

Sl. No	Interventions	Blocks Covered	Unit	Unit cost	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
I	**Strengthening of Seed Certification lab**															
	Blower, Conductivity meter, Dehuller/Scarifier, Dehumidifier Air Conditioner, Digital moisture meter, Dunnage, Fabricated display Racks ,Geaser, Generator, Heater,Hot air oven,Humidifier,Incubator,Induction stove,Microscope,Moisture meter,Packing machine,R.O system,Sample racks,Seed Grinder,Sieve,Thermohydro meter,Dunnage,Trolley for carriages,Working chair,Working table, Miscellaneous,	All Blocks	No's	13.36	1.00	13.36	1.00	13.36	0.00	0.00	0.00	0.00	0.00	0.00	2.00	26.72
II	**Strengthening of communication and networking facilities**															
	Computer accessories	All Blocks	No's	0.5	10	5.00	0	0.00	0	0.00	0	0.00	0	0.00	10	5.00
	Total					**18.36**		**13.36**		**0.00**		**0.00**		**0.00**		**31.72**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.7. Animal Husbandry

Livestock have been an integral component of India's agricultural and rural economy since time immemorial, supplying energy for crop production in terms of draught power and organic manure, and in turn deriving their own energy requirements from crop byproducts and residues. Livestock are now more valued as source of food and contribute over one-fourth to the agricultural gross domestic product and engage about 9% of the agricultural labour force. The livestock sector has been growing faster than crop sector; however, in recent years, the growth both in livestock production and productivity has decelerated considerably. India's livestock sector is one of the largest in the world. It has 56.7% of world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4% equine, 1.5% pigs and 3.1% poultry. In 2010-11, livestock generated outputs worth Rs. 2075 billion which comprised 4% of the GDP and 26% of the agricultural GDP. The total output worth was higher than the value of food grains.

Animal Husbandry sector plays a crucial role in ensuring the welfare of rural population. A majority of farmers depend on Animal Husbandry for their livelihood. Moreover, livestock sector provides supplementary employment and sustainable source of income to many small and marginal farmers. Thus, this sector is emerging as an important sector, leveraging the rural economy. In addition, this sector provides a continuous flow of essential food products like milk, meat, eggs besides draught power, raw materials like wool and hides for industries, and manure. With increase in production of livestock products, livestock rearing is also considered as an avocation with high export potential. Distribution of livestock wealth is more egalitarian, compared to land and hence, from the equity and livelihood perspective, it is considered as an important component in poverty alleviation programmes.

Keeping view in this mind, various major interventions are being planned and proposed in the district agricultural plan to be implemented beyond 12th five year plan. The major interventions are:

- ✓ Increasing the availability of fodder through field level interventions
- ✓ Increasing the availability of fodder by strengthening farm infrastructure
- ✓ Livestock breeding management
- ✓ Livestock health
- ✓ Improving the livestock productivity
- ✓ Improving the service delivery at veterinary institutions
- ✓ Enhancing livestock management
- ✓ Capacity building

Increasing the availability of fodder through field level interventions

Livestock rearing is one of the major occupations in India and is making significant contribution to the country's GDP. The livestock population, over the years, has shown a steady growth on broadly two counts *i.e.* (i) increase in the number of stall feeding based bovine livestock *viz.* buffaloes and hybrid cattle, and (ii) increase in the number of free grazing based livestock like goats and sheep that can survive on the fast degrading pasturage. The animal husbandry sector has a good growth potential. However, further growth of the sector will be as much dependent upon the availability of fodder. The available data reveals that the present fodder availability in the country is well below requirement. The data also reveals that only about half of the annual fodder requirement is met from the cultivated fodder and crop residues, whereas open grazing and fodder availability from common property resources like forests, pastures, village commons, *etc.* fulfills the remaining half of the annual fodder requirement. The issue to be taken note of is that it is the open grazing and fodder availability from the common property resources that provides sustenance to a vast majority of households with animal husbandry as the only vocation.

The increasing number of livestock and the changing dynamics of animal husbandry practices require corresponding increase in the type of fodder needed to meet the requirements of these new situations. To overcome these issues the following field level interventions are proposed to improve the fodder availability.

- ✓ Fodder production to the farmers by hydrophonic methods covering all blocks.
- ✓ Distribution of Azolla trays and Silage grass in all blocks.
- ✓ Fodder plot development covering all blocks.
- ✓ Meikal land development covering all blocks
- ✓ Distribution of raingun to the farmers covering all blocks

Increasing the availability of fodder by strengthening farm infrastructure

The livestock sector is handicapped due to inadequate infrastructure facilities as a result of low productivity. Infrastructure development for animal husbandry is felt essential to provide the desired veterinary services in the interior pockets of the districts so as to enable the livestock owners living in the remote areas can avail the opportunities to consider AH activities as livelihood option and maximize profit through livestock sector. Adequately providing proper infrastructure and equipment to the veterinary health care institution is necessary for the timely diagnosis and treatment of

animal diseases. Further, emphasis has to be laid on optimum utilization of waste land to grow fodder.

Improved infrastructure facilities will provide improved veterinary services contributing to reduction in the incidences of animal diseases thereby increasing the overall productivity of animals. The Rural Veterinary Dispensaries are either functioning from rented premises or in dilapidated buildings. Further, functioning of Veterinary Institutions in the rental buildings do not satisfy the requirement of a typical Veterinary Institution and with a restricted scope for further expansion, these are not ideal infrastructure. This necessitates strengthening the infrastructure of the veterinary institutions to offer better delivery of services and to reshape it into knowledge resource centres where best practices can be disseminated to the farmers. The following infrastructure facilities will strengthen the fodder availability such as

1. Distribution of Buffalo units (5 Buffaloes), Development of Native chicken farms and Establishment of disposal pits for poultry unit covering all blocks.
2. Integrated farming (Goat+Cattle+Fish+Agriculture /Horticulture) have to implement in all blocks except Kammapuram, Panruti and Vridhachalam.
3. Milking Mechine has to implement in Kattumannarkoil.
4. Starting of Rural Backyard Poultry Scheme (50) to unemployed have to implement in all blocks except Annagramam, Cuddalore, Kattumannarkoil and Kurunjipadi.

Improving the livestock productivity

Although India is a major producer of livestock products the average productivity of livestock is lower compared to world average. Inadequate availability of feed and fodder, insufficient coverage through artificial insemination, low conception rates, non-availability of quality males for breeding, poor management practices, high mortality and morbidity losses due to diseases, inadequate marketing infrastructure and unorganized marketing are the other major concerns. To maximize the livestock productivity the following activities should be implement. The intervention have been propose are

1. Establishment of Infrastructure facilities for Veterinary Institutions, Providing solar lighting panels at veterinary institution, Package of Modern Veterinary Diagnostic Aids to Veterinary Institutions such as Computerized X rays, Ultrasound, Diathermy etc and Establishment of Ambulance facility for animals have to implement in all blocks.

2. Establishment of Mobile Disease Diagnostic Labs have to implement in all blocks except Cuddalore, Kattumannarkoil, Kammapuram, Keerapalayam, Melbhuvanagiri and Nallur.
3. Establishment of Mobile Veterinary Units has to implement in Annagramam block.
4. Establishment of surgical theatres at veterinary institution have to implement in Annagramam, Mangalur and Parangipettai blocks.

Enhancing livestock management

The country has rich and diverse genetic resources of livestock in the form of a large number of species, breeds, and strains within a species. India has some of the best breeds of cattle and buffaloes with traits for dairy, draught power and dual purposes, several carpet wool breeds of sheep, highly prolific breeds of goats and adaptive breeds of poultry. Such utility genes and breeds would be identified, conserved and utilized for breeding and research. The focus would be on conservation of indigenous breeds of livestock and poultry. By developing slaughter house, livestock shandy also is helpful to enhancing livestock management. The intervention have been propose are

- Conservation of Indigenous breeds and Livestock Shandy improvement works have to implement in all blocks

Capacity building

Educating the farmers about the advanced crop production technologies as well as the techniques will enrich the knowledge of farmers through conduct of trainings and demonstrations to the farmers, youths and young entrepreneurs. On field demonstrations are conducted on fodder production technologies, seed production, poultry farming and sheep farming etc.

Capacity building programme is to strengthen the capacities of farmers, indigenous and local communities, and their organizations and other stakeholders, to manage sustainable biodiversity so as to increase their benefits, and to promote awareness and responsible action, in the form of trainings, demonstrations, exposure visits, etc. To create awareness among the farmers the following trainings and campaigns have to be conducted.

1. Conducting Demonstrations, Camps and Campaigns in Cuddalore block.
2. Creating awareness of livestock management to the farmers through Training Programmes has to implement in all blocks except Melbhuvanagiri.

3. Conducting demonstration on enrichment of dry fodder and silo making for green fodder has to implement in all blocks except Kurunjipadi.

Budget

The major themes proposed in the plan for animal husbandry sector with a total budget out lay of **₹ 3642.05 Lakhs (Table 4.23).**

Implementing agency

The projects proposed will be implemented by the Department of Animal husbandry sector.

Table 4.23 Budget requirement for Animal Husbandry Sector in Cuddalore District

(₹ in lakhs)

Sl. No	Interventions	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Increasing the Availability of Fodder through Field level Interventions															
1	Fodder production to the farmers by Hydroponic methods	Nos	0.05	All Blocks	104	5.20	130	6.50	130	6.50	130	6.50	130	6.50	624	31.20
2	Distribution of Azolla trays	Nos	0.1	All Blocks	14	1.40	59	5.90	114	11.40	125	12.50	125	12.50	437	43.70
3	Distribution of Silage bags for conservation of fodder crops	Nos	0.03	All Blocks	600	180.00	660	19.80	680	20.40	680	20.40	700	21.00	3320	261.6
4	Fodder plot development	Nos	0.005	All Blocks	2700	13.50	3000	15.00	5200	26.00	5600	28.00	5600	28.00	22100	110.50
5	Meikal land development (incl infrastructure development)	acre	0.05	All blocks	400	20.00	400	20.00	400	20.00	200	10.00	200	10.00	1600	80.00
6	Distribution of Rain gun to Livestock farmers	acre	0.25	All Blocks	9	2.25	22	5.50	47	11.75	49	12.25	52	13.00	179	44.75
	Improving the Livestock Productivity															
7	Distribution of Buffalo units(5 Buffaloes)	Nos	0.6	All Blocks	85	51.00	98	58.80	110	66.00	120	72.00	130	78.00	543	325.80
8	Integrated farming (Goat+Cattle+Fish+Agriculture /Horticulture)	Nos	4.5	All Blocks except B4, B11, B13	5	22.50	4	18.00	5	22.50	4	18.00	6	27.00	24	108.00
9	Development of Native chicken farms	Unit	2	All Blocks	5	10.00	5	10.00	5	10.00	5	10.00	5	10.00	25	50.00
10	Establishment of disposal pits for poultry unit	Farm	1	All Blocks	25	25.00	25	25.00	25	25.00	25	25.00	25	25.00	125	125.00
11	Milking Mechine	Nos	1	B3	14	14.00	15	15.00	15	15.00	15	15.00	15	15.00	74	74.00
12	Starting of Rural Backyard Poultry Scheme (50) to unemployed	Nos	1.25	All Blocks except B1, B2, B7, B3	0	0.00	1	1.25	6	7.50	3	3.75	4	5.00	14	17.5
	Improving the Service Delivery at Veterinary															

Sl. No	Interventions	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Institutions															
13	Establishment of Infrastructure facilities for Veterinary Institutions	Nos	10	All Blocks	0	0.00	0	0.00	13	130.00	0	0.00	0	0.00	13	130.00
14	Establishment of Mobile Disease Diagnostic Labs	Nos	30	All Blocks except B2, B3, B4, B5, B9, B10	3	90.00	6	180.00	5	150.00	5	150.00	5	150.00	24	720.00
15	Establishment of Mobile Veterinary Units	Nos	20	B1	1	20.00	0	0.00	0	0.00	0	0.00	0	0.00	1	20.00
16	Establishment of surgical theatres at veterinary institution	Nos	10	B1, B8, B12	3	30.00	0	0.00	0	0.00	0	0.00	0	0.00	3	30.00
17	Providing solar lighting panels at veterinary institution	Nos	30	All Blocks	3	90.00	3	90.00	3	90.00	3	90.00	1	30.00	13	390.00
18	Package of Modern Veterinary Diagnostic Aids to Veterinary Institutions such as Computerized X rays, Ultrasound, Diathermy etc.	Nos	1	All Blocks	26	26.00	27	27.00	27	27.00	26	26.00	26	26.00	132	132.00
19	Establishment of Ambulance facility for animals	Nos	30	All Blocks	3	90.00	3	90.00	3	90.00	3	90.00	1	30.00	13	390.00
	Livestock Management	Nos	80	B2	1	80.00	1	80.00	0	0.00	0	0.00	0	0.00	2	160.00
20	Conservation of Indigenous breeds	Unit of 1000 animals	0.1	All Blocks	300	30.00	30	3.00	30	3.00	30	3.00	30	3.00	420	42.00
21	Livestock Shandy improvement works	Pack	10	All Blocks	1	10.00	1	10.00	1	10.00	1	10.00	1	10.00	5	50.00
	Capacity Building															
22	Conducting Demonstrations, Camps and Campaigns	Nos	200	B2	0	0.00	1	200.00	0	0.00	0	0.00	0	0.00	1	200.00
23	Creating awareness of livestock management to the farmers through	Nos	0.1	All Blocks except B9	76	7.60	82	8.20	118	11.80	124	12.40	135	13.50	535	53.50

Sl. No	Interventions	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Training Programmes															
24	Conducting demonstration on enrichment of dry fodder and silo making for green fodder	Nos	0.1	All Blocks except B7	76	7.60	77	7.70	108	10.80	129	12.90	135	13.50	525	52.50
	Grand Total					**826.05**		**896.65**		**764.65**		**627.7**		**527**		**3642.05**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.8. Dairy Development

The importance of dairying in a country like India hardly needs emphasize. India has vast resources of livestock, which play an important role in the national economy and also in the socioeconomic development of millions of rural households. India has one of the largest stocks of cattle and buffaloes: more than 50 per cent of the world's buffaloes and 20 per cent of its cattle. Dairy sector acts as an important source of income for rural families, plays a vital role in providing gainful employment and income generating opportunities in the district. Dairy industry in the country is expected to witness spectacular growth in 2017, according to experts.

