# CHAPTER IV

# AGRICULTURE AND IRRIGATION

## INTRODUCTION

The district popularly known as the granary of Orissa is divided into three natural divisions viz., (i) the coastal belt comprising parts of Bhograi, Baliapal, Basta, Baleshwar, Bahanaga, Basudebpur, Remuna, Tihiri and Chandbali blocks, (ii) the submountainous region comprising parts of Bant, Khaira, Oupada, Nilagiri, Basta and Jaleshwar blocks, and (iii) between them a zone of highly fertile land intersected by a net-work of rivers known as central alluvial plains, comprising Dhamnagar, Bhandaripokhari, Bhadrak, Similia, Soro and Remuna blocks. To the east is a low-lying tract, a great part of which is impregnated with salt and exposed to damage from storm-waves. To the west, is an uncultivable region of high undulating land covered with bamboos and scrub jungles. Between these two tracts lie the alluvial plains, forming the greater part of the district, which presents a gradual and steady slope from the high lands of the west to the sea and a composition varying according to the relative proportion of the sand and silt of which they are formed[1]. According to the figures of 1981 Census, out of the total working population of 6,12,847 in the district, 4,84,956 persons, i. e., 79·20 per cent were engaged in agriculture as cultivators and agricultural labourers. In the year 1984-85, the total net sown area of the district was 4,49,000 hectares of which only 1,02,237 hectares and 36,648 hectares were irrigated in Kharif and Rabi seasons respectively and the rest was dependant on rainfalls only. The district was very poor in respect of irrigation facility till 1961 after which there has been some improvement. Having an average annual rainfall of 1583 mm., lack of irrigation facilities does not pose a problem for agricultural work unless there is exceptional adverse weather condition. Although it is the rice-pot of the state, still then visitation of natural calamities like flood, drought and cyclone to this district is frequent. Paddy is the main crop. Mung, Biri, Arhar, maize, groundnut, sugarcane and other crops are also cultivated.

### History of agricultural development in the district

Prior to independence, agriculture of the district was almost fully dependant on rain which was erratic. Moreover, this coastal district is subjected to floods at frequent intervals. In 1905, the Ministry of Scientific Agriculture was created and specific recommendations were formulated to study any adverse weather condition.

---

1. L. S. S. O' Malley, Bengal District Gazetteers, Balasore, 1907, Chapter-V, Agriculture.

An Agricultural Scientist was appointed to study the problems of cyclone, flood and drought prone areas in the country. In 1929 the Indian Agriculture Research Institute was established at Pussa and a number of research projects were formulated for the entire country. Subsequently during 1938-42 Grow More Food campaign was launched to motivate the farmers for use of chemical fertilisers. Japanese method of paddy cultivation was introduced with all improved technology but the production level did not increase to the desired extent. From 1966 onwards various research co-ordinated projects were undertaken through the Indian Council of Agriculture Research (ICAR) and a series of institutes of agricultural research together with their sub-stations were established throughout the country, covering major crops, problems of soil, salinity, drought prone area programme for arid zone, watershed management alongwith development of agriculture engineering, fishery and animal husbandry. Many constraints have come in the way of implementing the agricultural programmes, the most important being natural calamities. Till now the cultivation in the district is predominated by the traditional method of cultivation. The numbers of small and marginal farmers is too high. They are not in a position to avail themselves of the modern technology to improve their yield. As a result, the productivity of the lands has not appreciably increased inspite of application of modern technology in use of fertilisers, pesticides, high-yielding varieties of seeds, etc.

In 1947-48, one District Agriculture Officer post was created in the district. The District Agriculture Officer, Salandi Irrigation Project, Bhadrak was functioning at Bhadrak since 1966-67. Prior to 1976-77 under the scheme of National Extension Services, the Agriculture Extension Officers were assisting Block Development Officers in all the C. D. Blocks. During 1977, under the World Bank assistance, the agricultural extension was reorganised and T & V system was introduced to provide for training of Agricultural Extension Officers and leading cultivators and their frequent visits to farmers fields on a continuing basis. One Deputy Director of Agriculture was posted to each district for overall supervision of all agricultural activity in the district.

## LAND UTILISATION

The total geographical area[1] of the district was 6,47,000 hectares of which the gross cropped area was 6,28,334 hectares in 1984-85.

1. According to the Survey of India, the total geographical area of the district is 630·42 sq. km. (in 1987).

The statement below gives a picture of the land utilisation in the district during 1984-85.[1]

| | | (in hectares) |
|---|---|---|
| Forest[2] | .. | 40,000 |
| Barren and uncultivated land | .. | 24,000 |
| Land put to non-agricultural use | .. | 51,000 |
| Culturable waste | .. | 18,000 |
| Permanent pasture and grazing land | .. | 26,000 |
| Miscellaneous trees and groves | .. | 28,000 |
| Current fallows | .. | 17,000 |
| Other fallows | .. | 9,000 |
| Net area sown | .. | 4,49,000 |

**SOIL CONSERVATION**

In Baleshwar district a Soil Conservation Subdivision at the district headquarters is functioning from 1963-64 to undertake soil conservation measures. The problem of soil erosion is acute in the district due to flat slopping and undulating topography, rainfall, and salinity accumulation.

The western hilly terrain consisting of hills, hill slopes and piedmont plains without bunds and terraces, estimated to be 85,299 hectares, i.e., 70 per cent of the total area of 1,21,850 hectares, suffers from acute soil erosion like sheet, rill and gully erosion. This is due to over-exploitation of forests, grazing land, improper land use practices and terrain conditions.

The middle region of the district, i.e., alluvial plain estimated to be 1,65,888 hectares, i.e., 45 per cent of total area of 3,68,640 hectares, suffers from sheet erosion and stream bank erosion due to meandering nature of streams and rivers. As a result, valuable agricultural fields and homestead area are being damaged.

In the coastal belt, wind erosion and shifting of sand-dunes are some of the typical problem of erosion. In these areas soil salinity is widespread due to frequent inundation of agricultural lands by sea water during high tide and cyclonic periods. In this region also stream bank erosion, sheet erosion and rill erosion and sand-casting in agricultural land during high flood are observed.

1. *Source*—Deputy Director of Agriculture, Baleshwar.

2. According to the Forest Department the total forest area of the district is 359·57 sq. km.

In between sea and coastal plain a new land type known as coastal swamp (mangroves) which has been formed due to receding of sea estimated to be 14,000 hectares is lying fallow. A project profile for reclamation of coastal swamp and shelter belt plantation in the coastal belt from Udayapur to Dhamara has been submitted to the State Government by the Directorate of Soil Conservation.

A number of anti-erosion measures have been taken up by the Government. These measures include development of pastures in eroded land, massive tree plantation in drought-hit areas, plantation of cashew and other economic species in waste lands, contour bunding, levelling, gully control and conservation of farming, etc. For the prevention of soil erosion, cashew plantation over an area of 1052.20 hectares and miscellaneous plantation over an area of 80.40 hectares have been undertaken in the hill slopes, upland and government waste lands. Besides, bunding and terracing over an area of 48.87 hectares of crop land belonging to the tribal farmers in Nilagiri, ITDA has been done. By the end of 1984-85, five units of gully control structures have been constructed in hilly areas. In order to conserve soil and water, 17 farm ponds and 65 numbers of water harvesting structures have been constructed to harvest rain water for re-cycling the same for irrigation creating 732 hectares of ayacut area by the end of 1984-85.

One Soil Conservation Demonstration Centre (48 acres) and another Pasture Development Centre (25 acres) have been established at Nilagiri and Panapana with a view to demonstrating different aspects of soil and water conservation to multiply seeds and planting materials for subsequent utilisation.

In recent years emphasis is being given on construction of water harvesting structures and miscellaneous tree plantations under the Rural Landless Employment Guarantee Programme (RLEGP) and National Rural Employment Programme (NREP) sponsored by the District Rural Development Agency (DRDA).

## IRRIGATION

The Balasore District Gazetteer of 1907 says that owing to the ample supply of rainfall in ordinary years, irrigation is far less essential than in less favoured parts of the province, and except for the canals, it was comparatively little used. In low

lying tracts water was taken from the small streams and creeks by means of *tenda* or bamboo water-lift. Where the water had only to be raised a few feet, it was to be scooped up in a *sena*, a sort of basket made of split bamboo which is operated by two persons. So it can be well stated that irrigation, in the past was being made by means of *tenda*, *sena*, or *janta*. There are a number of rivers, big and small, in this district. Three major canals such as Churaman Canal, the Coast Canal and the High Level Canal were constructed with the aim of providing navigation and irrigation facilities. But these canals could not be used purposefully. The people were very reluctant to use canal water for irrigation purpose due to a superstition prevailing among them. In the old gazetteer of 1907 an interesting event has found place in this regard. It is mentioned, "the people generally were reluctant to resort to artificial irrigation, and as an instance of this feeling, mention may be made of the course of events in 1869 in Pargana Randhiyaorgara, which suffered severely from want of rain in that year. The river Salandi runs through the centre of this tract, and when the drought made itself felt and the people were praying for help, the Collector asked them why they did not use the river water as a means of irrigation. They only replied that it was not the custom; that the proprietors of lands on the river banks would object to channels being cut through their lands for the purpose of carrying water to fields further inland; that it would be very hard work; that it would not pay; and that river water was not so fertilizing as that which came "from heaven". At all events, the river water was not used and the crops perished in consequence".*

In that gazetteer it has been mentioned that in 1895-96 the irrigated area was only 10,105 acres (4,089·36 hectares); it increased to 29,248 acres (11,836·28 hectares) in 1898-99; in the 5 years ending in 1904-05 the average area irrigated was 37,000 acres (15,256·69 hectares); and in 1905-06 water was supplied to 42,784 acres (17,314·12 hectares); of which 42,000 acres (16,996·85 hectares) were under rice.

However, the situation and scope of irrigation has been changed considerably. Tanks, rivers, Nalas and other water reservoirs are being utilised for irrigation. Water pumps, run by diesel engines are also in vogue. People are becoming more and more conscious about this. From 1980 onwards emphasis has been given for water harvesting structures, maintaining the efficiency of ground water and cross-bunding of creeks together with modernisation of irrigation system at Salandi. The culturable land of the district is 4,570 square

* L. S. S. O' Malley, Bengal District Gazetteer, Balasore, Canal and Embankments Chapter.

kilometres. The irrigated area under flow irrigation in this district up to end of 1985-86 is about 20·40 per cent of the culturable area. The major irrigation projects operating in the district are discussed below.

## Major Irrigation Projects

### Baitarani System High Level Canal Range III

The High Level Canal Range III was a part of the ambitious canal project intended to connect Cuttack with Calcutta by means of a 368 km. long navigable canal. This scheme was done in three ranges. The High Level Canal Range I from Birupa to Brahmani, Range II from Kharasuan to Baitarani in the district of Cuttack and then Range III from Baitarani at Akhuapada to Salandi near Bhadrak in Baleshwar district. Out of the three ranges, range I and range II are defunct. The High Level Canal Range III, which is 30·57 km. (19 miles) long was completed in the year 1891. This navigable-*cum*-irrigation canal derives its supply of water from river Baitarani at Akhuapada. After opening of the railway communication in 1905 and better communication facilities in National High Ways, the navigational aspect of the canal has declined and the lock gate at Bhadrak is defunct.

There are seven distributaries with a total length of 109·03 km. (67$\frac{3}{4}$ miles) taking off from this main canal to irrigate an area of 19,673 hectares of land in Baleshwar district.

### Salandi Irrigation Project Left and Dasamauja System

The Salandi irrigation project is located in Kendujhar district and it irrigates partly in the Baleshwar district. The dam across river Salandi intercepting a catchment of 673 sq. km. has been constructed near village Hadgarh in Kendujhar district to impound water and release the same for irrigation purpose. The Salandi left main canal which is 7 kilometres long, has branches for 36·50 km. and there are 7 distributaries, 26 minors and 79 sub-minors command in over an area of 37·520 hectares in Bhadrak subdivision of the district. On the down stream of river Salandi below Bhadrak town there is a cross regulator at village Aharpada where the two canals namely Gopalia and Dasamauja have taken off to irrigate an area of 7,112 hectares in Bhadrak subdivision.

The project was started in the year 1961-62 and has been completed during the year 1981-82. The project was executed with World Bank assistance and the latest estimated cost of the project was Rs. 1,637·91 lakhs. This project is providing irrigation to an area of 44,632 hectares in 5 Community Development Blocks, namely, Bhadrak, Tihiri, Soro and Basudebpur of this district.

### Canalisation of Anandapur Barrage Salandi Right Canal System

Initially there was a proposal for construction of a barrage across river Baitarani at Anandapur in Kendujhar district to irrigate the area between Baitarani left and Salandi right. But subsequently in the year 1976 a committee of engineers after examining the capacity of the Salandi reservoir recommended that the Salandi right canal system with a culturable commandable area of 40,178 hectares can be irrigated by taking a canal on the right from Bidyadharpur barrage constructed across river Salandi. Accordingly, the canalisation scheme was started in the year 1976.

This is an ongoing project and the estimated cost was Rs. 1616·72 lakhs. Up to the end of 1985-86, 10·20 km. of right main canal, 72·88 km. of branch canals and 248·00 km. of distributaries, minors and sub-minors have been completed. The programme of work is to complete the project by 1988-89. The expenditure up to 1985-86 was 1,263·00 lakhs.

On completion, this project will irrigate 13,095 hectares in Kendujhar district and 27,083 hectares in Baleshwar district. Under this system, irrigation has been extended to 21,793 hectares of land in Baleshwar district up to 1985-86.

### Chudamani Canal

During 1825 to 1826 the first canal in Baleshwar district was constructed as a cut connecting Matai and Gamai rivers. It is known as Chudamani canal. This is also known as Rickets Canal named after the then Collector of the district. The primary purpose of this canal was transportation of salt from the Arangs in the south to the then port Churaman, whence it was shipped by sloops to Calcutta. The canal is in low-lying areas of Basudebpur Block. To some extent it also serves as a drainage channel. At present, the canal is silted up and is defunct. A scheme for renovating this canal for improvement of the drainage and to promote Rabi cultivation is now under investigation.

### The Coast Canal

In the year 1880 construction of Coast Canal was undertaken to establish a trade route from Chandbali to Calcutta through the river Matai. The work was taken up to provide employment opportunity against the famine. The canal was opened during 1885-87. The length of canal in Balashwar district is 133·60 kilometres. It is divided into four ranges with 8 locks. With the opening of railway from 1905 the navigation aspect of the canal started declining. In course of time out of 8 locks 6 locks have become defunct and only two at Bhogari and Jamkunda are functioning.

In the year 1984 the Government decided to improve the first range and a portion of 4th range (Charbatia to Dhamra road) so as to provide irrigation to 2,508 hectares of Kharif and 1,238 hectares of Rabi. The estimated cost of both the schemes was 139·75 lakhs. This is an ongoing scheme and is likely to be completed by 1987-88. The first range shall draw sweet water from river Subarnarekha whereas the 4th range shall draw its water supply from river Matei upto the end of February and extend irrigation facilities by lift arrangements.