During the last 10 years, the annual growth rate in Indian dairy industry is 4.6 per cent as compared to the global growth rate of 2.2 per cent. During this period, per capita consumption of milk in the country was 340 g a day as against 299 g globally. “India’s milk production has touched 155.4 metric tonnes during 2015-16. Consumption is increasing at a faster rate. However in the country more than 90 per cent of the dairying is at the subsistence level so the emerging trends have to increase the county’s milk production moreover. To fulfill the shortage in dairy sector the following interventions have been suggested.

Strengthening of milk storages and processing units

Clean milk production is a concept being used everywhere, where quality of milk has become prime importance. It has to be maintained throughout the milk supply chain right from the dairy farm environment to cooling & storage to its packaging. The machinery and equipment required depends on the level of mechanization desired and the scale of operation. However, some machinery and equipment are essentially required such as storage tanks, washer, coolers, pumps and processing equipment’s. Except for this some electrical installation also required to provide proper storage facilities.

The major interventions are,

- ✓ Milk storage tanks of various capacities covering all blocks.
- ✓ Milk pumps of various capacities covering all blocks.
- ✓ Point of scale machine and Billing system covering all Blocks
- ✓ Packing Machineries for milk, butter, Ghee, and other products covering all blocks.
- ✓ Plate type heater and Pasteurizers covering all blocks.

- ✓ Tub Washer, Can washer, Crates and conveyors system covering all blocks.
- ✓ Electrical installations (generators) in all blocks

Enhancing milk production and milk processing units

The quality of animals is critical in determining its milk productivity and hence overall production. Currently, low productivity per animal hinders development of the dairy sector. Despite being the world's largest milk producer, India's productivity per animal is very low, at 987 kg per lactation, compared with the global average of 2038 kg per lactation. The low productivity is a result of ineffective cattle and buffalo breeding programmes, limited extension and management on dairy enterprise development, traditional feeding practices that are not based on scientific feeding methods, and limited availability and affordability of quality feed and fodder. Animal health and breeding services provision, veterinary infrastructure development and vaccinations are the responsibility of the state government. These services have traditionally been provided for free or at a very subsidized rate but in the past few years it has been payable. state livestock development agencies are being set up as autonomous bodies to offer services in animal breeding in the form of procurement, production and distribution of breeding inputs (such as semen and liquid nitrogen), training and promotional activities. Despite these initiatives, the availability of services remains limited and extension activities in dairy management are woefully lacking. Let to get a better improvement in milk production than before the following inputs have been suggested.

- ✓ Provision of veterinary medicine covering all blocks.
- ✓ Fodder development equipment and seed material covering all blocks.
- ✓ Milk testing equipment's covering all blocks.
- ✓ Equipment's for artificial insemination covering all blocks.
- ✓ Milk society buildings and cow shed covering all blocks.
- ✓ Cryogenic containers covering all blocks.
- ✓ Weighing machines covering all blocks.
- ✓ Computer accessories covering all blocks.

Capacity building

India is the largest milk producer in the world with an annual production of over 155.4 metric tonnes of milk, yet the sector faces numerous issues. One of the major challenges facing the dairy sector is the growing gap between milk supply and demand. Another major challenge arises from the fact that more than 92 per cent of the animals are owned by

smallholders who had little ownership of land to manage them. The small farmers do not have sufficient resources and lack training in dairy sector that leads to poor animal health and low milk yield. Furthermore, the small farmers lack knowledge of modern breeding practices. To make the farmers as scholars in particular thing some trainings and camps has to be conducted. To make sure this the following intervention has been proposed.

- ✓ Training of personnel of MPCS, Union and federation covering all blocks.
- ✓ Infertility camps covering all blocks.

Marketing structures

Marketing is generally defined as the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. The word Dairy marketing means where the milk is kept and marketing. Dairy marketing truly came into the public consciousness with the introduction of the “Got milk” campaign in 1993. Marketing plays a vital role not only in stimulating production and consumption, but also in accelerating the pace of economic development. An efficient marketing system minimizes costs, increases returns to farmers by reducing the number of middlemen or by restricting the commission of marketing system. To increase the income in dairy sector the suitable marketing structure is vital. For that the following structures have been suggested

- ✓ Parlour structure covering all blocks.
- ✓ Milk product storage cabinets covering all blocks.
- ✓ Product billing system covering all blocks.

Quality control

Quality is a vital ingredient of a good brand. Remember the “core benefits” – the things consumers expect. These must be delivered well. To ensure the quality of the following interventions have been suggested

- ✓ Adulteration detection equipment’s covering all blocks.
- ✓ Milk testing equipment and laboratory covering all blocks.

Processing and value addition

While adding value to farm and livestock products before they reach the local and international market is one of the key aims of Vision 2030. Product diversification has

become an important aspect of business strategy with reasons for this increased focus being increased profitability, reduction in risk, increasing competition, higher growth and more efficient resource allocation. Value addition in the dairy value chain is still a challenge in our country. Value addition has been hailed as one of the solutions to the perishability challenge of milk by converting it to a more durable form and hence reducing farm losses. But only few of them undertake the value addition In India. To maximize the value addition in rural areas the following interventions have been suggested

- ✓ Dairy processing plants and its equipments covering all blocks.
- ✓ Water treatment plants and Reverse Osmosis have to implement in all blocks.
- ✓ Steam raisning plant in all blocks.

Development for dairy sector

Though the milk production has reached an all-time high in the district, the producers are not able to market the milk produced. This is mainly due to inadequate infrastructure available for procurement, processing of milk and marketing network. Providing proper infrastructure to the veterinary health care institutions is necessary for the timely diagnosis and treatment of animal diseases. An efficient management of cattle will be incomplete without a well-planned and adequate housing of cattle. Good quality milk is essential for production of good quality dairy products, taste and flavor, free from pathogens and long keeping quality. Immediately after milking, the milk must be cooled preferably to 4° C. This requires mechanical refrigeration or milk cooling tanks. These are expensive and can usually be afforded by large scale commercial farms. For small scale dairy farmers, setting up a milk cooling centre centrally may be the ideal solution. The following buildings have been proposed for better storage and improvement

1. Ware house for dairy products covering all blocks.

Budget

An outlay of **₹ 2112.00 lakhs** is proposed to fulfill the aforementioned interventions for five years. This foresighted implementation of developmental schemes in Dairy Sector has enabled to increase the per capita income of rural households in backward Districts. The details of budget requirement for each intervention across the blocks are shown in **Table 4.24**.

Implementing agency

The projects will be implemented by the Department of Dairy Development.

Table 4.24 Budget requirement for Dairy Development Sector in Cuddalore District

(₹ in lakhs)

Sl. No	Interventions	Blocks covered	Unit	Unit cost	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Strengthening of milk storage and processing units															
1	Milk Storage Tanks of various capacities	All blocks	1	15.00	0	0	2	30	0	0	0	0	0	0	2	30
2	Tub washer, Canwashers, Crate conveyor systems.	All blocks	1	10.00	0	0	1	10	0	0	0	0	0	0	1	10
3	Point of Sale Machines and billing systems	All blocks	1	0.25	0	0	0	0	1	0	0	0	0	0	1	0
4	Packing Machineries for milk, Butter, Ghee, SMP and Other Milk products	All blocks	1	18.00	0	0	0	0	2	36	0	0	0	0	2	36
5	Plate Heat type Chillers and pasteurizers	All blocks	1	10.00	0	0	2	20	0	0	0	0	0	0	2	20
6	Milk Pumps of Vaious capacities	All blocks	1	0.50	0	0	5	3	0	0	0	0	0	0	5	3
7	Generator of various capacities	All blocks	1	20.00	0	0	1	20	0	0	0	0	0	0	1	20
Enhancing milk productions and milk processing units																
8	Veterinary Medicine	All blocks	1	2.00	2	4	2	4	2	4	3	6	3	6	12	24
9	Two wheeler for AI technician	All blocks	1	0.50	5	3	5	3	5	3	5	3	10	5	30	17
10	Computer system with accessories	All blocks	1	0.50	2	1	2	1	2	1	2	1	2	1	10	5
11	Fodder seed materials	All blocks	1	0.25	5	1	5	1	5	1	10	3	30	8	55	14
12	Fodder development equipments like chaff cutter, Mower etc.,	All blocks	1	0.20	15	3	10	2	20	4	20	4	20	4	85	17
13	Bulk Milk coolers of Various capacities	All blocks	1	15.00	0	0	1	15	1	15	1	15	2	30	5	75
14	Milk cans	All blocks	1	0.04	200	7	200	7	200	7	300	11	300	11	1200	43
15	Electronic weighing scales of various capacities.	All blocks	1	0.30	5	2	5	2	5	2	5	2	5	2	25	10

Sl. No	Interventions	Blocks covered	Unit	Unit cost	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
16	Electronic milk testing equipments	All blocks	1	1.25	20	25	20	25	30	38	30	38	50	63	150	189
17	Milking machine	All blocks	1	0.80		0		0	50	40		0	50	40	100	80
18	Cow shed	All blocks	1	5.00	10	50	10	50	10	50	10	50	10	50	50	250
19	Society Buildings	All blocks	1	20.00	5	100	5	100	5	100	5	100	5	100	25	500
20	Cryogenic containers	All blocks	1	0.35	10	4	10	4	10	4	10	4	10	4	50	20
21	Equipments for Artificial Insemination	All blocks	1	0.50	2	1	2	1	2	1	3	2	3	2	12	7
Capacity building																
22	Training of personnel of MPCS, Union and Federation.	All blocks	1	0.05	50	3	50	3	200	10	200	10	200	10	700	36
23	Infertility Camps	All blocks	1	0.20	50	10	50	10	50	10	100	20	0	0	250	50
Marketing																
24	Parlour structures	All blocks	1	5.00	5	25	5	25	5	25	5	25	10	50	30	150
25	Milk product storage cabinets	All blocks	1	0.30	10	3	20	6	25	8	30	9	30	9	115	35
26	Product Billing systems	All blocks	1	0.30	10	3	10	3	25	8	30	9	30	9	105	32
Quality control																
27	Adulteration detection equipments	All blocks	1	4.00	0	0	1	4	0	0	0	0	0	0	1	4
28	Milk testing equipment and Laboratory.	All blocks	1	5.00	0	0	1	5	0	0	0	0	1	5	2	10
Processing of value addition																
29	Water Treatment Plants. Reverse Osmosis plant	All blocks	1	25.00	0	0	0	0	1	25	0	0	0	0	1	25
30	Steam raisning plant with accessories	All blocks	1	100.00		0		0		0	1	100		0	1	100
31	Dairy equipments	All blocks	1	50.00	0	0	1	50	1	50	0	0	0	0	2	100
Development of dairy sector																

Sl. No	Interventions	Blocks covered	Unit	Unit cost	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
32	Ware house for Dairy products	All blocks	1	200.00	0	0	0	0	0	0	1	200	0	0	1	200
	Total					**245**		**404**		**442**		**612**		**409**		**2112**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.9. Fisheries

Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about fourteen million people in different activities. With diverse resources ranging from deep seas to lakes in the mountains and more than 10% of the global biodiversity in terms of fish and shellfish species, the country has shown continuous and sustained increments in fish production since independence. Constituting about 6.3% of the global fish production, the sector contributes to 1.1% of the GDP and 5.15% of the agricultural GDP. The total fish production of 10.07 million metric tonnes presently has nearly 65% contribution from the inland sector and nearly the same from culture fisheries. Hence it's necessary to improve the fisheries development throughout the country.

In the Cuddalore district a coastal Length of 57.5 Km. from Nallavadu in the North and Thandavaraya Sholaganpettai in the South comprising of 46 fishing villages with total fishermen population of 47000. Among them 23840 are active fishermen and nearly 15000 fisherwomen are engaged in fishing related activities. There are 325 Mechanized fishing boats, 1723 FRP boats and 3000 FRP and wooden catamarans operating in this district. There are 35 Fishermen Cooperative Societies and 40 Fisherwomen Co-op societies are functioning in Cuddalore District. Thus the major objectives are implementing the welfare schemes through the Co-op societies and also some interventions are suggested to improve the fisheries development in this district.

Enhancement of fisheries production

Aquatic plants growing in ponds and lakes are beneficial for fish and wildlife. They provide food, dissolved oxygen, and spawning and nesting habitat for fish and waterfowl. Aquatic plants can trap excessive nutrients and detoxify chemicals. However, dense growths (over 25% of the surface area) of algae and other water plants can seriously interfere with pond recreation and threaten aquatic life. Water plants can restrict swimming, boating, fishing, and other water sports. Biological controls for aquatic vegetation have received considerable publicity. Several species of fish are herbivorous in that their principal diet is aquatic vegetation. One such species, the grass carp (also known as the white amur or Chinese carp), is being tested in various parts of the country. Hence in this district it is suggested to implement the biological control of aquatic weeds by stocking of Grass Carps in Aquatic Weed Infested water bodies with project cost of ₹ 30.00 lakhs covering all blocks.

Tremendous potential exists in India to augment fish production from freshwater aquaculture resources, which are spread across the length and breadth of the country. With concerted efforts to mobilize farmers to adopt fish farming, application of appropriate technologies for sustainable fish farming and fish seed production and availability of institutional finance, it would be possible to bring in substantial hikes in the annual fish production from the aquaculture sector within a span of 5 years. Hence in this district it suggested to implement the following intervention to enhance the production and growth of fisheries through Increasing Fishing Efficiency of Inland Fishermen and Fish Farmers, quality seed production through seed rearing in cages, Direct stocking of advanced fingerlings in irrigation tanks and panchayat tanks and Promotion of Ornamental fish culture with budget cost of ₹ 63.88 lakhs covering all blocks.

Infrastructure and assets

Fish Farming is an age old activity and in practice from ancient times. The successful fish culture requires ploughing of pond, addition of manure, stocking of fish seed; eradication of unwanted aquatic plants and animals, watering the pond; harvesting the crop and marketing of the produce. The fish culture technologies and economics are simple and understandable to the fish farmers. Hence the construction of fish ponds in this district is recommended for its commercial production with budget cost of ₹. 105.00 lakhs covering all blocks.

Also, the fishery wealth in the inshore waters is being overexploited due to excessive fishing pressure on the resources. Artificial reefs help in augmenting the productivity of the marine ecosystem. Artificial reefs act as habitats to marine aquatic organisms enhance the fish production through increased breeding activity and survival of young ones and act as a barrier for bottom trawling operations. Hence it is necessary to Install the artificial reefs in inshore areas and establishment of mini lab facilities in government fish farm of this district with budget cost of ₹ 130.00 lakhs covering all blocks.

Quality fish seed is the pre-requisite for successful fish farming. Department is using the techniques of hypophysation for the production of fish seed of culturable varieties. Brood stocks of required fish are maintained and sex-wise segregate is made two months before. The pairing is made and injected with calculated dose of pituitary gland or ovaprim, ovatide or ovpal is injected to male and female fish. Within the 6-8 hours of the injection eggs from female and sperm from male are released in the water. The fertilizer is external. Normally one kg fish releases about one lakh eggs. Hence it is necessary to construct the fish seed rearing centres in this district with budget cost of ₹ 600.00 lakhs covering all blocks.

Capacity Building

Effective extension support is essential for the promotion of Aquaculture in freshwater and brackish water areas. It is necessary to establish the information centres/data dissemination centres in Fishermen villages, animation camps in fisheries villages, seminars, exhibitions and workshop, and awareness centres for linking the fishing villages, marketing centres and the district offices. Hence in this district it is necessary to give training to fish farmers, organization of fish festival and providing Geo tube seawall and training wall to prevent in Coastal areas with budget of cost of ₹408.00 lakhs covering all blocks.

Budget

The budget requirement for fulfilling the above interventions is **₹ 1336.88 Lakhs (Table 4.25).**

Implementing agency

Department of Fisheries will be implementing the project

Table 4.25 Budget Requirement for Fisheries in Cuddalore District

(₹ in lakhs)

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Enhancement of fisheries															
1	Promotion of Ornamental fish culture	No's	3	All Blocks	0	0.00	1	3.00	0	0.00	0	0.00	0	0.00	1	3.00
2	Installation of Artificial Reefs in The Inshore Areas of Tamil Nadu Coast (Unit)	No's	25	All Blocks	1	25.00	1	25.00	1	25.00	1	25.00	1	25.00	5	125.00
3	Increasing quality seed produciton through seed rearing in cages	No's	0.4	All Blocks	5	2.00	5	2.00	5	2.00	5	2.00	5	2.00	25	10.00
4	Increasing fishing efficiency of inland fishermen and fish farmers	No's	0.055	All Blocks	25	1.38	25	1.38	25	1.38	25	1.38	25	1.38	125	6.88
5	Direct stocking of advancd fingerlings in irrigation tanks and panchayat tanks	Ha	0.04	All Blocks	100	4.00	200	8.00	250	10.00	250	10.00	300	12.00	1100	44.00
6	Biological Control of Aquatic Weeds by Stocking of Grass Carps in Aquatic Weed Infested water bodies	Ha	0.02	All Blocks	250	5.00	250	5.00	250	5.00	500	10.00	250	5.00	1500	30.00
	Section Total				**381**	**40.38**	**482**	**44.38**	**531**	**43.38**	**781**	**48.38**	**581**	**45.38**	**2756**	**221.9**
	Creation of infrastructure facilities															
7	Encouraging fish culture by establishment of fish culture ponds and provision inputs	Ha	2.1	All Blocks	5	10.50	8	16.80	10	21.00	12	25.20	15	31.50	50	105.00

Sl. No	Components	Unit	Unit cost	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
					Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Section Total				5	10.50	8	16.80	10	21.00	12	25.20	15	31.50	50	105.00
	Infrastructure and Assets															
8	Construction of fish seed rearing centre at Agaram	No's	400	All Blocks	1	400.00	0	0.00	0	0.00	0	0.00	0	0.00	1	400.00
9	Construction of fish seed rearing centre at Lalpettai	No's	200	All Blocks	1	200.00	0	0.00	0	0.00	0	0.00	0	0.00	1	200.00
10	Establishment of mini lab facilities in Government fish farms	No's	5	All Blocks	1	5.00	0	0.00	0	0.00	0	0.00	0	0.00	1	5.00
	Section Total				**3**	**605.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**3**	**605.00**
	Capacity building programme															
11	Organisation of Fish festivel	No's	5	All Blocks	0	0.00	0	0.00	0	0.00	1	5.00	0	0.00	1	5.00
12	Providing Geo tube seawall and training wall to prevent in Coastal areas of Tamil Nadu (Bommaiyarpalayam and Pillaichavady)	No's	400	All Blocks	1	400.00	0	0.00	0	0.00	0	0.00	0	0.00	1	400.00
13	Training to fish farmers	No's	0.03	All Blocks	20	0.60	20	0.60	20	0.60	20	0.60	20	0.60	100	3.00
	Section Total				**21**	400.6	20	0.6	20	0.6	21	5.6	20	0.6	102	408
14	Marine infrastructure facilities for fisher-folk of coastal towns and villages to enhance fish production & prevention of post harvest loss	Nos	300	All Blocks	**0**	0	4	1200	0	0	0	0	4	1200	4	1200.00
	Grand Total				**410**	**1053.48**	**514**	**1261.78**	**561**	**64.98**	**814**	**79.18**	**616**	**77.48**	**2911**	**2536.88**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.10. Fisheries Research

The Tamil Nadu Fisheries University, Nagapattinam (TNFU) is the unitary professional University in fisheries established in June 2012 by the Government of Tamil Nadu. NFU offers B.F.Sc and B.E (Fisheries Engineering) at Undergraduate level, M.F.Sc in the disciplines of Aquaculture, Fisheries Resource Management, Fish Processing Technology, Fish Quality Assurance and Management, Fisheries Engineering and Technology, Aquatic Environment Management, Fish Biotechnology, Aquatic Animal Health, Fish Pharmacology, Fisheries Extension, and Fisheries Economics at Postgraduate level and Ph.D. in the disciplines of Aquaculture, Fisheries Resource Management, Fish Processing Technology, Fish Quality Assurance and Management, Aquatic Environment Management, Aquatic Animal Health, Fisheries Extension, and Fisheries Economics at doctoral level.

1. AQUACULTURE

A. Inland Aquaculture

Natural resources are to be protected, nurtured and used meaningfully for the human welfare. Land and water resources are obviously and primarily to be used for the food production in order to prevent the human-animal conflicts for food. Indian fisheries sector has been playing an important role in the country's economy by its contributions to employment generation, income augmentation, foreign exchange earnings and providing food and nutritional security. The State of Tamil Nadu is geographically blessed with good natural resources like land and water. The fishery wealth of the State comprises of marine and inland fisheries that contribute remarkably for the supply of food Protein to the people of Tamil Nadu in addition to the export front. Like any other tropical province on the earth, Tamil Nadu too has conducive and supportive climate for the biological advantages of many aquatic organisms. The natural resources are bountiful with regard to fisheries development in the State and if meaningfully managed and maintained, it can yield a long term sustainable production for the benefit of the people of the State.

The State has a vast extent of freshwater and brackishwater resources constituting the inland fishery resources in the State. Totally 3,83,000 ha of inland water bodies are available made up of 78 reservoirs and short and long term seasonal ponds and tanks and brackishwater areas. The inland fish production during the year 2015-16 has been reported as 2,42,000 (0.24 million) tonnes. This accounted to 0.63 ton per ha.

The following Table gives the fish productivity from the inland water resources of the State during 2015-16:

Sl.No	Total available water spread (in ha)	Total production reported (in tonnes)	Fish productivity (kg /ha)
1.	383000	242000	631

The production that has been reported above is not falling in line with the actual carrying capacity of any tropical water body. The carrying capacity of the tropical water bodies has been reported to be around 500g of fish biomass per m^3, while the presently reported production is at 63g per m^3 indicating just 12% achievement of the available potential. Even at the worst situations like fluctuating monsoon and failure of rains in the tropical climate, the productivity can be 250g per m^3 leading to 2500 kg per ha which is about 4 times higher than what is achieved now.

The nominal estimations of the inland fisheries production in the State has revealed that a production of 4.50 lakh tonnes of fish in times of normal rainfall is possible in the State. This would present the situation of more than 1000kg (1.17 ton) production per ha. Achieving this production is the short-term goal for inland aquaculture, while the long-term goal must be 3.0 tons of fish per ha with the available water resources falling in line with other tropical countries in the World.

Interventions through infrastructure development and technology application

In filling up the above identified gap, interventions can be made in the following areas:

The present level of low productivity can be enhanced through creation of needed infrastructure at appropriate locations with introduction and adoption of improved technologies in inland aquaculture. The proven research data and strong research support system for drafting new policy or modification of existing policies can pave way for increasing the inland fisheries production. Introduction of alternate species and adoption of improved species, along with value addition on inland aquaculture can enhance fish production. Besides the above, channelizing the marketing procedure for increased income will attract more entrepreneurs. The intensification or expansion of aquaculture activity in the State may lead to a demand of 700 million fingerlings every year. Therefore, creation of additional rearing area is a must to cater to the needs of the inland sector.

With these brief background idea, Tamil Nadu Fisheries University is submitting the following plans and proposals in the identified districts as Action Plan for the improvement of the inland aquaculture production.

Application of newer technologies

Following are the possible working models for the task:

1. Creation of modern fish farming facilities together with modernization of existing hatcheries and farms in the State.
2. Identification and application of improved fish farming technologies in the districts with specific technical alterations.
3. Improvement in the seed production sector through improved broodstock development, management and dissemination of technologies to the hatchery operators for adoption
4. Evaluation and certification of seeds for farming and certification of genetically improved varieties for biosecured production process
5. Troubleshooting with more technical personnel and recommendation for the safe and sustainable aquaculture in the identified water bodies
6. Training and capacity building at various levels through demonstration and hands on training
7. Data collection, documentation and forming a support system for the policy making for the inland fisheries development

Keeping the above in mind, it is proposed to have projects in the following lines

1. Planning for more advanced infrastructure with suitable operation protocol for different farming systems, seed production activities, value addition, feed production and feeding processes.
2. Evaluation of identified water bodies for their suitability in terms of nutrient availability and application of intensive farming practices like cage farming, raceway or running water farming systems, integrated farming, increased stocking with conventional and alternative species like GIF Tilapia, Jayanthi Rohu, Pangassius, Murrel, Loaches, etc.
3. Development of Pilot level farming systems for Recirculatory Aquaculture System (RAS), integrated farming, culture of multi-species and alternative species, nutrient controlled farming system, etc can be established in different districts based on the resources and available technical manpower. Technology can be demonstrated to the farmers and stake-holders.