### Subarnarekha Irrigation Projects

This is an inter-state multi-purpose project for Bihar, Orissa and West Bengal to share the irrigation and flood control benefits. The proposal is to construct Chandil dam, Ichha dam, Kharkei barrage and Galudihi barrage in the state of Bihar and irrigate 1,60,000 hectares in Bihar, 94,000 hectares in Baleshwar and Mayurbhanj districts of Orissa and 5,000 hectares in West Bengal. The total cost of the project was Rs. 1,216·78 crores. Out of this scheme, in Phase-I, Chandil dam, Ichha dam and Galudihi barrage with the right link canal up to Orissa border has been taken up under World Bank assistance and the total estimated cost was Rs. 163·73 crores. The canal system of Orissa alongwith the improvement of Haladia reservoir and the new reservoir Jambira and Baura shall be taken up in Phase-II with an estimated cost of Rs. 263·90 crores. Distribution system of the Subarnarekha Irrigation Project through the Baisinga branch canal shall irrigate an area of 4,740 hectares in Baleshwar district.

### Sunei Medium Irrigation Project

It is a reservoir scheme across a small river Sunei near village Salchua in the district of Mayurbhanj. This is an ongoing project being executed through World Bank assistance. The estimated cost of the project was Rs. 27.00 crores and the project is to be completed during 1988-89. After completion, this project will irrigate a total area of 10,000 hectares in Mayurbhanj and Baleshwar districts. The Berhampur distributary of the canal system shall supply water to 2100 hectares of land in Nilagiri subdivision of Baleshwar district.

### Minor Irrigation

Tanks and reservoirs serve as the main source of minor irrigation. There are 55 numbers of small diversion weirs and reservoirs irrigating 6,971 hectares in the district. Out of these, 30 are completed projects, 30 partly derelict, 4 completely derelict and one project is under construction in Nilagiri subdivision.

## Lift Irrigation

The district comes under two distinct geological formations, namely, unconsolidated sediments and consolidated archeans. The former covers major river basins and coastal alluvial tracts which constitute 86 per cent of the gross area of the district in 19 C.D. Blocks. In this tract granular aquifers occuring in multiple layers alternating with clay beds provide vast scope for installation of all types of irrigation wells. But the behaviour of coastal saline tract is a little different. Due to the intrusion of saline water top in this region, aquifers are contaminated with salinity over a large area and hence, it is not suitable for installation of irrigation wells.

Basins of river Salandi provide good scope for integrated development of surface water and ground water. As the Nilagiri-I, Nilagiri-II and Khaira C.D. Block areas represent archeaen type of rocks, those have comparatively limited scope for ground water development.

Rivers Subarnarekha, Jambira, Burhabalanga, Kansbans, Salandi, Baitarani, etc., serve as the main drainage system for the district and provide large scope for installation of river-lift projects. By the end of March 1986, 244 numbers of river-lift projects exist along the banks of different rivers in the district which irrigate 5030 lakh hectares in the district.

Irrigation wells have been installed in almost all the C.D. Blocks of the district. Altogether 6,725 dug wells, 782 dug wells with pump sets, 1794 deep tube wells and 234 numbers of river-lift projects have been installed by the Orissa Lift Irrigation Corporation and the Comunity Development and Rural Reconstruction Department in this district. These sources irrigate 7.46 lakh hectares. Programme has been chalked out to install further 650 tube wells during the Seventh Five Year Plan period to provide irrigation facilities for 13,000 hectares in the district.

## SOIL

Systematic soil survey has not been done so far in this district. The soil classification given below is based on the visual impression and inferences drawn from the types of vegetation. Accordingly, the soils of the district can be divided into following classes :

### Alluvial Soil

It is formed out of salt deposited by flood water. The soil is mostly marked on the river sides of Subarnarekha, Burhabalanga, Salandi, Kansbans, Jalaka and Baitarani. Clay and organic matters are the main contents of this type of soil. As it is extremely fertile, crops like paddy, sugar-cane, jute, tobacco, pulses, vegetables and corriander are grown on this soil.

### Red Loam

This type of soil is mainly concentrated in west Baleshwar, especially in Nilagiri subdivision. The rapid flow of rain water that takes place in the undulating land causes soil drift. The wash-out contributes considerably to loss of fertility. It is reddish and suitable for growing fruits. The soil deposited in the slopes by process of erosion is rich with alluvium and is of medium fertility. It is capable of growing crops like paddy, vegetables, pulses, groundnut, maize, sesamum, mustard, arrow-root and turmeric.

### Sandy and Sandy loam

The sandy soil is found mainly in the coastal belt. The strip of land containing the soil gradually broadens and stretches towards the north. Cashewnut, casuarina and palmyra grow well in this soil. The sandy loam also confined to the coastal belt are suitable for the growth of cocoanut, arecanut, groundnut and vegetables.

### Black Soil

This type of soil is calcareous by nature, and cracks when becomes dried. During rains, it gets water-logged. It occures more or less in the western part of the district. Paddy is the main crop grown in this soil. With the extension of irrigation facilities crops like pulses, summer paddy, cotton, groundnut and chillies are also grown.

### Saline Soil

It occurs mostly in the low-lying areas near the sea. This soil contains high percentage of salt and is, therefore, unsuitable for cultivation. Only when salinity is washed out by floods, some coarse varieties of paddy are grown.

According to local terms these soils may be divided into four classes in the light of their composition, viz., Matal or clay lands, (*ii*) Dorasa or loamy soils, (*iii*) Balia or sandy lands and (*iv*) Patu or alluvial soils.

#### CLASSIFICATION OF LAND

The arable land in the plains consists of alluvium in which sand and clay are intermixed in varying proportions; but the cultivators recognise a large number of different classes of soil, the names of which vary according to their situation, elevation and composition. In an ordinary village, the lands fall primarily under three main divisions according to their situation, viz., (i) the low

lands retaining rain water, and hence called *jala* or wetlands; on which winter rice is grown. These lands predominate in the district and comprise the greater part of the whole cultivated area (ii) The high lands round the village homesteads, which being enriched by manure and household refuse, have a blackish colour and therefore called *kala*. Vegetables, cotton, jute and other valuable crops are grown on such lands. The homestead land is also known by the generic name of Gharabari or *kala* and the land lying between this and the fields is called Gantali and (iii) The river-side lands (Pala) being periodically fertilised by deposits of silt are suitable for growing tobacco, cotton, mustard and other Rabi crops.

In the Bhadrak Agriculture District *att* land, i.e., unbounded high land is confined to Khaira C. D. Block area only. The Berna or medium land covers 88,628 hectares. Generally paddy is grown in this type of land during Kharif season. The low land area known as Bahal is of 1,24,438 hectares where paddy is grown during Kharif season followed by pulses in Rabi.

Arable lands are also classified according to their elevation, the low-lying lands being called *gahira* and the high land *danga*. High lands which are not enriched by silt and cannot retain water are contemptuously reffered to as waste land (Thenga or Thengi). A further classification under which all lands fall is that of quality. The first class (*caul*) includes all soils which retain moisture up to the time when the ear is ripe; and alluvial and homestead lands also rankin this class on account of their special fertility. The second class (*doem*) includes land at medium level which retain moisture up to September. Inferior and sandy soils rank under the third class or *soem*.

### CROPS

Baleshwar mainly being an agricultural district is suitable for various crops. Cereals, pulses, oil-seeds, millets, fibre crops, various cash crops, spices and fruits are grown in this district. Of these, cereals are most important.

## Cereals

### (i) Paddy

Among cereals, paddy is the predominant crop. Out of the gross cropped area of 6,28,334 hectares in the year 1984-85, it alone covered an area of 4,19,269 hectares producing 3,79,930 tonnes of rice. The yield rate of rice per hectare in 1983-84 was 9·81 quintals and in 1984-85 it was 9·18 quintals. In the next year, i.e.,

1985-86 it went up to 9·32 quintals. So it seems that the yield rate of paddy has been increasing gradually due to modern day-to-day facilities available in the field of agriculture. The varieties of paddy cultivated in the district fall under three main categories (*i*) Biali or autumn rice; it is sown in May and reaped in August/ September, (*ii*) Sarad or winter rice; it is sown in May and June and harvested during October to January and (*iii*) Dalua or summer paddy. It is sown in December /January after the cessation of floods and harvested in March/April.

Of all the varieties, Sarad or winter rice covered 96 per cent, autumn rice one per cent and summer rice a little over two per cent of the total area under paddy cultivation. In this district paddy is sown broadcast on high lands. In low lands seedlings are transplanted. There is a saying in Oriya *"Rua dhana thua"* (ରୁଆ ଧାନ ଥୁଅ). It means, transplantation usually brings a better yield, but failure of rain immediately following the operation may lead to total failure of the crop. Cultivator, therefore, in order to avoid the risk, takes to broadcasting method. O'Malley writes in the Balasore Gazetteer (1907), "Nearly all the *sarad* rice is broadcast, transplantation being an unpopular system of cultivation, as it involves more labour and the transplanted seedlings are very delicate for the first month and liable to injury by flood and still more by drought. It is however admitted that, when successful, transplantation gives a larger yield, and it is resorted to for fields, especially for those under irrigation, which grow a *sarad* crop after *biali*, to avoid the risk of early floods and to replace the loss of that broadcast crop if it is destroyed before the end of July."

However, in 1984-85 of the total area under paddy, autumn paddy covered 9,000 hectares and winter paddy covered 3,86,000 hectares. The total Kharif paddy area comes to 3,95,000 hectares, out of which high yielding varieties covered 95,762 hectares and normal varieties covered 2,99,238 hectares. Summer paddy covered an area of 18,650 hectares out of which 16,550 hectares were under high yielding varieties and 2,100 hectares under normal variety.

### (ii) Wheat

Wheat is a crop of not much importance in the district. During 1907, it was grown on 100 acres (40·46 hectares) only. Gradually the cultivation of this crop is increasing. In the year 1984-85, high yielding varieties of wheat was grown on 4,016 hectares and 7,766 tonnes were produced with an average rate of 19·34 quintals per hectare.

## Millets

Millets are grown to a small extent in this district. Ragi, maize, jowar and Bajra are the main crops which are included in this category. In the year 1984-85, a total area of 1,603 hectares was under cultivation of different millets and 1,585 tonnes were produced.

### (i) Maize

Of the millets grown in this district, maize occupies the first position. Generally it is sown in the month of July and the cobs are plucked in September. During 1984-85, a total area of 1,068 hectares was under maize cultivation in Kharif and 937 tonnes were produced with an average of 8.77 quintals per hectare. In Rabi, a total area of 377 hectares was under cultivation of maize producing 488 quintals with an average rate of 12.94 quintals per acre.

### (ii) Jowar

In 1984-85 there were 52 hectares under jowar cultivation and 42 tonnes were produced with an average of 8.2 quintals per hectare.

### (iii) Other millets

In 1984-85, there were 106 hectares under the cultivation of other millets producing 52 tonnes with an average of 5.00 quintals per hectare.

## Pulses

Mung, Biri, Kulthi, gram, cowpea and fieldpea are the main pulses grown in this district. In 1984-85, a total area of 74,958 hectares was under cultivation of different pulses and 38,931 tonnes were produced with an average production rate of 5.19 quintals per hectare.

### (i) Mung

Next to paddy Mung occupies the priority of position. It is sown broadcast in August and September and reaped in December and January. In the Balasore District Gazetteer of 1907 it has been mentioned, "mung is a pulse largely consumed by poorer classes." But the statement seems no longer tenable because its consumption has become essential for both rich and poor. In the year 1984-85, Mung was sown in Kharif season over an area of 1,030 hectares and the production was 432 tonnes with an average yield rate of 4.19 quintals per hectare whereas in Rabi season it was sown in 37,237 hectares and the production was 19,466 tonnes with an average yield rate of 5.23 quintals per hectare.

### (ii) Biri

This crop is sown broadcast during rains. Generally it is grown after *biali* rice, mostly in inundated areas where the land is rich enough. In 1984-85, the area under Biri cultivation in Rabi season was 25,899 hectares and 13,666 tonnes were produced with an average yield rate of 5.28 quintals per hectare.

### (iii) Kulthi

Kulthi is one of the cheap rabi crops. It is sown in November and cut in February. This pulse is commonly taken in the form of Dal by the people belonging to poorer classes and is also used as cattle feed. In 1984-85, Kulthi was grown over an area of 2,777 hectares and with an average yield of 5.26 quintals per hectare 1,462 tonnes were produced.

## Oil-seeds

Mustard, til, ground-nut and castor are the principal oil-seeds cultivated in Kharif and Rabi seasons in the district. In 1984-85, oil-seeds cultivation covered an area of 34,154 hectares and 28,792 tonnes were produced with an average yield rate of 8.43 quintals per hectare.

### (i) Ground-nut

Of all oil-seeds, ground-nut covered the largest area being grown on 1,483 hectares in Kharif season and 9,021 hectares in Rabi season. With an average yield rate of 12·5 quintals per hectare in Kharif and 16·67 quintals per hectare in Rabi, the total production was 1,787 tonnes in Kharif and 15,040 tonnes in Rabi season.

### (ii) Mustard

During the year 1984-85, cultivation of mustard covered an area of 8,638 hectares, being the second predominant oil-seed. With an average yield rate of 5·19 quintals per hectare the total production was 4,482 tonnes.

### (iii) Til

Cultivation of til occupied the third position in 1984-85 in preference. During the year 1984-85 it was grown over an area of 1,408 hectares in Kharif and 8,040 hectares in Rabi season with an average yield rate of 5·04 quintals per hectare in Kharif and 5·00 quintals per hectare in Rabi season, the total production being 710 tonnes in Kharif and 4,019 tonnes in Rabi season.

### (iv) Castor

This crop covered an area of 411 hectares in Kharif and 5,012 hectares in Rabi season in 1984-85 and with an average yield-rate of 4·32 quintals per hectare in Kharif and 4·97 quintals in Rabi season, the total production was 177 tonnes in Kharif and 249·2 tonnes in Rabi season.

### Fibre Crops

Among fibre crops jute, mesta, sunhemp and cotton are cultivated in this district. During 1984-85, these crops covered an area of 9,212 hectares.

### (i) Jute

It is the chief fibre crop of the district which is grown on homestead lands having facilities of irrigation or rich alluvial soil by the river side. During 1897 the area under this crop was only 140 acres. Its cultivation is gradually expanding. In 1984-85 this crop was grown over an area of 6,500 hectares and 51,000 tonnes were produced with an average yield of 7·85 quintals per hectare.

### (ii) Sunhemp

Next to jute, sunhemp cultivation occupies the second position. During 1984-85 it was grown on 969 hectares and the total yield was 6,395 bales with an average yield of 6·6 bales per hectare.

### (iii) Mesta

Mesta cultivation covered an area of 350 hectares in 1984-85 and the total output was 1700 bales with an average yield of 4·86 bales per hectare.

### (iv) Cotton

During the year 1984-85, cotton cultivation covered an area of 20 hectares and 20 bales were produced with an average yield rate of one bale per hectare.

### Sugarcane

Sugarcane is an important cash crop. It covered above 2,000 acres in 1907. The plant requires a loamy soil and is grown generally on lands near the village or within easy reach of canal irrigation, or on the edges of natural water courses, where the land is out of the range of canal water. This crop requires incessant attention and involves a large expenditure of time,

1 Bale-180 kg.

labour and money. The field has to be ploughed some twenty times and richly manured before the cuttings are planted in January or February. Then constant irrigation is necessary, and the soil has to be loosened and oil-cakes are applied to the roots. These processes are repeated at intervals, the land being irrigated so as to keep it continually moist and after the fourth application of oil-cake in May or June, land is weeded and loosened. The stems are then wrapped in sugarcane leaves and tied up. After another weeding in August the leaves are bound together and the plants are tied together tightly to give them greater power to resist the storms. Finally, in December the canes are cut and the juice is extracted through bullock-driven crushers. During the year 1984-85 there were 1327 hectares under this crop and with an average yield of 65·47 quintals per hectare a total amount of 8,688 tonnes were produced.

**Betel (Pan)**

The cultivation of Pan (betel), another important cash crop is not so extensive. The introduction of betel in this district bears a story behind it. According to the Balasore Gazetteer of 1907 written by O'Malley, "it was introduced by some men of Bauri caste who came from Bengal and settled down in Balasore and it is still grown for the most part by men of this caste". Pan was previously grown in Bhograi, Dhamnagar, Bahanaga, Similia, Bhandaripokhari and Bhadrak areas. But now the cultivation is confined mostly to Bhograi area in occassional patches. The gardens are carefully fenced and covered with a thatched roof constructed with a kind of reed locally available. The vines are planted in rows supported by props and are grown under shade. The cultivation requires constant and careful supervision. Irrigation is done by pot-watering. With a good crop, its cultivation proves amply rewarding.

**Vegetables**

Different types of vegetables are grown in Kharif and Rabi seasons in this district. Among the main vegetables cultivated during Kharif season brinjal, lady's finger, pumpkin, ridged gourd, cucumber, chillies, Potal, bitter gourd, cowpea and potato may be mentioned. In the Rabi season brinjal, cabbage, cauliflower, Knolkhol, Potal, bottle gourd potato, sweet potato, bean, pumpkin, cucumber, cowpea, tomato, lady's finger, chillies and other vegetables are grown. In 1984-85 there were 62,654 hectares of land under cultivation of different vegetables and the production was to the tune of 6,68,550 tonnes. Cultivation of potato was negligible since 1983-84. Only 228 hectares of land covered for the cultivation of potato in that year. But in the year 1984-85 it covered an area of 3,690 hectares and with an average yield of 70·0 quintals per hectare

the production amounted to 25,830 tonnes. Sweet potato was grown over an area of 1,116 hectares during this year and the production was 11,510 tonnes with an average yield of 103·14 quintals per hectare.

### Condiments and Spices

Chilli, corriander, garlic, ginger, onion and turmeric are the main condiments and spices grown in this district. Among them chilli is the most important. This crop covered an area of 7,689 hectares followed by onion 3,570 hectares, garlic 1,646 hectares, turmeric 1,279 hectares, corriander 2,131 hectares, and ginger 516 hectares during the year 1984-85.

### Tobacco

Tobacco was covered on a very small area during the year 1984-85 which was to the extent of 25 hectares only. The production was 11 tonnes with an average yield of 4·4 quintals per hectare.

### Fruits

The most popular fruit is the plantain, which is grown in almost every part of the district. It is used as a fruit and also used in curries. The fruit is grown mostly in backyards and tank-banks. A good variety called *Patakapura* is popular amongst cultivators. In 1982-83, this fruit was grown over an area of 4,020 hectares. Other fruits which are generally cultivated in this district are mango, guava, kazilime, litchi, sopata, papaya, jack-fruit and pineapple. During 1984-85, there were 3,277 hectares under mango, 568 hectares under papaya and 1100 hectares under different fruits. Plantation of cocoanut have been taken in a large scale. A large number of cocoanut plants have been grown in Bhograi, Baliapal, Basta, Jaleshwar, Sadar, Remuna and Bahanaga C. D. Blocks. As the importance of cocoanut is growing high at present attention is being given for its cultivation. In 1984-85, 4540 hectares were put under coconut cultivation and 19,700 coconuts were produced. Among other fruits the names of Bel, jack-fruit, tamarind and pineapple may be mentioned.

## IMPROVEMENT OF AGRICULTURE AND STATE ASSISTANCE

As stated earlier the general condition of the farmers is poor. Government have implemented many programmes for improvement of agriculture through introduction of scientific agricultural practices. Training and visit system has been introduced through World Bank assistance. Under this system Village Agricultural Workers (V.A.W.) have been appointed to impart necessary technical guidance to the farmers. There are also Agricultural Extension Officers to supervise

the work of V. A. Ws. They also participate in group meetings. To motivate the farmers for modern method of farming, crop demonstrations and trials are being conducted in different seasons. Multiple cropping pattern demonstrations are also being conducted in different types of land, both irrigated and rain-fed, to educate the farmers that three or more crops can be grown in irrigated lands and two crops can be successfully taken up in rain-fed lands. Introduction of new high yielding varieties have also been taken up. Improved varieties of paddy, wheat, Mung, Biri, Arhar, ground-nut, cotton, til, mustard, castor, etc., have also been evolved and introduced. In the Nilagiri C. D. Block, Integrated Tribal Development Agency Scheme is being implemented since 1975-76. Different plant protection measures are in operation in this district. Sprayers and dusters are being used by the farmers for applying insecticides. The Minikit Programme containing improved variety seed of oil-seeds, millets and pulses are supplied to the farmers by the District Rural Development Agency. In the Special Rice Production Programme 40,000 numbers of paddy minikit were distributed during the year 1986-87. The traditional wooden plough has been replaced by iron plough in many places. Improved agricultural implements are being supplied at subsidised rates to the poor farmers. Use of tractors and pumps are on the increase.

The scheme of advancing Taccavi loan to the cultivators for improvement of land and for purchase of seed or cattle or such other purposes was introduced in the state, under the provisions of "Land Improvement Loans Act, 1883" and the "Agriculturist Loans Act, 1884". The above scheme was subsequently substituted by Co-operative and Bank loans. With a view to avoiding duplication, Government ultimately decided to stop disbursement of Taccavi loan altogether since 1st April 1980 and no such loan is being sanctioned thereafter. During the year 1985-86, 516·13 lakh rupees have been distributed through the co-operative and commercial banks among the cultivators in Kharif and Rabi seasons.

### AGRICULTURAL EXHIBITIONS AND SHOWS

Every year crop competitions on different crops are being organised to create interest among the cultivators for growing up different crops. Besides, agricultural exhibitions are also being organised every year in this district and prizes are awarded to successful farmers. In addition, farmers training programmes are now being conducted by the Agriculture department to educate the cultivators in advanced methods of scientific cultivation with improved seeds, implements and fertilisers.

## AGRICULTURAL IMPLEMENTS

Country-made age-old agricultural implements are in use throughout the district. Mechanical cultivation is practically non-existent. On the method of cultivation the Balasore Gazetteer of 1907 says, "the Oriya is a very conservative cultivator and has a apathetic indifference to agricultural improvements. Various experiments have been made from time to time at the instance of Government with new crops, selected seed and modern implements and an experimental farm has been started, but these experiments have had little effect on cultivation generally. The people still adhere to their old fashioned ploughs, which turn of scarcely six inches of earth; and nothing shows their conservatism more clearly than their failure to adopt the improved sugarcane mills which have become popular almost everywhere else in Bengal. A few of the Bihua iron sugar-crushing are found round Bhadrak, but elsewhere the ryot keeps to the old wasteful wooden mill"*.

"This want of progress is due to the fact that centuries of inherited experience has taught the cultivator to raise the best crop possible for the minimum of labour which he is willing to bestow, and he regards with disfavour any change involving an increase of labour. He can secure improved crops without increasing his exertions, by the use of improved seed and labour-saving appliances; but these he will not introduce. Such conservatism is due to the natural idleness and apathy of the Balasore peasant, whom one account describes as 'bigoted, wedded to custom, indolent and poor in the extreme'. His dislike of new methods is also largely due to the fatalistic spirit produced by the liability of the district to suffer from natural calamities".*

This poor picture of a Baleshwar peasant has changed considerably through the changing time and circumstances and the cultivator now responds more favourably to the introduction of improved methods of cultivation.

But the indigenous methods are still prevailing. Ploughing, sowing and the allied operations are carried out by the country ploughs. Other implements in use are spade, *fouda*, sickle and leveller. These implements cost less and are simple in make. Attempts to replace the less efficient implements by improved ones have met with some success. Improved light iron ploughs have been introduced. Japanese wedder, hoes, special *kodalis* and paddy thresher are some of the modern implements in use. Tractors

* *Source* : L. S. S. O' Malley—Bengal District Gazetteers, Balasore, 1907, Chapter, V (Agriculture).

and bull-dozers are supplied by Government on hire for reclamation of fallow lands. Some cultivators have their own tractors and pumpsets also.

The number of agricultural implements in use in this district during the year 1977 is as follows*.

| | | Number |
|---|---|---|
| Wooden ploughs | ... | 3,79,934 |
| Iron ploughs | ... | 4,835 |
| Sugarcane crushers (Bullock driven) | .. | 320 |
| Sugarcane crushers (power driven) | ... | 22 |
| Carts (Bullock driven) | .. | Not Available |
| Oil engines | ... | 39 |
| Electric pumps and pumps for tube-wells | .. | 8 |
| Tractors | .. | 6 |
| Oil crushers (Ghani) | .. | 148 |

ROTATION OF CROPS

Keeping in view the suitability of land, irrigation resources, restoration of soil fertility and socio-economic status of the farming community suitable cropping patterns are advocated for better utilisation of land, labour, water and capital.

Obviously in irrigated conditions three to four crop cropping pattern and in non-irrigated lands two or rarely three crop cropping pattern have been adopted. The farmers have been advised to grow short and medium duration high yielding varieties of paddy and other medium as well as light duty crops as second and third crops.

The cropping patterns adopted in Baleshwar Agriculture District in irrigated and non-irrigated conditions are given below:

**Irrigated Conditions**

Uplands (i) Ground-nut-wheat or mustard-vegetables
(ii) Early H. Y. paddy-mustard or wheat-pulses
(iii) Mung or Biri or cowpea-wheat-til
(iv) H. Y. paddy-potato-til or vegetables
(v) Maize-mustard-pulses or vegetables

* *Source* : Statistical Abstracts of Orissa, 1981.

Medium lands .. (i) H. Y. paddy-mustard-pulses or chillis
(ii) H. Y. paddy-wheat-vegetables
(iii) H. Y. paddy-potato-til or pulses or vegetables
(iv) Jute-early medium, H. Y. paddy-wheat or potato pulses or vegetables
(v) Jute-paddy or wheat-groundnut or pulses

Low lands .. (i) Long duration H. Y. paddy-pulses or vegetables
(ii) Jute-paddy-pulses or til
(iii) Jute-H. Y. paddy

**Non-Irrigated Conditions**

Uplands .. (i) Mung or Biri or cowpea-vegetables
(ii) Ragi-mustard or Mung
(iii) Maize or jowar-pulses (Kulthi)
(iv) Short duration paddy-mustard or pulses or cowpea or Biri
(v) Ground-nut and Arhar or cotton, Mung and Arhar or cotton, paddy or Arhar

Medium lands .. (i) H. Y. paddy-mustard-pulses
(ii) Jute-paddy-pulses
(iii) H. Y. paddy-pulses (field pea, lentil, Mung, Biri).
(iv) Short duration H. Y. paddy-groundnut, castor, til
(v) H. Y. paddy-wheat or chilli

Low lands .. (i) Jute-paddy-pulses
(ii) Paddy-pulses
(iii) Jute-vegetables

In Bhadrak Agricultural district, the following cropping pattern is adopted under irrigated and non-irrigated conditions:

Irrigated conditions (i) Paddy-pulses-vegetables
(ii) Jute-paddy-pulses
(iii) Jute-paddy-oilseeds (grount-nut)
(iv) Jute-paddy-vegetables
(v) Paddy-oilseeds-Pulses
(vi) Paddy-vegetable-pulses-oilseeds (til)
vii) Paddy-wheat
(viii) Early paddy-pulses-wheat

Non-Irrigated conditions (i) Paddy-fallow
(ii) Paddy-vegetables
(iii) Paddy-pulses (Piara)
(iv) Paddy-mustard

Of these, cropping patterns of paddy-pulses vegetable, jute-paddy-vegetables and paddy-oilseeds-pulses under irrigated conditions and paddy-pulses (Piara) and paddy-mustard in non-irrigated conditions are popularly followed by the cultivators. In improved method of cultivation early paddy-pulses-wheat and Ratna-T 9, Biri-vegetable cropping patterns are being followed.

From the above narration it is found that while multiple cropping pattern is adopted for irrigated lands double cropping pattern is advised for the lands in non-irrigated conditions.

**SEEDS**

The cultivators do not take proper care for preservation of seeds. Generally they keep the seeds in gunny bags after proper drying and cleaning. Those are stored with other grains meant for consumption. So there is every possibility of mixing with other seeds kept side by side. During recent years increased attention is being given for quality of seeds and seedlings to maintain quality of High Yielding Varieties. The cultivators are being advised to have quality seeds resort to improved method of cultivation and store the seeds in metal storage bins. Nucleus seeds are being supplied by the departmental farms, National Seeds Corporation, Orissa University of Agriculture and Technology and Central Rice Research Institute, Cuttack.

Supply of different seeds to the district by the Directorate of Agriculture and Food Production, Orissa, during the year 1986-87 is given below:

| Name of the seeds | Quantity supplied (in quintals) during 1986-87 | |
|---|---|---|
| | Kharif | Rabi |
| (1) | (2) | (3) |
| Paddy | 1,993 | 1,448 |
| Wheat | .. | 1,073 |
| Maize | 105 | .. |
| Gram | .. | 5 |
| Ground-nut | 699 | 731 |
| Mustard | .. | 23 |

| (1) | (2) | (3) |
|---|---|---|
| Til | .. | 4 |
| Mung | .. | 107 |
| Biri | .. | 74 |
| Dhanicha | 100 | ... |
| Jute | 43 | .. |

MANURES AND FERTILISERS

Cow-dung is the most important manure. But lack of proper preparation makes it poor in manurial constituents. A great deal of cow-dung is lost by its conversion into fuel cakes. The only other manure in common use consists of house-hold refuses. These manures are often spread on the rice lands at the time of the first plouging. Oilcake is occasionally used as a top dressing for valuable crops like sugarcane, betel and vegetables. Silt of old tanks are also used as manures in the fields. In the urban areas night soil manuring has been introduced. The street refuses and night soil are turned into compost and supplied to the cultivators at a cheaper rate. In the past, a strong prejudice existed against the use of night soil and bone-meal. Use of chemical fertilisers was almost unknown. But the picture has now changed a great deal. The cultivators have resorted to use of different chemical fertilisers. Results of application of such fertilisers are also demonstrated in the C.D. Block areas. Green manures, prepared out of sunhemp, Dhanicha and other leafy as well as succulent plants are being used. Steps have been taken for large scale production of compost and manures. Training is being imparted to cultivators regarding improved method of compost production.