4. Creation of regional water quality testing and disease diagnostics laboratories in different districts which can be established and manned for extending support services to the farmers and recommending the nutrient use in the aquaculture systems.
5. Major breeding Centres in the State can be equipped with the Sperm Bank for collection, storage and supply of cryopreserved spermatozoa for the breeding and production of genetically improved seeds. Characterization and spermatological features can be addressed by the University through the already established Cryopreservation Lab in the University. Technical inputs and needed training can be extended by the University as it was done earlier through NADP.
6. Cage culture of fast growing fishes in seasonal tanks: Open water bodies like tanks and lakes with large extend of water spread are reported to give a very low fish production in the country due to various reasons. The low stocking and poor control over the stock due to the large extend of the water span are the major reasons behind such low production and this can be rectified by the adoption of cage farming in the open waters. Natural fertility in the open water bodies can be used for the successful growth of fishes by adoption suitable stocking density and culture practice so as to have high survival and better growth. This has been proved beyond doubt in many east Asian countries where the per unit production is around 50kg per sq. m. Such high productivity is also possible in Indian water bodies, if suitable cages are framed and erected in the open water bodies like natural tanks, lakes, pools and reservoirs where the control of the fish stock will be possible in the cages.
7. Formation of Certification Centre will help in the certification of quality of broodstock and seeds. The protocol and procedure are already available for the fishes and in practice in other countries. The same can be done for the inland fish species to avoid culture of unwanted species. Only quality seeds can be used for the culture that can increase the production many folds.
8. Similar to Sperm Bank, separate Brood Banks can be established in selected places in the Cauveri, Thamirabarai, and Bhavani river basins, through which the quality brooders can be identified, segregated, developed and supplied to the farmers continuously so as to improve the seed production status in the State. In this line, needed evaluation and identification can be done by the University for efficient functioning of the Brood Bank.

9. An analytical wing can be established to identify potential areas for aquaculture in the selected districts through GIS and nutrient mapping of the water bodies in order to suggest suitable species and culture methodology. Needed training for the extension workers / agencies and farmers can be done through this Unit.
10. Data recording and support system is an essential component for the development of inland aquaculture. Therefore, TNFU proposes to have a functional unit for the recording of fish production data in the inland water bodies of the State including species composition, their biological data and the farmers' attitude and mind-set in the inland fish farming so as to redefine the inland fish production policies of the Govt.

.

In the national scenario, Tamil Nadu with its 0.383 million ha of potential freshwater area is standing at 9th place in inland fish production. States like Assam and Chhattisgarh which are having same extend of freshwater bodies (sometimes lesser than that made available for farming due to flooding and drought) stand at 7th and 6th place, respectively with above 25% more fish production than Tamil Nadu. In simpler estimation, if 50% of the potential water spread is considered useful for fish production purposes in the State, with 0.2kg per m^3 production per annum, there will be a production of 0.38 million tonnes instantly.

Possible outcome due to the above intervention in inland fisheries in the State

Inland fisheries in the State can yield the following benefits to the stakeholders and public in general:

1. With the creation of newer infrastructure in the farming and seed production centres, more technologies can be evaluated and disseminated for the benefit of the farmers. This would help in enhancing the area of production and yield. More production will ensure more fish available for consumption thereby good quality food is assured for the people of the State.
2. With adoption of newer and advanced technologies in the fish farming, the open waters can yield as high as 2 tonnes fish per ha, which is approximately 4 times higher than that of the present level of production. Ultimately the State's total fish production can go at least 100% increase from the present level.
3. Approximately 0.40 million tonnes of fish production is possible per annum from the available resources against the present production of 0.24 million tonnes.

This can result in the increased revenue (at least 100% of the present level) and more protein rich food for the people.

4. Through the establishment of Brood Bank and Sperm Bank production, sub-standard seeds can be totally avoided. This would also ensure the higher yield through stocking of certified seeds.
5. There are 2.0 lakh inland fisherfolk depending on the inland fisheries in the State and they can be provided with assured revenue and employment by adopting best fish farming practices in the inland water bodies. Fish farmers can be supported with the Aquaculture Information Centre.
6. Approximately this would benefit 1.0 lakh people directly and 2.0 lakh people indirectly in addition to the supply of protein-rich food to approximately 20 million people residing in the inland areas of the State.

B. Coastal Aquaculture/ Mariculture

The marine fisheries wealth of Tamil Nadu is well known. Long coast line together with biodiversity that helps in the enrichment of marine fauna and flora and efficient fishermen population make the State to contribute more from marine sector. Besides the natural exploitation of resources, coastal areas can be more effectively used for the production of marine fishes and shellfishes through aquaculture. Although Andhra Pradesh stands first in the quantum of shrimp production, Tamil Nadu is standing first in terms of productivity (tons/ha area). This vouches the fact that the aquaculture is done on more scientific lines with due consideration for ecosystem protection.

Tamil Nadu State with the second longest coastline in the country covers an area of 1,076 km accounting for 13.3 per cent of the Nation's Coastal line of 8,118 km. The following table gives the status of the marine fisheries in the State.

Exclusive Economic Zone (EEZ)	1.9 lakh sq. km
continental shelf	41,412 sq. km
Number of Coastal Districts	13
Number of Fishing Villages	608
Marine Fisher folk Population (Projected)	9.85 lakh
Fishing Crafts Registered (online): (2016-17)	
Mechanised Fishing boats	5,944
Traditional Crafts (mechanised & non - mechanised)	34,920 (29,587+ 5,333)

Infrastructure available	
Major Fishing Harbours	5 (Chennai, Thoothukudi, Chinnamuttom, Colachel and Muttom (PPP)
Medium Fishing Harbours	4 (Pazhayar, Mallipatnam, Nagapattinam and Cuddalore)
Fish landing Jetties (Landing Centres)	36
Misc Landing Points (unorganized)	254
Marine Fish Production 2015-16	4.77 lakh tonnes
Marine Products Export (2015-16)	85,063 MT (Rs.4,184.06 crore)

The inshore waters of 1,016 km long coast on the eastern side and 60 km long coast on the western side are found to be over-exploited, whereas the offshore and deep sea resources are yet to be exploited to its optimum levels. The marine fish production of the State presently is estimated to be 4.77 lakh tons against the estimated potential of 7 lakh tons.

Scope for coastal aquaculture in Tamil Nadu

People living along the coastal region have the greater chances of accessing the seawater and saline areas. Most of the population is largely depending on the exploitation of the sea and natural resources. Due to varied reasons there have been steady decline in the stock that results in diminishing revenue for the people who are depending on them. Therefore alternate livelihood options are to be developed and provided for the upliftment of their socio-economic status.

The proposed Action Plan is to establish demonstration and training centres for the technology transfer and providing technical assistance to the people in the coastal region to identify the possible alternate livelihood options. The living zones of the people can be enriched with the activities like small scale fish farming and aquatic animal fattening farms. These are chosen because of the familiarity of the animals among the people and the easy understanding of the animals' behavior for better management of the farming. Therefore the major activities that can be taken in the Action Plan are,

1. Establishment of technology development Centres and demonstration units
2. Support system for the coastal farming through laboratory, technical assistance, marketing guidance, trouble shooting and adoption of newer technologies.

The following activities can be considered for the coastal aquaculture development in the Tamil Nadu coast:

1. Seaweed farming – raft and pole methods
2. Seaweed processing and packing for market
3. Cage farming – marine fin fishes & lobster
4. Marine ornamental fish farming
5. Marine ornamental fish breeding and seed supply
6. Marine live-feed production
7. Marine finfish farming
8. Marine fin fish seed collection and brood stock development
9. Marine crustacean seed collection and rearing
10. Production of genetically improved species for aquaculture
11. Shell fish fattening (Lobster & crab)
12. Fabrication of cages and support structures for the farming activities
13. Feed production and supply
14. Micro rearing units with minimal expenditure for the local fisher folk as an alternative employment
15. Marketing assistance for the grown fishes as well as seeds

Achieving the goals

In achieving the goals, Centres can be established in 5 to 7 places identified in the coastal region where in the pilot level farming facilities for the above activities can be developed. Technical people at the level of Training Associates and Training Assistants can be employed for the training and demonstration purposes. Moderate level farming and laboratory facilities are to be established with a focus to assist the entrepreneurs to carry out the activities. Marketing assistances through buyer-seller meets can also be arranged for the efficient marketing of the produces.

Possible outcome due to the above intervention in the State

The adoption of the above activities along the coast of Tamil Nadu can yield the following benefits to the stakeholders and public in general:

1. With the creation of newer infrastructure in the farming and seed production centres, more technologies can be evaluated and disseminated for the benefit of the farmers. This would help in enhancing the area of production and yield.
2. Approximately 0.10 million ton of finfishes could be produced from coastal aquaculture that can increase the revenue and income to the farmers.
3. Alternative employment opportunities can help the coastal fisher folk to gain more control over their lives and economic development in the livelihood of the

fisherfolk is possible.

4. There are about 0.4 million fishermen families depending on the sea in the State and they can be provided with assured revenue and employment by adopting fish farming in the coastal areas. Steady migration from capture to culture ensure their life.

2. AQUATIC ANIMAL HEALTH

Disease outbreak is a major problem that affects the development and expansion of aquaculture sector. Diseases are caused due to imbalances in the interactions of the host, pathogen and the environment. Maintaining the health of the cultured organisms by providing adequate nutrition, optimum water quality parameters would help to avoid the disease outbreaks and associated production and economic losses due to diseases. Accurate and timely diagnosis of fish diseases combined with suitable management measures greatly help in their control and prevent diseases in aquaculture.

The following are some of the bottle necks in aquatic animal health management

1. Lack of a well equipped facility under one umbrella to carry out the diagnosis of diseases caused by pathogens, parasites, analyse the variations in the water quality parameters
2. Unavailability of field level diagnostic kits for rapid and accurate diagnosis of diseases
3. Lack of surveillance and awareness on the existing and emerging diseases and appropriate management in aquaculture
4. Lack of training on the field level identification of diseases and their control measures
5. Lack of awareness on the Good management practices (GMPs) for successful and sustainable aquaculture practices

Hence, the identified thrust areas for proposing on aquatic animal health are

1. Establishment of satellite laboratories across the state with well equipped facilities to extend services on disease diagnosis and water quality analyses
2. Development of rapid and accurate diagnostics for field level and lab identification of diseases
3. A disease surveillance network and monitoring system for continuous monitoring of existing and emerging diseases to develop strategies to prevent disease outbreaks in aquaculture production systems

4. Conducting training and awareness programmes on the field level identification of diseases and their management measures including biosecurity methods

3. HARVEST AND POST-HARVEST TECHNOLOGY

A. Harvest Technology

Fishing is one of the multi-million dollar industry provides huge foreign exchange and livelihood opportunities to millions of people in the country besides offering high quality protein rich food. Among the coastal state in India, Tamil Nadu is one of the major fish producing state, 5th in total fish production and contributing 0.7 percent of the total Gross State Domestic Product of the State. The state Tamil Nadu has a long coastline of about 1076 kms, accounting for about 17% of the Indian coastline. It has the EEZ area of 0.19million sq.km sharing 9.4% of the total EEZ of the country. The total fish production of the State during the year 2014-15 is 6.97 lakh tons (sector wise, from marine resources-4.57 lakh tons and freshwater and brackish water resources -2.40 lakh tons). A total of 5,395 traditional crafts 30,022motorized traditional crafts and 5,936 mechanized crafts are supports the coastal fish production (Tamil Nadu Fisheries Department report, 2017). Tamil Nadu is one of the leading exporter of the marine products, exported to the tune of 93,477 MT and earned a foreign exchange of Rs 5,308.17 crore during 2014-15.

Scope for Deepsea fishing in Tamil Nadu

In earlier days, Fishing in the state was purely a traditional activity has now transformed to a commercial, market driven, multi-dollar enterprise owing to introduction of synthetic fishing gear materials and mechanization. But due to uncontrolled increment of fishing vessels and over exploitation of fishery resources in the inshore waters, 90% of the stock within 50mt depth was exploited, this lead to reduction in livelihood income of the fishermen. Therefore the alternative livelihood option available with us is development of deep sea fishing for the upliftment of their socio-economic status.

Research and Extension gaps

Under the existing scenario, following are identified as the major research and extension gaps prevailing in the state,

1. Non adoption of Eco-friendly fishing gear Technologies as being followed in the Developed fishing Nations
2. Non availability of eco-friendly fishing technique like Trap fishing
3. Non availability of training services to the fishermen of Tamil Nadu on engine maintenance, sea safety and responsible fishing

4. Non availability shore based ship in campus of training facility to impart training on deep sea fishing technique to the fishermen of Tamil Nadu
5. Non availability of Laboratory facilities to conserve the forage fish stock depletion along the coast of Tamil Nadu due Long lining .