During the year 1986-87 the production of compost and green manuring is as follows:

| Name of the Agriculture District | Compost production (in tonnes) | Green manuring in Kharif (in hectares) |
|---|---|---|
| (1) | (2) | (3) |
| Baleshwar Agriculture District | 3,90,470 | 10,481 |

Among the chemical fertilisers generally nitrogenous, phosphetic and potassic fertilisers are in use. The quantity of various chemical fertilisers consumed during last five years ending in 1986-87 in the district is given in the following table. The use of fertiliser in the field of agriculture shows a gradual increase in the district. During 1986-87 the consumption of fertilisers per hectare of gross cropped area in the state as a whole was 16·4 kg. whereas the consumption of the district average was 23·6 kg., which was more than the state average.

| Year | Nitrogenous (in tonnes) | Phosphetic (in tonnes) | Potassic (in tonnes) | Fertiliser consumption per hectare of gross cropped area |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 1982-83 | 4092 | 1328 | 922 | .. |
| 1983-84 | 54163 | 17923 | 9911 | .. |
| 1984-85 | 4932 | 1861 | 1951 | 15·43 |
| 1985-86 | 6209 | 2242 | 1427 | 25·43 |
| 1986-87 | 9046 | 3649 | 2985 | 23·06 |

**Crop Diseases**

The crops are subject to attack of various pests and diseases. Pests and diseases cause a great problem resulting in loss of production. Common pest and diseases found in this district are given below:

| Name of Crop | Pests | Diseases |
|---|---|---|
| (1) | (2) | (3) |
| 1. Paddy | Stemborer, jasids, swarming cater pillar, case worms, leaf rollers, gundhibug, cut worms, brown plant, hopper, etc. | Blast, brown leaf spot, bacterial leaf, blight sheath flight, stemrol, etc. |
| 2. Jute | Jute semilooper, indigo cater pillars, mites, apions, etc. | Stemrot, rootrot and wilf |

| Name of Crop (1) | Pests (2) | Diseases (3) |
|---|---|---|
| 3. Groundnut | Hairy caterpillars, appide, leaf miners, termiters, white grubs | Tika disease and thrips, wilf, coller rot |
| 4. Sugar cane | Termites, root borers, early shoot borer, topshoot borer, red spidermites | Redrot, smut |
| 5. Jowar | Shoot fly, stem borer, ear head bug | Leaf spot |
| 6. Wheat | Termites, pink borer | Black rust, hoosesmit, henyinthosposum, leaf spot, allmaria, blast, leaf blight |
| 7. Maize | Termites, hairy caterpillars, stemborer, grass hopper, cutworm | Leaf blight, rust |
| 8. Mustard | Mustard sowfly, aphids | – |
| 9. Cotton | Sootted bollworm, pink bollworm, leaf roller, jassid, aphid, red cotton bug | Angular leaf shot authracnose |
| 10. Potato | Termites, white grubs, cutworm, epilachna beetle, jassid | Early blight, late blight, potato seab |
| 11. Mung, Biri and cowpea | Leaf eating caterpillar, pulse beetle | Powdery miedew rust |
| 12. Arhar | Hairy caterpillars jassids, cutworm, pad borers | – |
| 13. Gram | Leaf eating caterpillars, pad borer | rust |
| 14. Brinjal | Shoot and fruit borer, epilachna beetle | Wilt, root rot |
| 15. Banana | Banana stem borer | Banana will, bunchy top |

| Name of Crop (1) | Pests (2) | Diseases (3) |
|---|---|---|
| 16. Citrus fruits | Citrus butterfly cottory cushinoscale, citrus psylla | Citrus canker, foot not gummosis |
| 17. Mango | Mango hopper, mango fruitfly, jassids | Shooty mould, powdery milded, authracanose |
| 18. Coconut | Rhinocerous buta, red palrm weevil, black headed caterpillars | Root wilf, leaf blight |
| 19. Guava | Mango mealybug, fruitfly | Zinc deficiency |
| 20. Litchi | Mite, litchi fruit stones | Leaf spot |

**PLANT PROTECTION**

Generally the cultivators seldom take plant protection measures in their crops. In the past, use of *mantras* and fixing up sacred sticks were the traditional methods adopted to fight insects like rice bugs (Mahua) and thrips (Dhauli). But that practice now is no more prevalent. These are at present being replaced by spraying and dusting of gammexane, D. D. T. and other insecticides and pesticides. Scientific plant protection measures are gaining popularity because of their effective action and quick results. The cultivators are being advised for summer ploughing, seed and seedling treatment, spraying of pesticides in right time and right doses and growing disease resistant varieties of crops. Pest and disease surveillance work is being done by the field staff. Cultivators are also being given technical advice. Insecticides and fungicides are supplied to cultivators through C. D. Block and Grama Panchayat agencies. There is provision of free spraying of pesticides in epidemic areas, declared by the Collector. Cultivators are being supplied with sprayers and other equipments at subsidised rates. Some farmers have their own equipment also.

**AGRICULTURAL FARMS**

There were two seed farms in the district located at Balia and Bhadrak till 1959-60 when four new seed farms were established at Agarpara, Bahalda, Dhamnagar and Motto. In the meantime another farm has been established at Sergarh raising the total number of farms in the district to seven.

These farms are primarily meant for production of foundation paddy seeds and some flood resistants for supply to cultivators.

### Agarpara Farm

Situated at a distance of 12 miles (19·308 km.) from Bhadrak, this seed farm was established in 1959 over an area of 18·324 hectares. Of this the cultivable area is 15·532 hectares. The farm is mainly meant for multiplication of paddy seed. Some other crops like ground-nut, maize, jute and vegetables are also grown here in Kharif season. During Rabi season, wheat, potato, pulses are also grown.

### Bahalda Farm

This seed farm is located at a distance of 8 km., from Basta railway station and 32 kilometres from Baleshwar. The total area of the farm is 17.033 hectares, of which 14.585 hectares are cultivable. Besides paddy, which is the main crop, other crops like jute, maize, ground-nut, wheat and vegetables are also grown on a limited scale. Seed multiplication and demonstration of improved cultivation constitute the two important functions of the farm.

### Bhadrak Farm

Started in 1942, the farm is located on the Bhadrak-Chandbali road, about five kilometres from Bhadrak railway station. The farm stands over an area of 6.766 hectares of which 5.932 hectares are cultivable. Multiplication mainly of paddy seeds is carried out in the farm. Jute, maize, wheat, groundnut and vegetables are other crops which are grown here on a small scale.

### Dhamnagar Seed Farm

Situated on the Bhadrak-Dhamnagar road, at a distance of about 19 kilometres from Bhadrak, this farm was started in 1959. It extends over an area of 16.710 hectares of which 14.281 hectares are cultivable. The farm is meant for multiplication of paddy seeds and also for demonstration of improved method of cultivation.

### Motto Farm

The farm is located on the Bhadrak-Chandbali road, about 42 kilometres away from Bhadrak railway station. It covers an area of 17.632 hectares of which 15.224 hectares are cultivable. Usually flood and saline resistant varieties are tried in the farm. Other crops grown are *dalua* paddy, wheat and vegetables.

Seed multiplication is carried out in the farm. Besides, improved method of cultivation, like green-manuring, application of chemical fertilisers and other improved practices are also demonstrated here. This farm was handed over to the Orissa University of Agriculture and Technology and now functioning as Regional Research Station (Saline) from 1982.

### Balia Farm

This farm was established in the year 1916 over an area of 16.240 hectares. Of this, 13.492 hectares are cultivable.

### Sergar Farm

This farm is located near Sergarh over an area of 18.967 hectares. Of this, the cultivable area is 14,009 hectares. The seed multiplication work is being taken up.

## RESEARCH STATIONS

Under the World Bank assistance the following Research Stations have been established from 1980-81 under National Agriculture Extension Programme by O. U. A. T. as supporting activities for agricultural extension.

(i) Regional Research Station, Ranital

(ii) Saline Research Sub-station, Motto

(iii) Adaptive Research Station, Balia.

## HORTICULTURAL DEVELOPMENT

The district of Baleshwar, being situated on the coastal belt of the state is suitable for cultivation of different fruits like banana, coconut, lime, Sapota, guava, etc., For the Development of horticultural activities there are eight nurseries located at different places of the district. An account of these nurseries is given below :

Situated over an area of 16·80 acres (6·79 hectares) the Fruit Nursery, Balia, produced 5500 numbers of seedlings and 8,600 numbers of grafts during the three years ending 1986 of which 5,200 seedlings and 7,500 grafts have been sold to different cultivators.

The Transit Nursery at Nilagiri produced 1,500 numbers of seedlings and 450 numbers of grafts during three years ending 1986 and of these 1,200 seedlings and 320 grafts were sold. This nursery has an area of one acre (0.404687 hectare).

The Transit Nursery at Bhadrak, having an area of one acre (0.404687 hectare) produced 500 seedlings and 300 grafts during the above period of which 500 and 200 numbers respectively were sold to different interested cultivators.

The Baleshwar Transit Nursery situated over a tiny area of 0·25 acre (0·10 hectare), had produced 2,800 seedlings and 200 grafts during the above mentioned period of which 1,800 seedlings and all the grafts were sold.

The coconut nursery at Balia having an area of five acres (2·02 hectares) of land produced 28,878 number of seedlings in the above mentioned period of which 25,500 were sold to different cultivators.

Having an area of one acre (0·404687 hectare) of land the coconut nursery at Barapada had produced 7,920 seedlings during the same period of which 7,820 numbers were sold.

The Transit Nursery at Soro with an area of 0·50 acre (0·2023 hectare) of land was established in 1982-83 and production from this nursery was yet to come out.

The coconut nursery at Ranital having an area of one acre (0·404687 hectare) of land was established in 1981-82 in which 15,000 seedlings were produced.

### SOIL TESTING

Soil testing is an efficient tool to evaluate the nutrient status of different soils. The data derived therefrom are useful in recommending economic and effective fertiliser schedule for deriving maximum benefit out of fertiliser application. For this a Soil Testing Laboratory was established at Baleshwar in 1966-67. This laboratory, consisting of one Soil Chemist and 25 staff has been shifted to Balia since 1971.

### NATURAL CALAMITIES

Both floods and droughts frequently occur in the district. The former result from the sudden rising of the rivers, which have their source in the hilly region to the west. During summer they are nearly dry and their beds consist of vast stretches of sand, stripped by long reaches of land-locked water, through which small streams meander from bank to bank. But in the rainy season, and especially after a depression in the Bay of Bengal followed by heavy shower, they present an extraordinary contrast. They rise to a great height in a few hours, rush down with extreme violence and cause floods, which are frequently of short

duration, but quite unmanageable while they last. These rivers drain a large area, and so they bring down an enormous volume of water which the lower channels are unable to discharge, and which spreads over the country far and wide except where it is checked by embankments.

Droughts are due to the deficiency of the rainfall. In most years the rainfall is sufficient for the needs of the district, but in some years as in 1967 its early cessation proves fatal to the rice crop on which the people depend. Practically the whole of the cultivated area is under rice in Kharif season and other crops are scarcely grown at all.

There is, however, to a certain extent, a compensating influence in droughts and floods. While heavy floods drown the low-lands, the higher levels escape. If the floods are caused by an excessive local rainfall, as occasionally happens, the dry uplands are greatly benefited, but their extent is so small that this does not compensate for the loss of the crops in the low-lying tracts. The district does not present such extremes of dryness or moisture, that any considerable area ordinarily lies fallow in the uplands for want of rain, or upon the lower levels on account of the marshy character of the land. In years when there is scanty rainfall the low-lying tracts make up, in an important degree, by their freedom from flood, for the loss of crops in the arid higher levels. The *pats* or cup-lands produce magnificent harvests in dry seasons, while the higher tracts suffer severely. It may accordingly be accepted as a rule that in years of drought the sterility of the higher-levels may often be compensated by the increased outturn in the low-lying tracts. Generally speaking, therefore, a year of flood does more harm than a year of moderate drought.

**Cyclones**

Besides droughts and floods, the district is liable to a third form of natural calamity. Placed at the north-west corner of the Bay of Bengal, it is exposed to the full brunt of the cyclones generated at sea, which travel in a north-westerly course up the Bay and sometimes burst upon its shores accompanied by irresistible storm waves.

These cyclones are generally generated during the transition periods antecedent and subsequent to the full establishment of the south-west monsoon, i.e., during the months of April and May and October and November. Their most striking features are the great barometric depression in the centres and the magnitude of

the storm area. These two causes produce a large accumulation of water at and near the centre, which progresses with the storm and gives rise to a destructive storm-wave, when the centre reaches shelving coast. It then sweeps inland, and the damage caused is terrible and widespread.

## Cyclones of 1823, 1831 and 1832

Such destructive cyclones are fortunately rare, but so far back as we have records, we find that they have periodically devastated the district. On the night of the 27th May, 1823 there was a furious cyclone, which is said to have been the third calamity of the kind within eight years. It is reported that the sea suddenly rose and penetrated six miles (9.6 km.) inland carrying with it large ships and sweeping away whole villages with every living creature in them, not even the vestige of a human habitation being left. But the severest disaster of this kind on record occurred on the evening and night of the 31st October 1831. Along the whole extent of the cost the country was submerged by a storm-wave 7 to 15 feet (2·133 to 4·572 metres.) in height, which breached the Trunk Road at a point nine miles (14·5 km.) as the crow flies, from the east.

The report of the commissioners appointed to enquire into the famine in Bengal and Orissa in 1866 says "The most intense calamity of the present century (19th) seems to have been the inundation of the sea on the Balasore coast in 1831-32"[1].

According to an early account, "the whole country, for many miles on the sea coast, was inundated, and in this district alone, upwards of 22,000 lives were lost, and more than 50,000 head of cattle. The hurricane commenced in the north-east and blew from all points of the compass before it terminated not only no houses, except those pucca built, were left standing, but the whole district suffered more or less; the damage to property, and loss of life was enermous. Mr. Ricketts, at that time, Magistrate and Collector, made a circuit of the district immediately after the storm, and the names of more than 20,000 were registered as having perished. It is asserted the whole country was deluged by two successive waves, which carried everything before them. Many poor wretch was overwhelmed ere he could reach high ground, or even ascend a tree. Dead bodies of men, women and children were found after the storm, interspersed with those of wild beasts, birds and bullocks. The wind blow at times with the greatest violence; sturdy trees that had borne the blast from many a long day were uprooted, pillars erected hundreds of years since were levelled to the ground: two of the walls surrounding the jail were blown in, and one out: an iron suspension bridge was blown from its moorings and carried some distance

1. Drought in Orissa during 1954 and 1955, p. 3.

against the stream. The weather for two or three days previous to the storm looked cloudy and threatening, the following morning was clear and beautiful. The country looked as if it had been burnt up, every bush and blade of grass was blasted."

The distress and difficulties occasioned by this storm were scarcely surmounted, when a second great cyclone occurred in October, 1832. On this occassion the cyclone is said to have been more violent, but the storm-wave less destructive. These calamities were followed by a drought in 1833 by which the failure of the food supply was superadded to the destruction of the rice crops by the cyclones. In these three years 50,000 human beings were destroyed by drowning and starvation. The whole sea-face was depopulated, in some parts no vestiges of cultivation or habitation remained and many estates have never completely recovered.

### Cyclones of 1872, 1885 and 1887

Some violent storms occurred in 1872, 1885 and 1887. In 1872 the storm was accompanied by a tidal irruption all along the coast, and some lives and a great number of cattle were lost. That of 1885 did far less damage in this district than in Cuttack where a storm-wave 15 feet (4·572 metres) high, which broke over False Point on September 22nd, submerged 250 square miles and drowned about 5,000 persons. In Baleshwar, the only track which suffered severely from this cyclone and sea-wave was the government estate of Birso, where most of the tenants lost all or nearly all their crops. Here, as in other parts of the district over which the cyclone passed, a large number of houses and trees were blown down by the wind, the Engineer's house at Akhuapada was entirely wrecked and its roof carried away bodily. With these exceptions, the sea-coast of Baleshwar, which was then for the most part uninhabited and covered with jungle, did not suffer seriously, for the storm-wave was stopped by the embankment of the sea-coast canal, which saved hundreds of square miles from being submerged by salt water. The last great cyclone was that which burst upon the coast in the early morning of the 26th May, 1887, when the sea swept over the Orissa Coast Canal embankment and penetrated within 3·2 km. of the town of Baleshwar.

### Cyclone of 1942

After the lapse of about fifty-five years, another disastrous cyclone passed over the district on the night of 16th October, 1942. It caused a great deal of damage to crops, cattle and houses. The northern portion of the district, comprising the four police-stations of Bhograi, Baliapal, Jaleshwar and Singla, was badly affected. The on-rush of sea-water submerged vast stretches of land to the south of Bhograi police-station. The calamity took a toll of 291 lives. More than 35,000 houses had collapsed and 23,000 heads of cattle were lost.

## Cyclone of 1959

A severe cyclone accompanied with torrential rain started blowing from the afternoon of 29th September, 1959, and continued unabated till the morning of 1st October, 1959. It hit different parts of the district, but its intensity was felt more in the coastal belt. For two days following the disaster, the people suffered immensely. Normal life was paralysed. What the preceding flood had spared was destroyed by the cyclone and this aggravated the plight. Eighty-three lives were lost. More than 4,00,000 people and 1,50,000 acres of cultivated land were affected. About 19,000 houses were damaged and 2500 numbers of cattle lost. Of all the districts in Orissa, Baleshwar suffered the most.

## Cyclone of 1976

On the 12th May, 1976 a norwester affected seven villages which caused immense damage to private houses, public institutions and government buildings. Besides, more than 150 livestock and four human lives died and as many as 57 persons received injuries. Emergent relief was given by the Government for 3 days. Voluntary organisations also supplied cooked food and Chuda, etc., in the affected villages. Government sanctioned house building grants for all the collapsed houses at the rate not exceeding Rs. 150·00 per house.

## Cyclone of 1981-82

A terrible cyclonic storm visited the district during the period from the 8th to 10th December 1981 which caused immense damage to crops, houses, educational institutions and other public properties. This storm was detected over west-central bay of West Bengal on 8th December, 1981. It developed into a hurricane with wind speed exceeding 120 kilometres per hour. Moving northwards it crossed the coast near Sagar island at about 11·30 p. m. on 10th December, 1981. In this calamity the C. D. blocks of Bhograi, Baliapal, Jaleshwar, Baleshwar, Remuna, Bahanaga, Soro, Khaira and Similia of Baleshwar subdivision; Bhadrak, Tihidi, Bant, Basudebpur, Dhamnagar, Bhandaripokhari and Chandbali belonging to Bhadrak subdivision and Nilagiri and Oupada of Nilagiri subdivision were affected. A population of 1,08,840 belonging to 335 villages of 63 Grama Panchayats were affected by this calamity. Forty-one human lives and 259 livestock were lost in this hurricane, besides 39 houses fully and 117 houses partly collapsed. In Bhograi and Baliapal C. D. blocks huge damage had been caused to the betel vines.

## Cyclone of 1982

Before the foot-prints of the last cyclone were washed away from the memory of the people, they were again affected by a severe natural calamity in the form of cyclone on the 3rd June, 1982.

According to information received from the Meteorological Department, the storm was detected at 14·30 hours on the 1st June, 1982 at about 800 kilometres south-east of Paradeep in the district of Cuttack. It moved steadily in a north-westerly direction without appreciable intensification up to 8.30 hours of 3rd June. It intensified into a severe cyclonic storm with a core of hurricane wind during the course of the day and crossed north Orissa coast near False Point at late hours of the night. After nightfall it weakened into a cyclonic storm and moved in north-westerly direction causing heavy rains in the district of Baleshwar, alongwith six other districts of the state. According to the records of the ship Renusagar, berthed at Paradeep the speed of the wind was 180 kilometres per hour. But the anemometer of Paradeep radar had been blown away when the speed reached the above velocity and the wind speed at the time of actual crossing was reported to have been reached 220 kilometres per hour.

At Puri, Paradeep and Chandbali ports danger signal No. 7 was hoisted. Even though danger signal No. 10 was to be hoisted the message could not reach the port of Chandbali due to disruption of telecommunication system. Special cyclonic bulletins were broadcasted by All India Radio, Cuttack, at regular intervals.

In this devastation, 17 Community Development Blocks, i.e., Khaira, Similia, Bahanaga, Soro, Baleshwar Sadar, Remuna, Basta, Baliapal, Chandbali, Tihidi, Dhamnagar, Bhandaripokhari, Bant, Bhadrak, Basudebpur, Nilagiri and Oupada were affected. Altogether 12·72 lakhs of people belonging to 3,808 villages of 6,292 square kilometres were affected. Twenty-one persons lost their lives and 77 people were injured, besides loss of 204 livestock. 9,171 houses were fully and 39,896 houses partly collapsed and 47,598 houses partly damaged. The value of crop loss was estimated to have been 34·28 lakhs of rupees.

Immediate relief operations were rushed to the affected areas and the then Prime Minister visited the devastated areas for an on the spot study. The State Government submitted a memorandum to the Central Government for financial assistance and the latter sanctioned an amount of 56 crores of rupees for the purpose up to the 23rd July, 1982.

### Flood and River embankments

Baleshwar district being a coastal district is frequently subjected to flood. The total flood prone area of the district is about 1,807 sq. km.

Embankments for protection against flood inundation in small stretches have existed from the very early times and those were mounds in nature whereas the general countryside was open to inundation. Under Maratha Government the zamindars were to maintain the embankments. But this arrangement proved to be unsatisfactory. Subsequently during British regime the embankments were taken over by Public Works Department in 1831. These small embankments were insufficient in height and strength to withstand heavy flood. Hence from 1866 the strengthening of these embankments were taken up. Embankments were maintained under the Act XXXII of 1855 and there were 38 miles (61·15 km.) of embankments under Akhuapada—Jajpur division and 32 miles (51.49 km.) under Baleshwar division to protect 150 sq. miles (389·85 sq. km.) of land. Regarding past reports on embankments Kingsford settlement report, report of A. S. Thomson, Superintending Engineer, Orissa Circle and report on Revision Settlement of Orissa by W. W. Dalziel are of importance.

After independence, most of the embankments have been improved with raising and strengthening and new embankments have been constructed out of the flood control grants. Now there are 66 km. of capital embankments and 116·45 km. of Orissa agricultural embankments along different stretches of the rivers in this district. The problem of flood and the necessity of adequate remedial measures have been drawing the attention of the Government. The problems were studied by Orissa Flood Enquiry Committee in 1928 and another committee of 1959—62 and they suggested some remedial measures. Dr. K. L. Rao, the then Union Minister inspected the flood affected areas of Orissa and West Bengal on 21. 9. 67 and 10. 8. 68 and entrusted Jagar Ali and J. P. Jain, Consultants, Ministry of Irrigation and Power to study the flood problems. At the instance of Union Ministry of Irrigation and Power, a joint inspection of Subarnarekha river was made by the Chief Engineers of West Bengal and Orissa, and the Chief Engineer, Floods, C. W. P. C. (Central Water and Power Commission) during 1969. The recommendations were for double embankments and improvement of water way river Subarnarekha. But the double embankment proposal was not acceptable since this involves the problem of rehabilitation of 55,000 people of 173 villages on the river bank. Then during 1972-73 a Master Plan was prepared in consultation with the Chief Engineers of Bihar, West Bengal, Orissa and Central Water Commission with recommendation of the flood detention reservoirs in Bihar and marginal embankments in West Bengal and Orissa. Accordingly the Subarnarekha Multipurpose Poject report has been framed and Phase-I part of the Project with Chandil dam, Ichha dam and Galudihi barrage are under execution in Bihar State.

Similarly it has been proposed for construction of flood detention reservoir across river Baitarani at Bhimkund in Kendujhar district and to take up marginal flood embankments on either banks of river Baitarani to minimise the flood havoc in Baleshwar and Cuttack districts.

### Saline Embankments

Baleshwar district is having a coastline of about 145 km. The average high tide along the coast is 2·8 metres and the range of the tide is from 2.5 m. to 2·8 m. The tidal ingress causes the saline inundation in the inland. The total area subjected to saline inundation in this district is 651 sq. km. Saline embankments have been constructed along the coast and the creeks for a total length of 175 km. in different stretches to prevent saline inundation.

### Test Relief Embankments

The test relief embankments in small stretches along the drainage channels, creeks and along the rivers were constructed in the past as a test relief measure under the Revenue Department. It was decided by the Government that these test relief embankments which are giving protection to the villages and agricultural fields and are not creating obstruction to the free flow of water and are not creating any drainage congestion should be taken over by the Irrigation department. Accordingly the 40th, 49th, 50th and 51st Technical Advisory Committee examined and approved the list of test relief embankments to be maintained by the Irrigation department. The total length of test relief embankments in Baleshwar district maintained by the Irrigation department is 332.07 km.

A detailed list of Capital embankments, Orissa Agricultural embankments, Saline embankments and Test relief embankments maintained under the Irrigation department is given in Appendix I.

### Flood of 1868

So far as its effect on cultivation is concerned, the duration of a flood is more important than the maximum rise and the period of the season at which it may occur is of even more importance. For this reason, the flood of 1868, which occured after a fortnight's heavy rain and was then the highest within the memory of the people, did not do much damage; it occurred in June, and the crops consequently did not suffer greatly though every river in the district overflowed.

## Flood of 1896

In 1896, great damage was caused by exceptionally heavy and prolonged floods; the country was under water for nearly a month, and the loss was therefore exceptionally great. The inundations were due to the rising of the rivers Subarnarekha in the north and of the Baitarani in the south. The flood in the Subarnarekha began at the end of July, and when the water had subsided a little, attempts were made to repair the damage done and to transplant new seedlings; but in the last week of August the river again rose, sweeping away nearly all the transplanted rice. The central part of the district, along the Burhabalanga and Salandi suffered less than the northern tract, where about 300 square miles were inundated; but the south was seriously affected by the floods of the Baitarani river, and much damage was done to the standing crop. Some lost their houses and property, and there was more or less distress in all the tracts open to the ravages of the flood. Very little of the *bhadoi* crop was reaped, and the difficulties of the people were aggravated by the loss of the winter rice crop, for the fields had to be resown late, and a drought from about the middle of October to January was fatal to its growth. The result was, as described later in this chapter, a certain amount of scarcity and considerable distress among the poorer classes.

## Flood of 1900

In this flood the water rose 18 inches higher than the highest flood previously recorded. Prompt measures were taken for the relief of the sufferers, boats were sent out to rescue the homeless whose houses had been washed away; and they were brought into Baleshwar where they were clothed and fed until they were able to return to their villages. There was little loss of human life, but a large number of cattle were drowned, and special measures had to be taken to dispose of the carcasses which were found lying around the villages when the flood subsided. The agricultural embankments were breached and the crops suffered severely, especially in the western part of the district. The railway line was also breached at several places, and the running of trains from Baleshwar to the north was stopped for sometime.

## Floods of 1913 and 1920

In 1913, the rivers Matai, Burhabalanga and Baitarani rose in spate and caused extensive damages. Flood in 1920 again swelled the Subarnarekha, Panchpara, Matai and Baitarani rivers. A number of breaches in their embankments did considerable damage to crops.

### Floods of 1926 and 1927

In 1926, rivers in the district again rose in high flood and the damages in Bhadrak subdivision were intense. The flood of 1927 was unprecedented. There were breaches on the left embankment of Baitarani and 17·2 km. of the railway line were washed away. Dhamnagar police-station area was badly affected. About 65,000 houses were damaged. A considerable number of cattle and 53 human lives were lost. The winter crops also failed. To ameliorate the condition of afflicted people, gratuitous relief and Taccavi loans were distributed.

### Floods of 1931, 1940 and 1943

There was a partial failure of crop in 1931 in some parts of the district on account of a saline inundation in Chandbali and Basudebpur areas and water-logging in some other areas. There were also floods in 1940. The district again suffered the ravages of flood in 1943. The saline inundation in coastal tracts seriously damaged the paddy crop. The intensity of the havoc necessitated relief work. After this for about a decade onward, the district enjoyed a respite from the visitation of serious floods.

### Floods of 1955

In 1954, a general failure of rains overtook the whole state during the months of July and August when the thinning and reploughing of fields sown by broadcasting and the transplantation of paddy were on progress. The district, in particular suffered from acute distress which continued till the last week of August 1955. Then rain fell heavily and continuously for a week ending on 4th September, 1955. All the rivers rose to great height and it is said "the State did not ever have the experience of the kind in their living memory during the preceding one hundred years"*. The flood was so devastating that it breached embankments, roads and washed away many villages, and sand-cast vast areas of paddy lands. The loss sustained was colossal. The flood caused damages in this district to 629 villages affecting 2,14,408 people and 1,90,447 acres of cultivated land. There were 67 breaches of roads and embankments, 2,384 houses were damaged and 265 cattle lost. The approximate cash value of the crop-loss was Rs. 1,32,63,600.

### Flood of 1956

In 1956, contrary to expectation there was an earlier break of monsoon followed by a heavy rainfall throughout the first week of June and the rivers Baitarani, Burhabalanga and Subarnarekha, with their branches and tributaries, were in spate. Floods came

*Flood in Orissa Rivers—1955 and 1956.

in these river systems several times. Though the flood did not assail the previous year's height, the damages it did were considerable because of water-logging caused by heavy rainfall. In all 1691 villages and 19,672 acres of cultivated lands were affected. The flood caused 42 breaches in roads and embankments of the district. The total valuation of the crops lost was estimated approximately at Rs. 8,00,000.

Floods again occurred in 1958 and 1959 but the damage inflicted did not assume any serious proportion.

### Flood of 1960

The district was badly affected by the flood in 1960 which occurred twice from 15th to 25th August and from 25th September to 2nd October. The coastal tract of Bhadrak subdivision was worst affected. Five persons lost their lives. About 3,300 houses were destroyed and 8,100 damaged. The approximate cash valuation of the loss reported to have been Rs. 3,52,27,930.

### Flood of 1969

As a result of torrentia rainfall in the catchment areas from the 13th August, 1969, there were high floods in the rivers of Subarnarekha, Salandi and Baitarani on the 14th August. The rivers Burhabalanga and Kansabansa were also flooded on the next day. There were also heavy rains within the district on 13th August. As a result, floods, were experienced in the Baleshwar, Bhadrak and Nilagiri subdivisions and an area of 1,56,650·60 acres of cultivated land was affected and 490 acres were sand-cast. A population of 4,15,880 covering 980 villages of 10 C. D. blocks suffered in this flood.