The proposed Action Plan is to establish demonstration and training centres for the technology transfer and providing technical assistance to the people in the coastal region to identify the possible alternate livelihood options. The major activities that can be taken in the Action Plan are,

1. Establishment of Technology Development Centres and Demonstration units
2. Support system for the coastal fishing communities through ship in campus facility to impart training on Deep Sea fishing technique.
3. Establishment of Artificial fish bait development Laboratory to support Long line fishing.

The following activities can be considered for the inshore and deep sea fishing developments in Tamil Nadu:

1. Popularization of Eco-friendly fishing techniques – Gill netting , Long lining and Trap fishing Technologies
2. Organizing training on Sea safety and Responsible fishing methods
3. Imparting training programs on Engine maintenance
4. Imparting cost effective training on Deep sea fishing techniques with ship in campus facility
5. Creating Artificial fish bait development Laboratory to support the development of artificial fish baits for Long line fishing.
6. Introducing automated Trap fishing techniques as low energy fishing technique

Achieving the goals

In order to achieve the goals, Centres can be established both at main and shore laboratory campuses of Fisheries College and Research Institute, Thoothukudi. Technical personals such as Senior Research Fellow, Gear Technician, Skipper, Mechanical Engineer, Mechanic, Training Associates, and Training Assistants can be employed for the training and demonstration purposes. Ship in campus facility will be established with a focus to reduce cost of training on deep sea fishing; Artificial fish bait development Laboratory will be developed with the objective of studying the behaviour response of marine predatory fishes to different types of artificial baits which are found to be very much essential for successful long line fishing being encouraged both by Central

and State Governments in India. Trap setting vessel is yet to be introduced in India despite vast potential in Coral and rocky coasts of India.

Possible outcome due to the above intervention in the State

The adoption of the above activities can yield the following benefits to the fishermen community:

1. With the creation of new facilities such as Eco-friendly fishing gear Technology centre, Mobile training unit, Ship in campus facility, Artificial fish bait development Laboratory and Trap setting vessel, many technologies can be disseminated for the benefit of the fishermen communities which would pave way to increase fish production of the state and there by the livelihood of the fishermen.
2. Approximately 1,000 fishermen around the state will be trained to bridge the extension and research gaps in the field of fishing technology particularly with reference to Deep Sea fishing, Sea safety, Responsible fishing methods and marine engine maintenance.
3. Introduction of alternative fishing methods such as long lining and trap fishing can help the coastal fisher folk to venture into deep sea to harvest underutilized deep sea resources.

B. Post-Harvest Technology

Fisheries sector plays a significant role in the Indian economy in terms of its contribution to growth and development. For growth, the sector contributes through its share in GDP and foreign exchange earnings gained through the export of fish and fishery products. Tamil Nadu ranks fourth among the states in terms of total fish production. Fishes can be effectively used for the preparation of value added fishery products which can provide better employment opportunities and income to the fishers. It can also provide high quality protein for human consumption by conversion into value added products in various convenient forms.

Being a highly perishable commodity, fish requires proper landing facilities, processing, storage, transport and distribution facilities running through the entire supply chain from capture to consumer. The demand for fish and fishery products shows growing trend and the depletion of resources in near shore waters demands the use of this resource effectively and make available to common man. Hence it is necessary to ensure that every kilogram of harvested fish is fully utilized for human consumption. The

loss in the post harvest fishery has been estimated at 15% owing to lack of adequate post harvest infrastructure in the State.

If fishermen can sell their fish to consumers within a few hours of catching, little post-harvest technology is needed. However, this is seldom the case, and fish has always to be preserved in some way - iced, frozen or cured until it reaches the consumer in distant places. The major factors that affect the nutritive value of fish products depend on the way fish is handled, processed or preserved, stored, transported and marketed. The fish is exposed to stress from the time it is caught to landing onshore by the fishing vessel. Moreover, the time lag in transport of fish from the processing/wholesale markets to the consumers' table is very crucial that determines the quality of fish supplied. The way in which the fish is handled while transporting plays a vital role in ensuring the quality of fish that serves the consumers' table.

About two-thirds of the total landed fish in India is consumed in the fresh condition and the remaining is utilized for preservation by other methods. The fishes caught from inland sources are almost entirely diverted to the fresh fish market, none of the long-term preservation techniques being employed for them.

The post-harvest field with its emphasis on handling, processing, distribution and marketing is a complex series of events that is challenging to the policy making body/administration. Moreover, post-harvest fishery losses play an important role in maintaining or increasing the domestic supply of fresh fish or fishery products that can be purchased by middle and larger income level family.

Problems to be addressed

- *Percapita consumption of fish is very low,* it is only 9 kg against the recommendation 14 kg. Availability of diversified quality fish products in the domestic market has to be increased to ensure increase in percapita consumption of fish.
- *The post-harvest losses recorded are 12%* in the state which leads to intense revenue loss to fishers. Creation of awareness among fishers, train them on improvised fish preservation techniques and value addition will be the ideal solution to overcome this loss. *The reduction in post-harvest losses has a direct impact on local and regional trade flows.*
- There are entrepreneurs interested in taking up the business of production of value added fish products. But they could not as the *venture capital is high*. There

are improvised and modern techniques available with state and central organizations for the entrepreneurs. The projects under NADP will serve as a bridge and fill the gap to promote entrepreneurship that results in *availability of diversified fish products in household brands in the domestic market*.

- Fish is a wonderful, nutritious food that has much health beneficial attributes which helps us to overcome lifestyle diseases and malnutrition. The project under will have great role in addressing *malnutrition issues, creating food security and providing employment opportunities*.
- Post harvest infrastructure is inadequate with regard to business incubation centers and marketing channels like Aavin. *The domestic fish marketing system is neither efficient nor modern and is mainly own by private hands with* a *huge number of intermediaries between producer and consumer*. This project under NADP will eliminate intermediaries and increase the fisher's share in consumer rupee. *Branding of state fishery products is essential that signals difference in quality and price points.*
- *The institutional fish marketing with the active participation of the stakeholders* would be successful. The production centers and retail units established through NADP project will function like Aavin to promote marketing of fish and fishery products to augment income to fishers.
- Awareness among consumers is lacking and the *consumers should be educated about their right to have healthy fish, free from spoilage and unhygienic environment, including their right to have value for their money*.

The following activities in Fish Processing that can be considered in the Action Plan

I	**Fish processing - Novel technologies and techniques**
1	Development of techniques to improvise and modernize traditional preservation of fish
2	Modernization of dry fish production through solar drier
II	**Value addition and product diversification**
1	Development of snack foods from fish
2	Promotion of consumption of farmed Tilapia through product development and diversification
3	Development of ready to eat products from farmed freshwater fishes to promote consumption
III	**Branding of fish products and institutional marketing**

1	Creation of regional production centres for fishery products with State Brand
2	Creation of institutional fish retail outlets with the participation of stakeholders
IV	**Reduction of post harvest losses**
1	Awareness to fishers on hygienic handling of fish
2	Creation of awareness among fishers on fish processing technologies
3	Capacity building and skill development programmes on fish processing technologies
V	**Enhancement of percapita consumption of fish**
1	Awareness campaign on health beneficial attributes of fish
2	Production of short films on nutritive value of fish and screening in theaters and television channels
VI	**Utilization of seaweeds and other marine resources for food security**
1	Development of nutraceutical products form seaweeds
2	Popularization of seaweed products through mass media
3	Development of seaweed snack foods
VII	**Ensuring nutritional security through fish and fishery products**
1	Supply of preserved ready to eat and ready to cook fish products through public distribution systems
2	Supply of fish and fish products in mid day meal programme
VIII	**Enforcement of international quality standards in fishery products meant for domestic market**
1	Creation of laboratory facility at regional level for testing and certification of fish and fishery products
2	Establishment of sea food forensic laboratory to test the authenticity of fishery products international market
3	Establishment of state level Aquatic Food Safety Analytical Center
4	Accredited Microbial Quality Testing Laboratory for Certification of Aquatic Food Products in South Tamil Nadu
IX	**Utilization of fish processing waste and by catch**
1	Installation of fish waste rendering plant at selected fishing harbours and fish markets
2	Development of fish compost for production of organic food
3	Installation of unit for producing biogas from fish waste
4	Development of technologies for effective utilization of shrimp shell waste
5	Development of peptides from fish processing wastes as dietary supplement

Possible outcome due to the above intervention in the State

- Creation of “Fish Processing Business Incubation Centre” in all coastal districts and Fish and fishery products retail outlets in all inland (non coastal) districts to transfer fish processing and value addition technologies through incubation and marketing support to fishers, unemployed youth and women self help groups.
- Fishes could be processed using recent and updated techniques in production centers and packed in attractive packages distributed and sold through retail outlets.
- Better utilization of catch, improve returns to fishers and provide employment and income generation opportunities to the fishers and other entrepreneurs.
- Promotion of consumption of value added fish products among school children and general public through distribution of diversified value added fish and fishery products.
- Necessary guidance will be rendered to food industries and government agencies with sound scientific knowledge supported by state of art facilities.
- Nutritional labelling, quality testing, shelf life assessment, certification of cleanliness, safeness and nutritional quality of ingredients and products, analysis of additives, adulterants, contaminants will be carried for the aquatic products meant for domestic market which is not strictly adhered in the current scenario.
- The post harvest losses can be minimized by adopting suitable post harvest technologies to create direct impact on regional trade flows and to minimize the intermediaries to increase the returns to fishers.
- Branding of state fishery products to promote diversified fish products in household brands in the domestic market through institutional fish marketing with the participation of stakeholders.
- The nutritional benefits of edible macroplants from the sea can be made available for human consumption.
- Offal from finfish and shellfish can be effectively converted in to products of commercial importance

4. FISHERIES RESOURCE AND ENVIRONMENTAL MANAGEMENT

Tamil Nadu is one of the important state which is blessed with both freshwater and marine fisheries resources. Being part of tropical region it is blessed with rich aquatic diversity and fisheries in the state form one of the important sector which provides employment to millions of people and contributes to food security. It has a

coastline of over 1076km and the continental shelf area of 41,412 sq.km. Tamil Nadu ranks second in marine capture production with the share of 7.07 lakh tonnes which is 20% of the total Indian Fisheries Landings during the year 2016. The marine fish landings has been a growing continuously growth.

The State is also endowed with extensive freshwater resources with an extent of 3.73 lakh ha. Fisheries play a vital role. Presently, this sector provides employment opportunity for 11.85 lakh people – 9.64 lakh in marine sector and the remaining 2.21 lakh in freshwater sector. The fisheries resources are essential for

i) food and nutrition security
ii) economic and social development from fisheries and aquaculture, marine and coastal tourism, shipping, mining, energy and
iii) ecosystem services such as carbon sequestration, water filtration, atmospheric and temperature regulation, protection from erosion and extreme weather event

There are 2500 species of fishes found in different aquatic environment. The fisheries in the state are one of the vital source for food security. These resources are affected by pollution, habitat alteration and over exploitation. The unique aquatic environment face gradual decline in aquatic resources particularly the rare and endangered organisms necessitates some urgent steps that need to be taken to conserve them. The existing resources have to be effectively managed to provide adequate employment.

As India is the signatory of Convention on Biodiversity, these distinctive aquatic marine gemplasms have to be preserved and conserved to get the benefit out of it. The conservation initiative will help to fulfil the prime objective of Tamil Nadu Biodiversity Board and Tamil Nadu State Fisheries Department on continuously improving knowledge and understanding of the aquatic resources, their conservation, management and development. Over recent decades, resource managers have been working to limit the loss of aquatic resource. Longstanding strategies and programs are in place across all jurisdictions that are concerned with conservation specifically or with the ecological sustainability of aquatic sectors. Despite limitations in the knowledge of what exists, its current condition and pressures, observations of significant decline in some aquatic resource in some areas lead to the conclusion that India's fisheries resources are in a state of continuing decline. The effects of a number of threatening processes are

resulting in declines in habitats, changes in ecosystems and loss of species. The resources are eroding rapidly because of over fishing, pollution from land based sources, mangrove deforestation, climate change and ocean acidification. The effectiveness of, and seek improvements in, efforts to minimize future degradation has to be monitored and regulated.

Fishermen are constantly upgrading the fleet to reach new resources (species/stocks) and new areas after over-fishing the stocks in the earlier fishing grounds. The catches from the new areas and new resources mask the decline of many near shore resources. Small pelagic fishes contribute significantly during the recent years particularly the oil sardine, whose increase could be attributed to a combination of over-fishing of apex predators and increase in sea surface temperature. Available studies from marine indicates that the species like (i) elasmobranchs, (ii) anchovy, (iii) penaeid prawns, (iv) lobsters, (v) pomfrets and (vi) seerfishes were declined after reaching a peak and indicating overfishing. The large number of juveniles landed indicates recruitment over fishing and growth over fishing which leads to severe loss in yield. The bycatch related issues further worsens the resource. Apart from this Indian is facing changing climatic conditions and on-going environmental degradation, which loom food security and livelihoods. So there is an urgent to conserve the resource from the impacts of climate change and evaluate the potential conservation strategies to improve food security. Presently the adoption of proper management measures to capture the right sized species, low-cost inshore fish-aggregating device utilization, and improved natural resources management (including marine-protected areas) were identified as important measures to conserve these resources.