### Flood of 1971

There was heavy rainfall in the catchment areas of the river Subarnarekha, Baitarani, Kochila, Genguti and Jalaka, on the 7th June, from the 27th July to 28th July and 8th August to 9th August 1971. As a result, the above rivers were in spate affecting large areas. To add to the misery, another disaster was faced by the district when flood water of Midnapur district of West Bengal rushed through the Coast canal and over—topped the embankment in Bhograi C. D. Block of Baleshwar subdivision, inundating 253 villages in protected areas and affecting 45,331 acres of cultivable land in Bhograi, Jaleshwar, Baliapal, Basta, Tihidi, Bhandaripokhari, Chandbali, Basudebpur, Bhadrak, Baleshwar Sadar, Remuna, Soro Similia, Dhamnagar and Nilagiri C. D. Blocks. This affected a population of 69,640. The Bhadrak-Chandbali road was completely cut off for a fortnight. Besides there were breaches in the existing test

relief embankments which inundated vast areas. Again there was heavy rainfall in the entire district from the 14th October to 16th October 1971 accompanied by cyclonic wind particularly in the Basudebpur area. As a result, floods appeared in the rivers of Burhabalanga, Baitarani, Salandi and Kansbans. In this flood the Bhadrak-Chandbali road, Bhadrak-Basudebpur road and Baleshwar-Basta road were cut off. About 1,125 marooned people were shifted to safer places.

During this year 6·13 lakhs of people belonging to 15 C. D. Blocks were affected. An area of 5·21 lakh acres were also affected in it. Besides the loss of two human lives, 36 livestock were lost by this flood. Relief as permissible was granted by the Government.

**Flood of 1972**

Due to excessive rains on 13th and 14th July, 1972 the rivers of this district were in spate causing damage by sand-casting of land, destruction of crops, loss of human life and livestock. In this flood Soro, Similia, Bahanaga blocks of Baleshwar subdivision and Bhadrak, Bant, Bhandaripokhari, Dhamnagar, Tihiri, Chandbali, Basudebpur and Khaira blocks belonging to Bhadrak subdivision were affected. A population of 4·45 lakhs of 931 villages suffered and 2·89 lakh acres of land were affected. This natural calamity claimed loss of two human lives and 72 cattle.

**Flood of 1974**

There was heavy rainfall and gales with a speed of about 80 kilometres per hour from the morning of the 15th August and it continued on the following day. As a result, there were high floods in the rivers of Subarnarekha, Chitrarekha, Jalaka, Kansbans, Burhabalanga, Sone, Gangahara, Baitarani, Genguti and other small rivers flowing in the district. In this flood 5,57,440 people of 1,372 villages belonging to Bhograi, Jaleshwar, Basta, Baliapal, Baleshwar, Remuna, Chandbali, Dhamnagar, Bhandaripokhari and Tihiri blocks were affected. It claimed a toll of two human lives and 23 livestock. Two important breaches, one at Misrapur and the other at Kantighai on the left bank of the Baitarani occurred. The early variety of paddy was substantially damaged. Besides, nine minor irrigation projects and twenty-seven roads belonging to Rural Engineering Organisation (now defunct) were also damaged alongwith forty P. W. D. roads, 222 private institutions and 1,497 tube-wells.

**Flood of 1975**

Due to heavy precipitation in the catchment areas of Subarnarekha, Burhabalanga, Jalaka, Kansbans, Salandi and Baitarani all these rivers were in high spate crossing the danger levels between

the 18th and 22nd August, 1975. Spill over water of Salandi inundated the low-lying areas of Bhadrak town. River Jalaka in Basta area and Kansbans in the Soro area were also in spate. Communications from Bhadrak to Anandpur of Kendujhar district and Basta to Baliapal were completely disrupted. Flood water entered Jaleshwar and Chandbali towns in the evening of 19th August. Serious breaches occurred at Ambagadia and Jagannath Prasad of Bhadrak subdivision in Baitarani left embankment. Chandbali, Bansada and Tihiri were water-logged for more than a week. In this flood 1,013,100 people of 2,408 villages belonging to 17 C. D. blocks in two subdivisions and an area of 643·769 acres (260·72 hectares) were affected. Nine* persons died in the flood and loss of livestock amounted to 600. People were given all possible government assistance basides the help of a large number of private organisations and individuals.

### Flood of 1978

There was a mild flood in September 1978 in the rivers of Baitarani, Genguti, Subarnarekha, Jalaka, Pejagola, Burhabalanga, Sone and Gangahar causing damge to the C. D. Blocks of Basta, Baliapal, Baleshwar, Bhograi, Jaleshwar, Remuna, Dhamnagar, Bhandaripokhari, Tihiri and Chandbali. A population of 5,33,609 of 1,102 villages belonging to 101 Grama Panchayats were affected by this flood. This flood claimed loss of one human life besides affecting a total area of 3,30,218 acres of which 68·730 acres were under different crops.

### Flood of 1981-82

The district experienced its first phase floods in the last week of June, 1981 in the rivers Baitarani, Kochila, Genguti and Burhabalanga. As a result of this flood 362 villages in three C. D, Blocks of this district were affected covering a total area of 51,133 hectares. Besides, cultivated land of 26,655 hectares were also affected with an estimated crop loss of six lakh rupees. Although six houses fully collapsed, no loss of human lives or cattle was reported. During the month of September this district was also visited by a medium flood in the rivers of Baitarani and Sona, a tributary of Burhabalanga. No serious damage during this flood was reported.

### Flood of 1984

The district of Baleshwar is generally affected by flood from August to October. But during 1984, there was flood in river Subarnarekha on 5th June, 1984. The river further crosed danger level on 28th

* Out of 21 persons left for sea from Basudebpur whereabouts of seven persons and one person from Jagannath Prasad of Baleshwar district were not known.

June, 9th, 15th and 28th August and on 5th Septmber, 1984. Similarly there was flood for 3 times in river Baitarani. Rivers Burhabalanga, Kansbans, Jalaka, Reb and Kapali were also in spate during the year. Owing to flood, 17 out of 19 C.D. Blocks covering 1,604 villages with a population of 9.06 lakhs were affected. 6393 private houses and 2,212 school buildings were collapsed. There was 3 human casualty.

### Flood of 1985

During 1985, there was flood during the months of August, September and October. Flood during October 1985 in river Subarnarekha was the highest in recent memory. There was also heavy flood, in rivers Baitarani, Burhabalanga, Kansbans, Sone and Jalaka. All the 19 C. D. Blocks covering 2,511 villages with a population of 13,66 lakhs were affected. As many as 24,714 private houses and 3,212 school buildings were either collapsed or damaged. A number of roads and embankments were also damaged. There was human casualty to the extent of 41 and cattle 885.

### Famines

The following is an account of early famines taken from O' Malley's, Balasore District Gazetteer (1907).

"Previous to the inception of the Orissa canal system, droughts and famines were of frequent occurrence. Historical records show that terrible famines occurred in the 14th, 15th and 16th centuries; and during the rule of the Marathas the district suffered grievously from repeated famines. In the memorable famines of 1770 the land lay untilled, rice was not to be had at two seers per rupee, and while the people were dying by hundreds of thousands, the Marathas soldiery plundered and devastated the country. In 1780, the whole country had sunk into such absolute desolution that there was not a single place except Puri and Cuttack which could furnish even one battalion with provisions. In 1792-93 the miserable peasants again experienced the horrors of famine; scarcity followed in 1803, and when the country passed into the possession of the British its condition was wretched. A large portion of the land had been thrown into waste; many of the people had fled to the jungle; and the population was insufficient to till the fields."[1]

### Famine of 1865-66

In 1865-66, a famine of most intense and desolating in character, popularly known as "Na-Anka Durbhikhya", visited the district. No such calamity had ever occurred. "It had to be dealt with by a body of officials, ignorant of the signs of its approach, unprepared to expect it, and inexperienced in the administration of relief measures; nor were the native inhabitants more aware of what was coming on

1. Chapter VI, Natural Calamities, p.98.

them than the British Officers. The rainfall of 1865 was scanty and ceased entirely after the middle of September so that the out-turn of the great crop of winter rice, on which the country mainly depends, was reckoned at less than a third of the average crop. Food-stocks were low both because the quantity exported in 1865 was unusually large, and because the people, unaccustomed to precarious seasons, had not retained sufficient stores at home. When the harvest failed the gravity of the occasion was not perceived and so special inquiries were instituted, while prices long remained so moderate that they offered no temptation to importers and forced no reduction in consumption on the inhabitants, till suddenly the province was found to be almost bare of food. It was only in May 1866 that it was discovered that the markets were so empty that the jail prisoners and the Government establishments could not be supplied. But the southern monsoon had now begun and importation by sea or land became nearly impossible. Orissa was at that time almost isolated from the rest of India; the only road leading to Calcutta was unmetalled and unbridged; and there was little communication by sea. By great exertions, the Government succeeded in importing about 10,000 tons of food-grain by the end of November, and this was given away gratuitously or sold at low rates, or distributed in wages to the starving population. But meanwhile the mortality among those whom this relief did not either reach, or reached too late, had been very high, and it was estimated that nearly 10,00,000 persons had died (in the whole of Orissa). The rate of mortality reached its climax in August, when heavy rains caused great suffering among the people, who were then at the lowest state of exhaustion, emaciated by hunger and without adequate shelter. Disastrous floods in Cuttack and in the south-east of Balasore followed these rains and in all the low-lying lands the crop was lost. The harvest in the higher lands was, however, a good one; the new crop came into the market in September; and though the rate of mortality continued high for sometime owing to cholera, the famine came to close in November.

## History of the famine in Balasore

With this brief sketch of the general history of this disastrous famine, we may turn to a more detailed account of the progress of events in Balasore. The rice crop of Balasore in 1864 had been unusually a good one, and the exports enormous. In 1865, no alarm seems to have been felt regarding the safety of the cold weather or *sarad* rice crop till September, or even later, prices still ruling at 23 to 20 seers per rupee. At the end of October, however, complaints were received from the zamindars that the crops

were ruined; that the ryots, being unable to obtain advances, could not pay their rents; and that the cultivators had blindly disposed of all their produce and kept no stock in hand. In November, prices had gone up to 16 and 11 seers per rupee, and the distress became acute. Accordingly, a Relief Committee was appointed, but it was considered that no immediate measures of relief were required. Early in 1866, there was an extraordinary outbreak of crime, and the houses of those who were supposed to possess grain were attacked and plundered by their destitute neighbours. At the end of January, starvation appeared, the poor began to flock into the town and gratuitous distribution of food was commenced. In March and April, the number of starving people in the town rapidly increased; and on the 2nd May the Commissioner reported that, owing to the extraordinary rise in prices it had been for some months beyond the means of the poorer classes to procure sufficient rice to support life, and that they were eking out a miserable subsistance by eating roots, herbs and leaves. The general population had fallen into a state of dejection, and had lost all energy. They were swarming into the villages, and they were dying of cholera, dysentery or hunger. Even in Balasore town, the organised relief was utterly insufficient to meet the need of food. A distribution which the Commissioner witnessed in April was a scene of utter confusion, the starving crowds were beyond management; they seized the food as soon as they saw it, and even fell on the Commissioner, snatching from his hands and pockets the rice which he intended to distribute. So uncontrollable was the attack of the paupers on the pots of cooked food, that for a time the Committee was obliged to give our uncooked rice, but it was soon found that the rice so given was devoured raw, and the Committee therefore reverted to cooked food.

Government began to import grain in June, steamers being sent round by sea with large cargoes of rice, and by the end of July 12,000 maunds had been imported. Private importations by land from Midnapore into the north of the district were also considerable, but still hardly sufficient to meet the demand from day to day,. Traders too, began to import grain from Calcutta on pack-bullocks, but in the middle of June this traffic was stopped by the rains, which made the unmetalled road impossible. Rice shops were opened early in the town and at several places in the interior for the sale of rice to all-comers at a low rate; but, unfortunately, the relief operations received a check, just at the time when they were in full operation, by a failure in the supply of rice. In August the stock became exhausted at a time when a vessel was lying at the mouth of the Balasore river with a cargo of 10,000 maunds of rice. Her draught of water how ever was so great, that she could not come within 8 miles of the shore;

and the country boats and sloops could not get out to her without the assistance of a steamer. Unhappily, no steamer was available at the time; and ultimately bad weather set in, which drove the ship across the Bay of Bengal to Akyab. Thus the supply of rice was unexpectedly snatched away almost from the mouths of the people just when it was most needed. The result was intense distress in the first half of August, and in the first 12 days of that month the police removed over 1000 corpses from the town."[1]

The Collector in his report[2] to the Commissioner wrote: "The death rate was found to diminish steadily in direct ratio to the distance from the sea. The tract under the hills of Nilagiri kingdom suffered but slightly from the famine. This is probably due to the fact that the ryots here bunded the small hill-streams and they stored the main part of the scanty supply of rain which fell in 1865. The ryots on the east of the trunk road trust mainly to their tanks for water, and as these did not fill in that year, death was the consequence."

"The distress in the Bhadrak subdivision was equally great. In March and April grain robberies and incendiarism had appeared to an alarming extent; and in May it was reported that rice was selling at the rate of three and half seers for the rupee, and that numbers of people were starving. Relief operations were started at Bhadrak, but it was not till the 10th August that rice arrived in sufficient quantities to enable the Committee to open centres in the interior, and to afford relief on any considerable scale. Heavy inundations added to the suffering. In the eastern part of the subdivision, the early rice crop was injured, houses were swept away, and the people perished of cold, exposure, and hunger, being cut off by the floods from access to supplies. The grain-dealers had closed their shops, declaring that they had no rice left. On the 25th August, rice was sold at Dhamnagar, 10 miles south of Bhadrak, at the rate of one rupee per seer, the highest price recorded at any time or place during the famine. Supplies were kept up at the relief centres, but with great difficulty, from Balasore; and in September a second inundation fearfully enhanced the distress of the people. On the 25th October it was reported that the distress was still very great, that the country everywhere bore traces of famine, inundation and pestilence. Unsown lands, ruined houses and living skeletons met the eye everywhere. In the preceding week the daily total of persons receiving gratuitous relief at the eleven centres which had been established in the subdivision amounted to 2,03,000 giving a daily average of 29,000."[3]

1. Balasore District Gazetteer, 1907, Chapter VI, pp. 98 - 100.

2. Collector's letter No. 393, dated 16.7.1867.

3. Balasore District Gazetteer, 1907, Chapter VI, pp. 100 - 101.

In the whole of the district, the tract (comprising Ankurah and Berah) situated on the sea coast between the Kansbans river on the north and the northern boundary of Killa Kanika, was the scene of intense suffering. In the earlier part of 1865 excessive rain destroyed a great portion of rice crop, and almost the whole of the remainder perished during the subsequent drought. This tract had already been declining since the abandonment of salt monopoly and was thus less able to cope with such an accumulation of disasters and had suffered the most. The mortality was about 48 per cent, the highest in the district (Collector's report).

"The coming in of the new crops gradually relieved the distress. On 5th November, the Government sales were stopped; and the Collector reported that public health was improving and trade reviving. Soon after the majority of the paupers dispersed and returned to their homes. The Relief Committee finally stopped operations on the 24th November. During the year the price of rice rose as high as $2\frac{1}{2}$ seers to the rupees, and in the town of Balasore alone 10,000 paupers succumbed to starvation and disease. The total mortality was estimated at 2,17,608 although 31,424 deaths being ascribed to diseases resulting starvation; 29,558 persons emigrated, and the total loss was, therefore, 2,47,167, or one-third of the population.

The maximum number of centres opened for gratuitous relief, including 11 in the Bhadrak subdivision, was 22, the distance between them ranging from 5 to 22 miles, but averaging 12 miles. Shops for the sale of rice to those who had money, were opened at 7 places besides Balasore town, in which 3 shops were established. The daily average number of persons relieved from June to November was 26,497, viz., 4,552 employed on light labour and 21,945 in receipt of gratuitous relief. The greatest difficulty was experienced in getting the people to work at all; and the Collector reported that the Oriyas would rather die than go even a few miles from their homes to procure work.

The Famine Commissioners in their Report give the following general review of the operations:—

"After the famine had unmistakably declared itself the local endeavours to meet it were crippled by want of funds. Until May, the possibility of obtaining assistance on such a scale as that on which it was subsequently obtained, was never contemplated, nor indeed, was any adequate idea entertained of the dimensions which the requirements for aid would assume. "There were starving people in April," it has been said, "but we did not

realize that they would come pouring in such thousands". Nor indeed, could these numbers have been anticipated by the residents of Balasore, for many of the paupers came from other districts and from the estates of the Tributary Rajas. After the importation of rice was undertaken, it was more than once necessary to restrict the district operations, in consequence of the scantiness and uncertainty of the supply, and many of those who received the imported rice in June and July were probably too far gone to be saved. The number of paupers ascertained to have in the town of Balasore alone between June and October was 8,900, of whom 6,132 died in the streets and 2,768 in the hospital. The mortality culminated in August, and was to some extent affected by the rains and inundations of that month.

"The mortality in and about Balasore town, and the famine sights to be seen there were more terrible than at any other place in Bengal or Orissa. The mass of paupers assembled was larger than it was elsewhere. The town lay in the way of many who left their homes in hopes of reaching Calcutta. Of these, many, exhausted and disabled by hunger and diseases from going further, remained to swell the number who were fed by the Relief Committee. Subjects of the neighbouring Tributary Rajas also flocked in to share in the relief. These, as well as the travellers generally, arrived in such a condition that they were beyond recovery. In the early months, cholera, and subsequently other bowel-complaints caused by bad and insufficient food, carried off hundreds; the least change of weather to cold or damp was immediately fatal. Many who were caught by bad weather at a distance from the places of distribution had not strength to crawl back to get their meal, and so died, where they lay, in out-houses or by the way-side. Even in fine weather, many were found dead in the morning where they had lain down to sleep at night; others, when they went to drink, fell into the water through sheer debility and were drowned."[1]

The role played by the native zamindars to relieve the distress has been stated in the following words by the then Collector.

"I regret to state that the zamindars throughout the district have done little or nothing for their royats; the advance of rice that they have sometimes assisted men of substance who were likely to be able to repay them, but gave little aid to those whose need was direct. More than this it is reported that they have, with some exception, collected as much as possible of their rents."[2]

1. Balasore District Gazetteer, L.S.S. O'Malley, 1907, pp. 101-102.
2. Report No. 393, dated 16.7.1867 from the Collector to the Commissioner.

## Scarcity of 1897

There was scarcity in 1897. "The rainfall in 1896 was 9 inches above the normal, amounting to 69 inches, but its distribution was untimely. There was heavy rain in June, July and August, but there was an almost complete cessation of the rainfall from the latter part of September to the close of January. The consequence of these abnormal conditions was that there were successive and heavy floods followed by drought. The floods almost totally destroyed the *bhadoi* and winter rice crops in nearly all the tracts not protected by embankments. These were also breached in many places, and extensive tracts lay under deep water for a considerable period. The peasants endeavoured, after the floods subsided, to recoup their losses by fresh planting, but the cessation of rains from the latter part of September gave the finishing stroke in many places to what had escaped or been replanted after the flood. Want of rain in September and October was equally injurious to the *rabi* crops. The people tried their best to meet the loss by raising *dalua* and other special crops, and the situation was also relieved by the railway works then in progress, which gave employment to a large number of the labouring classes. These works were supplemented by those started for the repair of the damages caused by the floods, and fortunately there had been good harvests in the two preceding years. Notwithstanding, therefore, the poor out-turn of crops, no rice had to be imported, but on the contrary the export of rice from Balasore increased. The result of this exportation at a time when prices were very high outside Orissa meant that the cultivators received good prices for such surplus stock as they possessed, though much of the profit doubtless went to middlemen. The classes that suffered most were the landless labourers and those depending on fixed incomes, including the *bhadralok* whose circumstances were straitened by high prices. The wants of the former were, however, met to a large extent by the demand for labour in railway and public works activities and where necessary, by district works that answered the purpose of relief works. The case of the very low castes and of those who ordinarily depend on private charity, was the worst and the former, being very poor, felt the pinch most acutely. For the ordinary receipient of private charity, where private charity was exhausted, gratuitous relief was afforded, so that the apprehended general scarcity was quietly tided over, and the district did not experience anything of the proportion of a famine."[1]

## Droughts of 1918 and 1949

There were not many years of acute scarcity after 1897. The first decade of the present century was a period of droughts occuring frequently due to scanty rainfall. The year 1918 witnessed

1. Balasore District Gazetteer, 1907, pp. 102-103.

one of the severest years. The distress that came was acute. The district was again affected by drought in 1949 and Bant, Basudebpur, Similia, Soro, Singla, Baliapal and Bhograi police-stations were largely affected.

## Droughts of 1954 and 1965

In 1954, the rainfall was only 32·61 inches. How acute could be the condition of the drought and the fate of the crop due to this low rainfall could be imagined from the rainfall in the district in 1865 (the Na-Anka famine year) which was 52·60 inches. Nearly 4,25,500 acres out of the total cropped areas of 9,39,393 acres were affected by severe drought involving a population of 11,06,012 of the district. The average out-turn of crop was 6 *annas*, i. e., 37·5 per cent though in certain pockets it was even 4 *annas*, i. e., 25 per cent.

During the early period of monsoons of 1965, the rainfall in most parts of the district was so insufficient that the agricultural operations could not be carried on properly. Towards the latter part rains intensified but this was untimely and excessive, causing floods in the Bhadrak subdivision and damaging the standing crop by submersion. In north Baleshwar, the late rains could do no good to the crops which gave poor yield. In fact, with the late rains the impression that the crops regenerated themselves was created by what was really an abundance of straw bearing chaff.

## Drought of 1979-80

During the year 1979 there was practically no pre-monsoon rain in most of the districts of the state. In this district also monsoon started late and the rainfall was erratic. There was a shortage of 0·5 per cent, 62 per cent, 39 per cent, 25 per cent, and 28·8 per cent of rainfall than the normal in the months of April, May, June, July and August, 1979, respectively. As a result agricultural work hampered and there was drought which affected 209 Grama Panchayats of 19 C. D. Blocks. In all these Grama-Panchayats, there was a crop loss of 25 to 49 per cent.

## Drought of 1982

Due to inadequate rainfall there was a severe drought during Kharif. Out of 4353 villages, 1758 villages sustained crop loss of 50 per cent and more.

## ANIMAL HUSBANDRY AND FISHERIES

### (i) Animal Husbandry

Before independence there was not much of veterinary/animal husbandry activities in the district. There was only one Veterinary Dispensary a Baleshwar town. A District Veterinary Office was opened at Baleshwar in December, 1952 consequent on reorganisation of the Animal Husbandry and Veterinary Department. The office of the Chief District Veterinary Officer started functioning from 1·7·1983. He is now assisted in office work, administration and supervision of animal husbandry activities by four Assistant District Veterinary Officers belonging to different disciplines at district level and by three Subdivisional Veterinary Officers at subdivisional level.

The district possesses a considerable livestock asset. Animal husbandry avocation has become a major programme because of its potentiality to generate employment and income, both to farming and non-farming households. Lower capital investment and quick return are the factors responsible for making animal husbandry programme popular among the rural families. Agriculture alone cannot improve the economic condition of the rural poor because the district which depends upon monsoon for agriculture is visited regularly by flood, drought and cyclone. Therefore livestock and poultry development schemes are an evendual scope of development in the district.

The success of animal husbandry programme largely depends upon necessary infrastructure, availability of fodder, concentrate feed together with proper marketing support of livestock products. Much emphasis has been placed already on these but in comparison to Government intention and needs of people, efforts undertaken so far are not adequate.

Detailed livestock position in the district as per 1982 Livestock Census is given below:

| | | No. in lakhs |
|---|---|---|
| Cattle | .. | 12·63 |
| Buffalo | .. | 0·18 |
| Sheep | .. | 0·10 |
| Goat | .. | 4.18 |
| Pigs | .. | 1·64 |
| Poultry | .. | 5·32 |

Most of the above livestock are of non-descriptive type and are maintained with minimum care and attention. The farmers can hardly pay proper attention towards nutrition and hygiene of their animals. As a result, though the population of the district is quite substantial, the over-all livestock production in terms of milk, meat, eggs, etc., is far below the desired level. The average milk production of a local cow is about 250 ml. per day. Buffaloes, however, give a little more milk than cows. To provide health care to the livestock, there were in 1986, 31 Veterinary Dispensaries and 193 Livestock Aid Centres against 4 and 7 respectively in 1952-53, and only one Veterinary Hospital in 1931-32.

In the early thirties some improvement in the poor stock of the cattle was sought to be affected in the towns and a few places in rural areas by crossing the local breeds with bulls imported from up-country. But in order to bring about genetic improvement in the local cattle and buffalo population, for enhance ment of milk production, cross breeding the local cows with exotic Jersey bulls has been introduced through artificial insemination in the recent past. There are 3 Key Village Blocks and 115 A. I. (Artificial Insemination) Centres in the district. But out of these, frozen semen A. I. is done at one unit and in the rest 114 centres A. I. is done with chilled semen. There are 2 semen collection centres at Bhadrak and Baleshwar for supply of chilled semen to the A. I. centres. To make the A. I. programme successful, lots of extension activities and motivation are to be undertaken along with castration of scrub bulls. During the three years 1983-84 to 1985-86, A. I. has been done in 57,676 cases, but the number of progenies born was 23,235 which gives an overall average success of 40 per cent. During the same period, A. I. by frozen semen gave a success of about 49 per cent (out of 660 A. I. done in the frozen semen unit at Baleshwar, 320 progenies were born).

Paddy being the major crop in the district, paddy straw is available as the staple roughage all the year round for the cattle and buffaloes. There is acute shortage of green fodder. Fodder demonstration plots are raised in some of the veterinary institutions where land is available for demonstration as well as to supply slips and roots to the interested farmers. Besides seasonal fodder seeds like M. P. Chari, maize, cowpea, barseem, etc., are supplied to a few beneficiaries both in Kharif and Rabi. Inspite of efforts made in all settlements to reserve lands for pasturage and the statutory provision in the Orissa Government Land Settlement Act, 1962, to reserve at least 5 per cent of effective area of a village as Gochar, cultivation has encroached

upon the grazing lands for many years past, particularly so after independence and abolition of zamindaries. So the cattle have to be content with dry stubble of the fields and such scanty herbage as the road sides, river banks, tank beds and the field ridges could afford. The situation is not likely to improve unless fodder cultivation is taken up in large scale in farmers' fields individually or in community lands through co-operative efforts of the villagers. The availability of balanced concentrates feed is also very much lacking in the district. Though there is a feed mixing plant at Remuna, it is not in a position to supply the demand of the public because the plant is of a small capacity. In the past the use of concentrate feed in the district was negligible because the milch cow population were of local type and poor yielders which could barely nurse their offspring for which no feed was given. But in the recent past, with introduction of high yielding cross cows, the demand for feed has gone up. Hence to cope up with the situation the capacity of the feed plant at Remuna needs to be increased. Milk production in the district is quite insufficient to meet the demands of Bhadrak and Baleshwar towns. A considerable quantity of milk is transported to the towns from nearby C. D. Blocks of Bahanaga, Soro, Basudebpur, Tihiri and Chandbali. Milk marketing facilities have been provided through organising Primary Milk producing co-operative societies linked to District Milk Union at Baleshwar. A chilling plant of 2000 litres installed capacity has been set up at Baleshwar by the District Milk Union. There are 32 primary societies organised and registered in the district but the Union has not so far been able to collect milk from all the societies due to difficulty in transportation. So a large quantity of milk from Basudebpur, Tihiri and Chandbali areas is being disposed of by farmers in shape of bi-products like cheese and Ghee at low-cost. Therefore, strengthening of the Milk Union has to be thought of for success in dairy development programme.

### Sheep Development

According to 1976 Livestock Census, there were only 9,729 sheep in the district and the same has been increased to 10,355 as per 1982 Census. This increase is very marginal and gives an indication that the agro-climatic condition of the district is not very congenial for sheep development.

### Goat Development

There has been an increase in goat population in the district from 3·15 lakhs in 1976 to 4·18 lakhs in 1982 Census. Goat rearing has a good prospect in the district. But poor village people are in the

habit of keeping 2 to 3 goats of their own which provide them a good regular income with minimum attention and care. People do not find any problem for marketing since traders often visit rural areas on weekly markets for purchase of goats. Goat can subsist on browsing and can thrive well on tree leaves and grasses. All these factors offer a good scope for goat development in the district by promoting the programme among the weaker section of the community to supplement their income.But as they destroy tree sapplings by browsing, increase in their number is detrimental to any programme of afforestation or tree plantation.

### Piggery Development

Tribal people are fond of rearing pigs. They prefer the local breed as they are disease resistant and could be maintained without much managerial skill and special feeding. Such farmers are encouraged for pig rearing through financial assistance and subsidy under Integrated Rural Development and Economic Rehabilitation of Rural Poor Programmes. This activity is limited to Nilagiri subdivision of Baleshwar district. In other parts of the district the usual omnivorous type are bred by the lowest castes called Ghusurias.

### Poultry Development

The poultry population in the district was 5·24 lakhs and 5·32 lakhs during 1976 and 1982 Livestock census respectively, thus recording a marginal growth between the two censuses. Practically poultry has not made much headway in the district though there is bright prospects of this sector to develop.Mostly poultry birds are maintained by the Scheduled Caste and the Scheduled Tribe families in their backyard and the birds are mostly of local breed which are uneconomical.

There are three poultry units in the veterinary dispensaries of Baleshwar, Soro and Nilagiri to meet the demand of hatching eggs of the public. There are a very few commercial layer and broiler units established in the district under private sector through bank finance. There are 2 Primary Poultry co-operative societies in the district.