The existing knowledge on inland aquatic resources is very little because of poor exploration activities particularly in Tamil Nadu. There is an urgent need to protect, sustain and responsibly use these resources. Managing these water bodies in proper manner will offer sustainable livelihood option for the rural poor.New initiatives should also be taken to exploit the resources effectively in a sustainable manner. Through sustained technological up gradation and proper managerial measure could help to use these resources. Eco-system approach to fisheries management has to be implemented for the sustainable harvest of these resources.

Deployment of low-cost inshore fish-aggregating devices is likely to have the highest positive impact on oceanic fish supply in Gulf of Mannar and Palk Bay and

substantially enhancing the regions food security. Low-cost inshore FADs are accessible to subsistence and small-scale fishers, thereby increasing the domestic production of oceanic fish.

Introduction of more effective management of coastal and marine resources, especially those associated with coral reef ecosystems is evolved. This will help to maintain their productivity over a longer period of time, while building their resilience to climate change impacts and human-induced environmental threats. The project has to support capacity-building activities on integrated coastal resources management. Climate change adaptation for resilience-building has been emphasized through the implementation of project activities. The application of fish-aggregating devices, development of community-based resource management plans, and effective management of MPAs are much need activities.

Possible Interventions

State Apex fisheries biodiversity reference centre for resource conservation

It will provide a regional focus on developing taxonomic expertise and skills, as well as the infrastructure needed to support the natural resource management and scientific communities within the Gulf of Mannar region and Bay of Bengal area.

Although species identification and nomenclature are fundamental for resource conservation, Government agencies throughout the world often lack taxonomic expertise and some have little scientific credibility for their management of aquatic resources. Scientific advice is needed to improve environmental management, prevent harmful incursions of alien species and to identify new aquatic resources for aquaculture and fishery developments. Since the 1980s, there has been worldwide decline in the number of qualified taxonomists employed in research institutions.

The center will create awareness on the importance of fisheries resources through the collection housed at the biodiversity centre. DVDs on aquatic biodiversity will be produced and the same will be used to educate the need for conservation of aquatic resources to the coastal people. Awareness camp will also be conducted at school level.

Indigenous fisheries resource conservation

Tamil Nadu ranks 8th place in inland fish production in India (1.85 Lakh MTs). The inland fisheries sector has about 3.73 lakh ha. of water spread area with nearly 2.23 lakh inland fisherman directly depending on this sector for their livelihood.

Diversification of agricultural activities for increased production, employment and income is well - known. Likewise, aquacultural activities also increased fish production and economical status. Fish seeds and broodstock quality, Monsoon failure affects the inland fish production. Introduction of Gangetic carps (catla, rohu, mrigal) in inland waters affected the minor carps. Hence, minor carps restoration and production must be done to improve TN fish production.

Native fish species form a major component of food consumed by families, especially those living closer to freshwater resources. Some species available and amenable for diversified in freshwater aquaculture are *Labeo cabasu, L. bata, L. gonius, L. fimbriatus, Puntius sarana, Mystus gulio, Anabas testudineus, Clarias batrachus, H. fossilis, Pangasius pangasius, Channa marulius* and *Etroplus suratensis*. These species are a rich source of nutrition for the rural poor either on a seasonal basis or round the year. These native species are considered as low volume and high value fish species. These small indigenous species are always part of enhancing rural food and livelihood security.

Fish Genomic conservation centre

Threats to fish biodiversity are prevalent worldwide. Its conservation is imperative both for the continued development of aquaculture and for the re-establishment of weak stocks in natural systems. Fish gene banks have become an essential support system for existing efforts to protect habitat.

The fish genetic diversity of this region is not thoroughly studied. New species as well as new records have been described from the region especially from Western Ghat Rivers and Gulf of Mannar Biosphere. Further, studies on closely related fish group will help to find out new finfish varieties

Conservation of weak stock genetic diversity has particular importance for locals who rely on them for food. This centre will promote, train, and help implement the management and preservation of fish biodiversity in Tamil Nadu and help to establish "ex situ" (gene banking) conservation initiatives for the management of fish genetic resources.

This facility has to be created to guarantee the proper preservation of genetic resources (tissues samples, molecular preparations and products available in the

southern Tamil Nadu region, particularly the aquatic resources of Gulf of Mannar and River Thamirabarani, and to facilitate their use by the National / global scientific community. The voucher specimen and data relevant to their value will be stored in this facility under sub-zero level.

The preservation of genetic diversity and enable healthy propagation of the breeds/strains, at present or some future date breeding objectives change. The fish gemplasm will also be maintained in live conditions.

GIS centre for fisheries resource management

Geo graphical information system technology has wider application. They can be used in optimizing sampling, explain spatial distribution of fish species. It could be used for ecosystem sensitive zone identification, effect of fishing and pollution. These information could also be useful in stock assessment and fisheries resource management. These advanced information tools could facilitate knowledge based coastal resource management and provide sufficient input for the managers to take appropriate decisions.

Blue growth initiative in fisheries resource conservation

Aquatic ecosystems act as important reservoirs for inorganic carbon with the oceans storing roughly 50 times more carbon dioxide (CO2) than the atmosphere; ecosystems such as mangroves, seagrasses, and inland waters are among the most efficient ecosystems in sequestering CO2 in the form of 'blue carbon' sinks. They can sequester up to five times the amounts of carbon absorbed by tropical forests and function as important nursery, feeding and reproduction areas for many species. In addition, mangrove forests provide natural protection against storms and erosion for coastal communities and breeding grounds for many aquatic species.

The Climate change based projections from global warming models indicate that we may see nearly continuous warming of about 0.74°C per decade of this century. Climate change has the potential to significantly affect fisheries, as it will influence the workings of ecosystems and the abundance of different species. Blue Growth/ Blue Economy strategies have to be adopted to promote at the initial stages food security and decent livelihoods. Blue growth aims to assess ways and means to mitigate the cumulative impact of these economic sectors on the living aquatic resources, biodiversity and eco-system services and to develop synergies between the

sectors. To overcome the effects of climate change, studies needed in the following areas for mitigation measures.

-Impact of climate change on critical habitats such as coral reefs, seagrasses and commercially important fish resources to evolve monitoring protocol and mitigation strategies

-Impact of climate change on coastal and inland aquaculture and possible mitigation measures

-Use of renewable energy resources to reduce the carbon emissions from fisheries and aquaculture activities

Possible Outcome

- With the creation of newer infrastructure will help to establish the existing fish Fisheries Resources of Tamil Nadu.
- Could help to monitoring and maintain endangered fish species.
- Help to use and exchange of aquatic genetic resources in a better way for aquaculture/ fisheries.
- These units will help to create public awareness on conservation and management of fisheries resources.

5. FISHERIES ENGINEERING

Fisheries resources of Tamil Nadu are abundant. The State has about 1,076 km long coastline and 3.83 Lakh ha of freshwater spread in the inland; including lakes, tanks and 56,000 ha of brackishwater spread which can form the base for the diverse fisheries industries in the State. There are about 848 registered aqua farmers and 346 European Union approved fish processing facilities which give sustenance to around million families in the country and in the State. Besides this, there are about 10 million people depending on this fisheries industries and allied activities in one way or other. The water ecosystems have been identified as a food production system for the people and offer livelihood to the rural people. Though this sector generates significant foreign exchange earnings, these biological activities are depending on many engineering structures and machineries. It is believed that engineering interventions in various fields of fisheries are very minimum as a today and needs to be given due considerations in order to make this sunrise sector flourish further.

Problems to be addressed

- Inland aquaculture and mariculture involves many manual operations for effective aquaculture. In order to reduce the human drudgery during the farm operations, development of many on-farm implements/machines are essential.
- Harvesting of fish is the biggest task in aquaculture and it is mainly done by manual operations. Existing crafts and gears should be modernized to most sophisticated large scale modern fishing system for reducing the harvesting time and human drudgery.
- Energy requirement in the ponds as well as feeding cost occupies huge amount of operational cost. Also, uninterrupted power supply is essential for pond automation and effective management in aquaculture. Hence, renewable energy based farm systems will save the money as well as energy for the fish farmers.
- Automation is required for Fisheries and Aquaculture Technologies, since other industries (Manufacturing, Transportation and Food processing) are successfully well established. However, problems faced by the farmers in this sector require demand based special solutions. Hence, automation of technologies could help this sector to flourish further.
- Management in fish farming is a high laborious task. Farmers are facing problems like water shortage, feed control, disease control, etc. that will severely affect the harvest. Hence, time-based control measures are required. That can be executed through remote monitoring systems through wireless sensor networks. Such sensor networks could be employed in advanced aquacultural systems like recirculatory aquaculture, nano-filtratiton system, cage culture and aquaponics.
- Precision Fish Farming (PFF) concept is required to apply control-engineering principles to fish production, thereby improving the farmer's ability to monitor, control and document biological processes in fish farms.
- Crossing international border line is one of the major issues faced by fishermen. Hence advanced navigational aids are essential to be a part of the any fishing boat. So that fishermen can safely do the fishing operation within a limit and international problems could be avoided.
- Fish needs to undergo Pre-processing operations like de-scaling and filleting that are important operations before the fish is further processed into next stage.
- Marine catches include variety of fishes that are categorized into low value and high value fishes based on need and utilization. However, utilization of low value fishes is very meagre and dumped as a waste. Hence, utilizing the low value fish

into value addition to meet out the demand of fish and fish based products through extrusion and other processing technologies are necessary.

- It is necessary to provide them a unified facility whereas they can produce their products at a minimal cost. Hence, establishment of fish processing technology based business incubation centre that motivates the beneficiaries to turn-up the entrepreneurs is needed.
- Processing of fish leads to develop many value added products from the fully extracted meat. Such kind of machines is needed for the fish processing industries as well as fisherwomen for effective value addition.
- Waste in the fish/food industry is a major issue but generation of this waste is unavoidable. The kind of waste produced from processing industry primarily consists of the organic residue of processed raw materials. The utilization and disposal of product specific waste is difficult, due to its inadequate biological stability, potential pathogenic load, high water content, potential for rapid auto-oxidation and high level of enzymatic activity.

The following are the thrust areas in Fisheries engineering that can be considered in the Action Plan

I	**Aquacultural Engineering**
1	Farm implements for effective aquaculture practices
2	e-interface gadgets for sustainable aquaculture practices
3	Renewable energy power operated aerators/feeders for aquaculture
4	Wireless sensor network/Remote monitoring system for aquaculture farms
5	Mobile gadgets/apps for remote monitoring system for aquaculture farms
6	Advanced aquaponics systems for dual income
7	Nanocomposites for effective water recirculation in aquaculture farms
8	Bionanosensors for water quality monitoring system
9	Modified abosrbents for wastewater treatment system
II	**Navigation and Marine Engineering**
1	Cost effective fibre boat
2	Weather station for effective fishing
3	Cost effective gadgets for sustainable fishing
III	**Fish Process Engineering**
1	Low cost handling devices/machines for fish processing
2	Solar power operated fish processing machines / tricycle for fish vendors
3	Cost effective packaging and storage technologies for fish and fish products

4	Fisheries technopark cum fish processing technology business incubation centre

Possible outcome due to the above interventions in the State

- Development of farm implements/machines for fish farming helps to reduce the human drudgery and encourage the fish farmers to do farming in a large scale.
- Development of gadgets for fish farming makes the fish farmers to do farming in a remote-control method. Hence, farmers need not be in a farm all the time. Farmers can able to operate a feeder or aerator being in a home or any other place.
- Precision fish farming helps to effectively utilize the resources and helps the farmers to achieve more profit.
- Advanced aquacultural systems helps to increase the production as well as managing the resources effectively.
- Development of harvestors could reduce the harvesting time for farmers and also reduce the human drudgery.
- Development of fish processing machines could make the pre-processing and processing in a hygienic manner. Better utilization of catch, improvement of returns to fishers and providing employment and income generation opportunities to the fishers and other entrepreneurs are possible through the development of many value added products.
- Retailing of fish could be increased by effective packaging techniques and advanced cold storage systems.
- Fisheries Techno Park cum Fish Processing Technology business incubation Centre shall enable fish farmers to take up the venture successfully, which shall later promote them to have their own self-employment and also it can be utilized to develop the skilled manpower to the Fish Processing Industries.
- The post-harvest losses can be minimized by processing the fish before it spoiled by adopting suitable post-harvest technologies to create direct impact on regional trade flows and to minimize the intermediaries to increase the returns to fishers.
- Waste utilization could be enhanced by adapting suitable technologies to convert waste into effective feed materials for usage by the farms.

6. FISHERIES EXTENSION

A fishery, especially the areas of aquaculture and processing has already been globally acknowledged as important source of nutritional food and livelihood. Based on

its continuous and enormous contribution in providing proteinaceous diet in recent years, fisheries are generally regarded as the most promising sub-sector in agriculture. However, food industry experts feel that the benefit from the sub-sector has not yet been optimally harvested on par with its actual potential. This can be understood, when we take the example of Tamil Nadu, one of the progressive States of India especially in terms of fisheries development. The State, with the second longest coastline in the country has been blessed with vast and diverse fisheries resources. Despite the abundant natural wealth, the State's marine (4.72 lakh tons) and inland (1.97 lakh tons) fish production is comparatively low against the estimated production (Marine - 7.00 lakh tons and inland - 4.50 lakh tons) potential of the State. It clearly depicts that there is a gap between fish production and potential of the State. Subsequently, the gap extends in the form of recommended (13 kg) and actual (9.80 kg) annual percapita intake of the State.

Though several anthropogenic (pollution, destructive fishing methods, multiple stakeholders for fresh water) environmental degradation (climate change, habitat destruction) exists as a challenge for augmenting fish production in the State, Government of Tamil Nadu through Department of Fisheries and Tamil Nadu Fisheries University (TNFU) is on right track in scouting viable options for increasing fish production of the State. All the food production sector line departments (like Agriculture, Veterinary, fisheries etc) have been started in the respective States of our Country to ensure the increase in food production through research and extension activities. Hence, these departments can be considered as the first and largest extension system of a State. Since the establishment of State Agricultural Universities (SAUs) with the mandate of teaching, research and extension, these departments slowly deviated from their very purpose of creation and currently concentrating mainly on the prosperity of people involved in food production. In this case, Tamil Nadu Fisheries Department is also no more an exception. After the establishment of TNFU in 2012, the department is largely held responsible for the socio-economic welfare (through its schemes and subsidies) of 12.14 lakh fisher population whereas fisheries research and development activities of the State are entrusted with TNFU. However, none can deny the fact that both the TNFU and the State dept. of fisheries need to work together to narrow down the aforesaid gap in fish production through efficient utilization of the fisheries resources of the state.

Realizing the importance of research and human resource development activities of TNFU, Govt. of Tamil Nadu is constantly encouraging the University to strengthen its

infrastructure by establishing new colleges, research and extension centres throughout Tamil Nadu. At present, the University in total has 34 constituent units across the State. For the past five years, the University has proved its calibre and has successfully emerged as the number one fisheries University of India (ICAR SAU ranking 16-17). Using its State-of-the art research infrastructure and faculty, the University has developed many innovative fish production technologies in accordance with different resources of fisheries existing in the State. These technologies can be used for increasing the production, only by ensuring adoption of it in large numbers by farmers. It has to be also noted that lack of awareness about the scientific practices for obtaining optimum yields is often being cited as one of the major reasons for under-utilization of the available resources.

This is the point, where one of the mandate i.e., extension (transfer of technology) of the University is expected to play a major role to help increase fish production. However, it has been learned from the past experience of SAUs in the State that extension still remains as one of the weakest linkages that need to be strengthened sufficiently to realize the potential of any food producing sector to increase food production and generation of more employment opportunities in the sector. This strengthening will definitely help in addressing the major problems existing in fisheries technology transfer such as:

(a) Non-availability of skilled man power with different levels of skill to meet out the man power requirements of emerging fisheries enterprises
(b) Non-availability of incubation centres to train and encourage (in the form of hand holding) the aspiring youth to venture into fisheries based businesses
(c) Lack of fisheries related base line data especially the technology, training and other service requirements of farmers
(d) Lack of recent advancements in content generation infrastructure like Information and Communication Technology (ICT) driven communication lab which will enable developing required extension education materials like extension publications, educational video and audio (radio) programs
(e) Paucity of aforesaid extension education materials and appropriate training modules for imparting the knowledge and skills on the improved technologies among the farmers, interested entrepreneurs and educated youth

Hence, considering the above difficulties and keeping in mind the fact that it is a newly established University, TNFU's extension wing has to be exclusively strengthened

in terms of infrastructure and manpower. Overcoming the aforesaid difficulties through various “extension exclusive” establishments will help to strengthen the extension linkages not only with the field functionaries but also with the various types of stakeholders associated with the development of fisheries. In most of the well-established SAUs of the State, KVKs and exclusive communication centres has already been established to carry out and coordinate various multiple extension activities which is helping them to get wider reach in the technology dissemination activities. Therefore, this proposal has been made as an initial step for establishing a state of the art infrastructure exclusively for extension activities of all the constituent units of the University.

Cuddalore District spreads over an area of 3,678 sq. km with 57.5 kms of coast line and 8104 ha area of inland water resources. The principal river of the district is the Pennar or the Ponnaiyar. The Gadilam River also flows through Cuddalore District. A part of river Paravanar, also called Uppanar also flows through the district. Major irrigation and long seasonal tanks are spread in 5986 ha area. Veeranam Lake is considered as one of major water resources of the district. There are around 11,735 inland fishermen and a total of 28 Inland Fishermen Co-operative societies are functioning. Around 129 shrimp farms are registered in Coastal Aquaculture Authority. There are fish rearing centers and a number of shrimp aqua farms. A government fish seed farm was located in Lalpettai to supply the Indian Major Carp seeds. But the district does not have training centers exclusive for fisheries to guide the fish and shrimp farmers.

Considering the above, rich potential resources a fisheries training centre (FTC) could be created with the following facilities like a training hall, dormitory hall, wet training lab, etc. If the centre will be created it will help to expert and public for effectively transfer the technology and study the impact of the technology. Also this would help us to cater the needs of technology in the districts in order to redefine the technology transfer programmes for the future.

Project components

1. Mobile aquaclinics for water quality analysis and disease diagnosis in Cuddalore.
2. Awareness to fishers on hygienic handling of fish in Cuddalore.
3. Creation of awareness among fishers on fish processing technologies in Cuddalore.

4. Capacity building and skill development programmes on fish processing technologies in Cuddalore.
5. Enhancement of per capita consumption of fish in Cuddalore.
6. Awareness campaign on health beneficial attributes of fish in Cuddalore.
7. Production of short films on nutritive value of fish and screening in theatres and television channels in Cuddalore.
8. supply of preserved ready to eat and ready to cook fish products through public distribution sytems in Cuddalore.
9. Supply of fish and fish products in mid day meal programme in Cuddalore.
10. Supply chain management to promote consumption of farmed freshwater fishes in Cuddalore.
11. Installation of waste rendering plant at selected fishing harbors and fish markets in Cuddalore.
12. Development of fish compost for production of organic agricultural and horticultural crops in Cuddalore.
13. Installation of unit for biogas from fish waste in Cuddalore.
14. Development of technologies for effective utilization of shrimp shell waste in Cuddalore.
15. Establishment of trap setting vessel to impart eco friendly fish trapping technology among the fishermen of Tamil Nadu in Cuddalore.
16. Deisgn and development of e interface gadgets for sustainable aquaculture in Cuddalore.
17. Developnment of mobile gadgets/apps for remote monitoring system for aquaculture farms in Cuddalore.
18. Development of cost effective gadgets for effective fishing in Cuddalore.
19. Development of mobile apps for effective fishing in Cuddalore.
20. Design and development of solar powered tricycle for fish vendors in Cuddalore.
21. Design and development of gadgets for fish processing in Cuddalore.
22. Establishment of KVK in Cuddalore.

Budget

The budget requirement for fulfilling the above interventions is **₹ 2591.43 Lakhs (Table 4.26)**.

Expected outcome

The creation of infrastructure will enhance the quality of the research and it paves way for the state-of-art for the young researchers. The research and developmental

activities is a continuous process, the innovative ideas that emerges from the young minds will help in identifying solutions to the field problem.

Implementing agency

The projects will be implemented by Tamil Nadu Fisheries University in the various colleges and research stations.

Table 4.26 Budget Requirement for Fisheries Research in Cuddalore District

(₹ in lakhs)

Sl. No	Interventions	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Aquatic animal health and management														
1	Mobile aquaclinics for water quality analysis and disease diagnosis	100	Cuddalore	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	1	100.00
	Harvest and Post harvest														
	Reduction of post harvest losses														
2	Awareness to fishers on hygienic handling of fish	0.005	Cuddalore	133	0.67	133	0.67	133	0.67	133	0.67	133	0.67	665	3.33
3	Creation of awareness among fishers on fish processing technologies	0.6	Cuddalore	25	15.00	25	15.00	25	15.00	25	15.00	25	15.00	125	75.00
4	Capacity building and skill development programmes on fish processing technologies	6.6	Cuddalore	13	85.80	13	85.80	13	85.80	13	85.80	13	85.80	65	429.00
	Enhancement of per capita consumption of fish														
5	Awareness campaign on health beneficial attributes of fish	0.005	Cuddalore	52	0.26	52	0.26	52	0.26	52	0.26	52	0.26	260	1.30
6	Production of short films on nutritive value of fish and screening in theatres and television channels	50	Cuddalore	0	0.00	0	0.00	1	50.00	0	0.00	0	0.00	1	50.00
	Ensuring nutritional security through fish and fishery products														
7	supply of preserved ready to eat and ready to cook fish products through public distribution sytems	12.9	Cuddalore	0	0.00	1	12.90	0	0.00	0	0.00	0	0.00	1	12.90
8	Supply of fish and fish products in mid day meal programme	12.9	Cuddalore	0	0.00	1	12.90	0	0.00	0	0.00	0	0.00	1	12.90
9	Supply chain management to promote consumption of farmed freshwater fishes	64.5	Cuddalore	0	0.00	1	64.50	0	0.00	0	0.00	0	0.00	1	64.50
	Utilization of fish processing waste and by catch														

Sl. No	Interventions	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
10	installation of waste rendering plant at selected fishing harbors and fish markets	130	Cuddalore	0	0.00	1	130.00	0	0.00	0	0.00	0	0.00	1	130.00
11	Development of fish compost for production of organic agricultural and horticultural crops	65	Cuddalore	0	0.00	1	65.00	0	0.00	0	0.00	0	0.00	1	65.00
12	Installation of unit for biogas from fish waste	161.5	Cuddalore	0	0.00	1	161.50	0	0.00	0	0.00	0	0.00	1	161.50
	Development of technologies for effective utilization of shrimp shell waste	100	Cuddalore	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	1	100.00
	fishing technology														
13	Establishment of trap setting vessel to impart eco friendly fish trapping technology among the fishermen of Tamil Nadu	300		1	300.00	0	0.00	0	0.00	0	0.00	0	0.00	1	300.00
	Fisheries Engineering														
	Aquacultural engineering														
	Farm implements														
14	Deisgn and development of e interface gadgets for sustainable aquaculture	20	Cuddalore	0	0.00	1	20.00	0	0.00	0	0.00	0	0.00	1	20.00
	Automation technologies														
15	Developnment of mobile gadgets/apps for remote monitoring system for aquaculture farms	15	Cuddalore	0	0.00	0	0.00	1	15.00	0	0.00	0	0.00	1	15.00
	Navigation and Fisheries Engineering														
16	Development of cost effective gadgets for effective fishing	15	Cuddalore	1	15.00	0	0.00	0	0.00	0	0.00	0	0.00	1	15.00
17	Development of mobile apps for effective fishing	8	Cuddalore	0	0.00	0	0.00	0	0.00	0	0.00	1	8.00	1	8.00
	Post-harvest fisheries engg														

Sl. No	Interventions	Unit cost	Blocks Covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total	
				Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
	Handling, transportation and storage														
18	Design and development of solar powered tricycle for fish vendors	2	Cuddalore	1	2.00	1	2.00	1	2.00	1	2.00	0	0.00	4	8.00
	Processing machines														
19	Design and development of gadgets for fish processing	20	Cuddalore	0	0.00	0	0.00	0	0.00	1	20.00	0	0.00	1	20.00
	Fisheries technology transfer														
20	Establishment of KVK	1000	Cuddalore	1	1000.00	0	0.00	0	0.00	0	0.00	0	0.00	1	1000.00
	Grand total				**1418.73**		**770.53**		**168.73**		**123.73**		**109.73**		**2591.43**

4.11 Water Resource Organization (PWD)

Cuddalore District is endowed with good network of irrigation systems, even from the time of Chola Kings. Proper maintenance and upkeep would make the systems more effective. There are 270 canals and 592 PWD tanks are situated in the district. Canals irrigate 31 per cent of the gross net area irrigated by various sources. Sometimes, on the formation of depression in Bay of Bengal, heavy to very heavy rains are received but flows as flood, as the rain water could not be stored and utilised fully for getting the maximum advantage and most of the channels. The livelihood of the people in this basin depends on agriculture only. Most of the canals and tanks are silted and bushes like *Prosopis*, *Acassia* spp and water hyacinth occupied major part of the tanks and canals, there by storage capacity of the tank is very much reduced. Hence, to raise the water table level, construction of check dams,diaphrams need to be taken up in canals to increase the storage capacity of the tanks and there by crop cultivation area in tank ayacut area can be increased.

Project components

- Construction of check dams across the rivers (furnished in table) covering Cuddalore and Vridhachalam blocks.
- Improvements to increase carrying capacity of canals covering Kurunjipadi, Parangipettai, Kumaratchi blocks.
- Rehabilitation of Koppadi weir-II and Extention of Coleroon North Rajan Channel covering Kumaratchi, Kammapuram, Nallur, Panruti, Mangalur, Parangipettai and Annagramam
- Construction of a Diaphragm wall across Pennaiyarand Coleroon River in Vallambadugai covering Kattumannarkoil and Panruti blocks.

Budget

The budget requirement for fulfilling the above interventions is **₹ 99735.00 Lakhs (Table 4.27)**.

Expected outcome

The project will increase the Ground water table level and carrying capacity of canals during the heavy rain period and thereby increasing the crop cultivation area. This will result in the ensuring of food security for the people.

Implementing agency

Department of Water Resources Development will be implementing the project.

Table 4.27 Budget Requirement for PWD in Cuddalore District

(₹ in lakhs)

Sl. No	Name of Scheme	Blocks Covered	Unit	Unit cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
1	Construction of a checkdam across Gadilam river near Vilagalpattu Village in Cuddalore Taluk .	Cuddalore	Ha	8.96	125	1120.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	125	1120.00
2	Construction of a checkdam across Kattu odai in Peyiganattam Village near Thambipettai in Kurinjipadi	Cuddalore	Ha	2.31	65	150.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65	150.00
3	Construction of a checkdam across Manimuktha nadhi near Paravalur Village in Virudhachalam Taluk .	Virudha chalam	Ha	13.67	120	1640.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	120	1640.00
4	Rehabilitation of Koppadi weir-II and Extention of Coleroon North Rajan Channel Aqueduct in Kattumannarkoil taluk.	Kumaratch i	Ha	7.33	525	3850.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	525	3850.00

Sl. No	Name of Scheme	Blocks Covered	Unit	Unit cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
5	Construction of a Checkdam across Nariyan odai near Naduveerapattu village in Cuddalore taluk.	Cuddalore	Ha	1.04	0.00	0.00	91	95.00	0.00	0.00	0.00	0.00	0.00	0.00	91	95.00
6	Construction of a Diaphragm wall across Pennaiyar in Viswanathapuram village in Panruti Taluk.	Annagramam	Ha	8.67	0.00	0.00	150	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	150	1300.00
7	Improvents to increase carrying capacity and construction of checkdam of Lower Paravanar in Kurinjipadi, Chidambaram and Cuddalore Taluk.	Kurinjipadi	Ha	12.88	0.00	0.00	3300	42500.00	0.00	0.00	0.00	0.00	0.00	0.00	3300	42500.00
8	Improvents to increase carrying capacity and construction of checkdam of Lower Paravanar in Kurinjipadi, Chidambaram and Cuddalore Taluk .	Parangi pettai	Ha	13.00	0.00	0.00	1400	18200.00	0.00	0.00	0.00	0.00	0.00	0.00	1400	18200.00

Sl. No	Name of Scheme	Blocks Covered	Unit	Unit cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
9	Construction of a checkdam across Therkuveli odai near Ayikuppam Village in Kurinjipadi Taluk .	Kurinjipadi	Ha	1.16	0.00	0.00	0.00	0.00	147	170.00	0.00	0.00	0.00	0.00	147	170.00
10	Construction of a checkdam across Manimuktha nadhi near Kilpalaiyur Village in Virudhachalam Taluk .	Kamma puram	Ha	9.33	0.00	0.00	0.00	0.00	150	1400.00	0.00	0.00	0.00	0.00	150	1400.00
11	Construction of a checkdam across Gomuki nadhi near A.Kolapakkam Village in Veppur Taluk of Cuddalore District .	Nallur	Ha	10.00	0.00	0.00	0.00	0.00	120	1200.00	0.00	0.00	0.00	0.00	120	1200.00
12	Improvements to increase carrying capacity of Velliangal odai ,and theirby increasing recharge in Kattumannarkoil taluk of Cuddalore district.	Kumarat chi	Ha	0.36	0.00	0.00	0.00	0.00	11600	4200.00	0.00	0.00	0.00	0.00	11600	4200.00

Sl. No	Name of Scheme	Blocks Covered	Unit	Unit cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
13	Construction of a checkdam across Malattar river near Sirugramam Village in Panruti Taluk.	Panruti	Ha	1.72	0.00	0.00	0.00	0.00	0.00	0.00	116	200	0.00	0.00	116	200.00
14	Construction of a checkdam across Sengal odai near Rajakuppam Village in Kurinjipadi Taluk .	Kurinjipadi	Ha	3.51	0.00	0.00	0.00	0.00	0.00	0.00	74.00	260.00	0.00	0.00	74	260.00
15	Construction of a checkdam across Periya odai in Irrappavur village near Narasingamangalam Village in Titagudi Taluk .	Nallur	Ha	20.00	0.00	0.00	0.00	0.00	0.00	0.00	18	360	0.00	0.00	18	360.00
16	Construction of a checkdam across Vellar river near Gudalur Village in Tittagudi Taluk.	Mangalore	Ha	34.68	0.00	0.00	0.00	0.00	0.00	0.00	62	2150	0.00	0.00	62	2150.00
17	Construction of a checkdam across Vellar river near Adhivaraganallur Village in Bhuvanagiri Taluk.	Parangi pettai	Ha	122.97	0.00	0.00	0.00	0.00	0.00	0.00	64	7870	0.00	0.00	64	7870.00
18	Construction of	Kumaratch	Ha	23.44	0.00	0.00	0.00	0.00	0.00	0.00	320	7500	0.00	0.00	320	7500.00

Sl. No	Name of Scheme	Blocks Covered	Unit	Unit cost	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		Total	
					Phy	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
	a Diaphragm wall across Coleroon River in Vallambadugai village in Kattumanarkoil Taluk.	i														
19	Construction of a Checkdam across Pennaiyar river in Melkumaraman galam village of Panruti taluk.	Annagram am	Ha	9.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	362	3360.00	362	3360.00
20	Construction of a checkdam across Manimuktha nadhi near Bhudamur Village in Virudhachalam Taluk .	Virudhach alam	Ha	15.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124	1900.00	124	1900.00
21	Construction of a checkdam across Kazhudur odai near Kumarai village in Titagudi Taluk.	Nallur	Ha	8.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36	310.00	36	310.00
	TOTAL					**6760.00**		**62095.00**		**6970.00**		**18340.00**		**5570.00**		**99735.00**

B1 – Annagramam, B2 – Cuddalore, B3 – Kammapuram, B4 – Kattumannarkoil, B5 – Keerapalayam, B6 – Kumaratchi, B7 – Kurinjipadi, B8 – Mangalur, B9 – Melbhuvanagiri, B10 – Nallur, B11 – Panruti, B12 – Parangipettai, B13 – Virudhachalam

4.12. Cooperatives

Agricultural cooperatives or farmers' cooperatives are cooperatives where farmers pool their resources for mutual economic benefit. Agricultural cooperatives are broadly divided into agricultural service cooperatives, which provide various services to their individual farming members, and agricultural production cooperatives, where production resources such as land or machinery are pooled and members farm jointly. Agricultural supply cooperatives aggregate purchases, storage, and distribution of farm inputs for their members. By taking advantage of volume discounts and utilizing other economies of scale, supply cooperatives bring down members' costs. Supply cooperatives may provide seeds, fertilizers, chemicals, fuel, and farm machinery. Some supply cooperatives also operate machinery pools that provide mechanical field services (*e.g.,* plowing, harvesting) to their members. Agricultural marketing cooperatives are often formed to promote specific commodities.

Project components

1. Construction of Office Building covering all blocks except Mangalur
2. Construction of compound wall covering all blocks
3. Purchase of computer and peripherals covering all blocks except Kumaratchi, Kurunjipadi and Mangalur.
4. Furniture have to supply in Annagramam, Cuddalore, Melbhuvanagiri, Panruti, Parangipettai and Vridhachalam.
5. Modern counter have to supply in Cuddalore, Melbhuvanagiri, Nallur and Panruti
6. Xerox machine have to supply in Annagramam, Cuddalore, Katumannarkoil and Kammapuram.
7. AC Annagramam, Cuddalore, Melbhuvanagiri, Panruti, Parangipettai and Vridhachalam.
8. Renovation of Fair Price Shop has to supply in all blocks except Keerapalyam, Kumaratchi, Kurunjipadi and Mangalur.
9. Godown construction have to implement in all blocks
10. Processing unit have to implement in Annagramam, Cuddalore and Panruti
11. Burglary Alarm have to implement in Melbhuvanagiri, Panruti and Vridhachalam blocks.

Budget

The budget requirement for fulfilling the above interventions is **₹ 2540.19 Lakhs (Table 4.28)**.

Expected outcome

Agricultural marketing cooperatives will provide the services involved in moving a product from the point of production to the point of consumption. Agricultural marketing includes a series of interconnected activities involving planning production, growing and harvesting, grading, packing, transport, storage, food processing, distribution and sale.

Implementing agency

Department of Cooperative Societies will be implementing the project.

Table 4.28 Budget Requirement for Cooperatives in Cuddalore District

(₹ in lakhs)

Sl. No	Co-operation	Blocks covered	2017-18		2018-19		2019-20		2020-21		2021-22		Total Amount	
			Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin
1	Construction of Compound wall	All blocks	0	0	35	208.25	34	185.2	26	140.67	25	176	120	710.12
2	Construction of Office Building	All blocks except B8	0	0	58	166.53	56	78.43	40	170.75	49	173.6	203	589.31
3	Establishment of Processing unit	B1, B2, B11	8	74.83	0	0	0	0	0	0	0	0	8	74.83
4	Renovation of Fair Price Shop	All blocks except B5, B6, B7, B8	1	11.2	33	261.12	29	112.05	27	100.82	24	71.92	114	557.11
5	Renovation of Godown	All blocks	0	0	25	151.44	19	40.4	16	77.7	17	98.24	77	367.78
6	Strengthening of Cooperation Centres (Furniture's, Solar panel, Modern counter, Xerox machine, Air Conditioner, CCTV Camera, Bore well, Generator, UPS Battery, Cash Counting Machine, Invertor, Jewel Weighing Machine, Packing Machine, Purchase of computer and peripherals, Hand Billing machine, LED Display for tender process, Purchase of Jewel Carat Meter, Smart Card Printing Machine, Burglary Alarm, Agricultural Equipments, Safety Locker, Purchase of Display racks, Defender Door, Purchase of Paddy drying machine, Automatic Printer machine, Conveyer, E-Tender process, Fork Lifter, Gunny Bag Stitching machine, Jewel tester, Pallets, Tarpaulin, Trolley and Printing Press machineries)	All Blocks	2	2.2	87	62.76	104	87.18	62	56.6	42	32.3	297	241.04
	Grand Total			**88.23**		**850.10**		**503.26**		**546.54**		**552.06**		**2540.19**

Cuddalore-B1, Panruti-B2, Annagramam-B3, Kurinjipadi-B4, Virdhachalam-B5, Kammapuram-B6, Mangalur-B7,Nallur-B8, Keerapalayam-B9, Kumaratachi-B10, Bhuvanagiri-B11, M.Koil-B12, Parangipettai-B13

Table 4.29 Consolidated Budget for Cuddalore District

(₹ in lakh)

Sl. No	Sectors	2017-18	2018-19	2019-20	2020-21	2021-22	Total
1	Agriculture	21651.64	23743.30	23982.02	23790.28	24421.46	117588.70
2	Agricultural Research (TNAU)	56.00	100.00	732.00	20.00	100.00	1008.00
3	Horticulture	4886.03	4907.03	4945.91	4934.78	4950.16	24623.91
4	Agricultural Engineering	4008.65	3137.69	2580.79	2373.99	2199.29	14300.41
5	Agricultural Marketing	1708.03	1117.65	777.10	800.95	795.95	5199.68
6	Seed certification and Organic Certification	18.36	13.36	0.00	0.00	0.00	31.72
7	Animal Husbandry	826.05	896.65	764.65	627.70	527.00	3642.05
8	Animal Sciences Research (TANUVAS)	0.00	0.00	0.00	0.00	0.00	0.00
9	Dairy Development	245.00	404.00	442.00	612.00	409.00	2112.00
10	Fisheries	1053.48	1261.78	64.98	79.18	77.48	2536.88
11	Fisheries Research (TNFU)	1418.73	770.53	168.73	123.73	109.73	2591.43
12	Water Resource Organization (PWD)	6760.00	62095.00	6970.00	18340.00	5570.00	99735.00
13	Civil Supplies & Cooperatives	88.23	850.10	503.26	546.54	552.06	2540.19
	Total	**42720.20**	**99297.09**	**41931.44**	**52249.15**	**39712.13**	**275909.97**

The total budget requirement for the implementation of various interventions by different departments in Cuddalore district is **₹ 275909.97 lakh.**


KARNATAKA
KERALA
SRI LANKA