### Veterinary Relief

Rinderpest continues to be the most prevalent disease among the cattle. For rinderpest eradication scheme 11 Livestock Inspectors have been posted. The number of vaccinations done by them are as follows:

| | | |
|---|---|---|
| 1983-84 | .. | 1,59,946 |
| 1984-85 | .. | 1,19,665 |
| 1985-86 | .. | 1,34,945 |

Disease control activities of the department during the last three years are given below:

| | 1983-84 | 1984-85 | 1985-86 |
|---|---|---|---|
| 1. No. of animals treated .. | 8,93,970 | 8,92,296 | 7,78,940 |
| 2. No. of preventive innoculations done .. | 3,70,524 | 2,92,944 | 1,55,071 |
| 3. No. of pathological specimen examined .. | 17,205 | 18,952 | 17,716 |

### (ii) Fisheries

Fisheries is important not only for its high unit value but also for improving the rural economy and for providing gainful employment to a large section of the rural population. As in the field of agriculture and animal husbandry, the last two and a half decades have also witnessed great progress in the field of fisheries in the country. In Orissa, however, though some progress has been achieved in exploiting demersal resources of the sea, progress in inland fisheries and in tapping pelagic resources of the sea has not been very substantial when considered against its potentiality. Fishing may be broadly divided into three categories, viz., (*a*) Marine, (*b*) Inland and (*c*) Brackish water. In Orissa all the three categories are present with immense potentialities. The district of Baleshwar is also very rich in the resources of all the three categories.

#### Marine

The district of Baleshwar has a coastline of 130 km. starting from Dhamra on the south to Udayapur on the north out of a total 488 km. of coastline in Orissa. This coastline is very much rich in pelagic resources.The marine fishermen population of the district is around 84,000 with 30,000 active fishermen, as per survey conducted by the Fisheries department in 1981. The coastline is dotted with 23 numbers of ice plants and cold storages on both private and public sectors. There are also 24 landing bases on the costline where around 21,000 tonnes of marine fish is landed annually out of a total landing of 46,000 tonnes in the state. The boat-side value of these marine fishes in the district come to around 150 million rupees. The major landing bases are at Dhamra, Chudamani, Chandipur, Kasafal and Talasari where about 360 mechanised boats and around 2,500 traditional boats are operating.

Fishery department introduced mechanised fishing for the first time in the district in the year 1962 and in the same year also nylon was introduced which replaced the traditional cotton twine for

making fishing nets. The efficiency and longivity of the nylon is about 3 to 4 times more than the traditional cotton twine. It has since acted as a catalyst for development of marine fisheries by:

(1) encouraging interested entrepreneurs for speedy mechanisation and establishment of ice plants and cold storages by arranging institutional finance for them and providing subsidy,

(2) providing better harbouring, mooring and repairing facilities,

(3) imparting marine training to fishermen boys with stipend,

(4) operating a few trawlers and gill-netters at Chandipur for survey, investigation of resources and diversification of fishing methods, and

(5) encouraging mechanised fishing through co-operative societies, etc.

The department has constructed two ice plants with cold storage facilities at Chandipur and Chandbali for supply of ice to the private fishermen at reasonable cost. A concrete 'T' jetty with approach road, diesel outlet, drinking water facility was constructed at a cost of Rs. 15 lakhs at Chandipur with funds provided by Government of India for landing base for mechanised and traditional vessels. But this jetty is not used by the fishermen as they find it more convenient for landing their fish in the traditional fishing base at Balaramgadi. At Chandipur 30 fishermen boys are annually trained with a monthly stipend of Rs. 75/- per trainee for a period of ten months. Harbouring facilities and approach road at a cost of Rs. 11 lakhs have been provided at Chudamani fish landing base in Basudebpur C. D. Block. Government of India have established a fishing harbour at Dhamra which is the only fishing harbour in the state. This harbour was opened in 1978 and it provides facilities like landing-quay, slipway, workshop, auction hall, etc. It has been designed to accommodate 200 mechanised vessels besides catering to the needs of nearly 300 traditional crafts of both Baleshwar and Cuttack districts. At present 52 mechanised trawlers and gill-netters avail the facilities at Dhamra. The annual landings of the harbour is nearly 5000 tonnes and it is expected that it will increase three-fold during a couple of years. At present there are two ice plants with cold storage facility on private sector at Dhamra. A road has been constructed to connect Dhamra fishing harbour with the National Highway No. 5, covering a distance of about 60 km. for transport of fish to Calcutta by road and rail. But a part of the road from Basudebpur to Dhamra often gets inundated and breached during high flood. It has not yet been constructed fully. Therefore the objective of fishing harbour to

provide remunerative price to the poor fishermen has not been fully achieved. The department has established three marine fishermen co-operative societies with institutional finance and subsidy by providing boats, engines, fishing gears, and managerial and technical staff. These societies are :

(1) Maa-Dhamrai Marine Fishermen Co-operative Society which operates 20 numbers of thirty-two-footer trawlers at Dhamara and engages 100 fishermen at Dhamara area.

(2) Rajlaxmi Fishermen Co-operative Society which operates 40 Gill-netters at Chandipur and engages 200 fishermen of the locality.

(3) Kirtania Fishermen Co-operative Society which operates 23 Gill-netters at Talasari and engages 115 fishermen of Bhograi areas.

There are also nearly 27 numbers of small marine fishermen co-operative societies in the district which have been helped by various ways in shape of institutional finance and subsidy from government.

The Orissa Marine Fishing Regulation Act., 1981 has been introduced since 1984 with a view to regulating fishing by fishing vessels in the sea along the coastline under which all mechanised and traditional boats are to be registered with the Fishery department on payment of some annual license fees. Delimitation of zones have been marked for traditional, small mechanised and bigger mechanised crafts which are rarely observed by mechanised trawlers due to inadequate enforcing machinery.

Foreign aided scheme—An alround Integrated Fisheries Development Scheme with assistance from NORAD (Norwegian Assistance for International Development) is in operation in the district from 1986-87. The investment of NORAD will be around 80 million rupees. The scheme will help four Grama Panchayats of Sadar C.D. Block. The scheme envisages (1) berthing and harbour facilities at Kasafal fishing base, (2) all-weather road to the fishing base, (3) provision of medical care amenities in the project area (4) improvement of education facilities in the project area, (5) drinking water facility in the project area and also in the landing base (6) technological improvement of fishing gear and craft of the traditional sector.

Under the Bay of Bengal Programme, an organisation of F.A.O. funded by SIDA, twenty non-formal education centres have been established in the coastal fishing villages of the district. Under the said scheme improved trawler gears have been tried at Chandipur

and its successful findings have been passed on to the private sector, as a result of which many private trawlers are now using high opening trawl nets for more catches.

To monitor and execute implementation of the above marine schemes a class I officer of the rank of Deputy Director, Fisheries, is stationed at Baleshwar. He is assisted by one Assistant Director of Fisheries and six Extension Officers. There are 3 Assistant Directors in-charge of three co-operative societies mentioned above.

Inland—Except Nilagiri and Oupada C. D. Blocks, the entire district of Baleshwar is plain and low-lying for which almost every house-hold has a small pond. Though pisciculture is an age-old practice, regular culture on scientific lines was not in practice because technology was not adequately developed and available to the fish farmers. They adopted wild culture and production was as low as 250 kg. per acre per annum, whereas scientific pisciculture proved that production can be at least 600 kg. per acre per annum. The survey report by the Fisheries department has revealed that there were about 4,427 hectares of water area available in 19 C.D. Blocks of the district to take up pisciculture. This area is confined to 23,385 tanks of Grama Panchayats, Revenue department and private persons. The survey also indicates that 3,590 hectares of water area is feasible to take up pisciculture on modern scientific method. Bulk of this water area are in derilict and semi-derilict condition. To adopt scientific pisciculture through modern technology financial assistance for improvement of the water area and for supply of fish seed feed, etc., is necessary. For development of inland fisheries a Fish Farmers Development Agency (FFDA) with World Bank assistance with Collector as Chairman and Fishery Officer of the rank of Assistant Director of Fisheries as Chief Executive Officer was set up in 1977-78. The Chief Executive Officer is supported by five Superintendents of Fisheries, one Assistant Engineer and two Junior Engineers. Its main objects are:

(1) to cover available water area under modern pisciculture practice.

(2) to make available institutional finance to the fish farmers with necessary subsidy from the Agency.

(3) to prepare plan and estimate for renovation and excavation of tanks and to supervise the work through the technical staff.

(4) to impart technical know-how to the fish farmers through the extension agency set up in each C. D. Block.

(5) to train the fish farmers for scientific management of the culturable water area and also to train interested entrepreneurs on induced breeding of the Indian Major carps (Catla, Rohi, and Mrigal) and Exotic carps (Silver carps, Grass carp and Cy. Carpio).

This Agency also monitors family oriented poverty eradication schemes under IRD/ERRP relating to inland pisciculture. By the end of 1985-86 it has given assistance to 7,072 beneficiaries besides covering 1,733 beneficiaries under ERRP and IRDP. 8,543 numbers of tanks covering 2,204 hectares of water area have been covered under scientific pisciculture through FFDA. To supply improved seeds of major carps to the pisciculturists, the department has got three fish-seed distribution centres in the district, viz., (1) Digha fish farm at Baleshwar town, (2) Bhadrak fish seed farm at Bhadrak town, (3) Randia fish farm near Bhadrak town. At present fish seed is supplied at the rate of Rs. 50 per 1,000 fries excluding the cost of packing and transport. The department sells nearly 35 lakhs of fish seed on an average annually to different fish farmers. There are also 8 fish farmers in the district who produce induced bred fish seed to the extent of 30 lakhs for sale to public. Private traders from west Bengal also sell fish fries in the district as the department is unable to supply the demand. The Orissa Fish Seed Development Corporation has established one fish seed hatchery at Sarabhanga, 7 km. from Bhadrak with World Bank assistance. The hatchery started producing fish seed from 1985-86 and it produced about 20 lakhs of fish seed for supply to the different fish farmers in the district. It is projected that this hatchery will produce nearly ten billion of fish seed for supply to different fish farmers of the district and also to the neighbouring districts. The demand of fish fry in the district is around 180 lakhs and with the present available infrastructure facilities the district can produe 135 lakhs of fish seeds. The present inland fish production in the district is around 2,000 tonnes and its approximate farm site value is around Rs. 30 millions.

To monitor and execute different normal and developmental schemes in the inland sector there is one Assistant Director of Fisheries with headquarters at Baleshwar. Each of the 19 C. D. Blocks is provided with one Fishery Extension Officer supported by one Fishery Demonstrator.

Brackish Water—Until recently fishing in brackish water, like fishing in the sea, was confined to capture fishing. Culture fishing in brackish water has assumed great importance in recent years dominantly featured by prawn farming. From the resources inventory survey undertaken by the Department of Fisheries it is estimated that around 17,000 hectares of low-lying brackish water

area is suitable for development of fin and shell fish farming in the state, out of a total resources of 31,618 hectares of such area. The survey indicates that in the district of Baleshwar out of 3,236 hectares of brackish water area, approximately 2,560 hectares are feasible to undertake coastal aquaculture. To develop the coastal aquaculture in the state with emphasis on prawn culture in the low-lying areas close to the sea-shore the State Government have established one Brackish Water Fisheries Development Agency in Baleshwar (SFDA) in the year 1983 with the Collector, Baleshwar, as the Chairman and a Fishery Officer of the rank of Assistant Director of Fisheries as Chief Executive Officer. The aims and objects of the Agency are as follows :

(1) to survey the resources available in the district to take up coastal aquaculture.

(2) select sites for taking up brackish water fish-*cum*-prawn culture through the target group.

(3) to encourage the private parties to take up coastal aquaculture in their own land and also taking lease of the government land. The Agency will select land and fix up entrepreneurs and arrange lease from the Revenue authority.

(4) to organise co-operative society to take up prawn culture on co-operative basis.

(5) to train entrepreneurs and fish farmers in the modern way of prawn and brackish water fish culture, identification of economic varieties of prawn, collection of prawn seed from the natural resources and their transport to the fish farmers.

(6) to select beneficiaries to take up prawn culture with BFDA subsidy and other assistance.

(7) to give overall technical guidance for prawn and brackish water pisciculture.

The Agency has so far helped 165 beneficiaries and developed 60 hectares of water areas for development of brackish water fish, including prawn. Under IRD/ERRP it has also helped 118 beneficiaries to take up prawn culture in 27 hectares of water area and has trained 217 beneficiaries on brackish water aquaculture method in collaboration with MPEDA (Marine Products Export Development Authority), a Government of India undertaking.

## IMPORTANCE OF FOREST IN THE ECONOMY OF THE DISTRICT

Excepting Nilagiri subdivision, there is no natural forest worth the name in the district of Baleshwar. Forest in Nilagiri range chiefly constitutes the species like Sal, Piasal, Asan, Sisoo, Bandhan, Dhaura, Arjun, Gambhari and other miscellaneous species. The important major forest produce of the district are timber and firewood. But considering the size of its population, forest in the district fails to meet the growing demand of the people and the district to a large extent has to depend upon the neighbouring district of Kendujhar especially for timber. However, the role of the forest in sizing the economy of the district can never be ruled out in so far as the local people depend upon the forest for making agricultural implements, house building materials and fuel.

The major items of minor forest produce are the Mohua flower and seed, Sal leaves, myrabolans, tamarind, nux vomica, Sunari bark, tusser, oil-seeds, stone, ballast, chips, etc.

Black granite chips are an important source of revenue as huge quantities of chips are being supplied to the railway. Long term leases have also been granted by Government to the contractors.

Forest generates employment potentialities for the local people. In connection with various forest works, such as, road work, chips cutting, plantation of trees and in other operations like felling, logging, loading and transport of timber, etc., labourers are in great demand by the government as well as by the contractors.

Income accrued in rupees to the district from major and minor forest produces of the district during last four years, i. e., from 1981-82 to 1984-85 is furnished in the following table.

| Year | Timber | Firewood | Minor forest produce including stone quarry | Total |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | [5] |
| 1981-82 | 11,85,566 | 11,94,190 | 1,61,782 | 25,41,538 |
| 1982-83 | 13,72,196 | 4,51,214 | 1,15,075 | 19,38,485 |
| 1983-84 | 44,27,174 | 31,27,501 | 1,45,896 | 77,00,571 |
| 1984-85 | 18,65,850 | 7,97,000 | 1,74,111 | 28,36,961 |

## APPENDIX I

### LIST OF RIVER EMBANKMENTS

| Name of River | Left/ Right | Name of Embankments | Length in km. |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| (A) Baleshwar Irrigation Division | | | |
| (*i*) Capital Embankment | | | |
| Subarnarekha | Left | Flood guard embankment .. | 6·50 |
| Subarnarekha | Left | Bhograi Embankment (from Batagan to Rankatha) | 23·50 |
| | | Total .. | 30·00 |
| (*ii*) Orissa Agricultural Embankment | | | |
| Subarnarekha | Left | Khaljori side Embankment .. | 3·50 |
| Subarnarekha | Right | Darabudhi Embankment .. | 4·50 |
| Subarnarekha | Right | Palapada Embankment .. | 4·50 |
| Subarnarekha | Right | Machharanka Embankment .. | 1·00 |
| Hanskura | Left | Panchupali Embankment .. | 5·00 |
| Subarnarekha | Right | Jamkunda Embankment .. | 3·00 |
| Subarnarekha | Right | Bodas Embankment .. | 1·00 |
| Subarnarekha | Right | Baliapal Embankment ... | 2·00 |
| Jalaka | Right | Mathani-Motasol Jalaka embankment .. | 4·20 |

*(contd.)*

| | | | | |
|---|---|---|---|---|
| Burhabalanga | Left | Dumudo Embankment | .. | 3·50 |
| Burhabalanga | Right | Gabagan Chargachhia Embankment | .. | 4·00 |
| Burhabalanga | Right | Kantabania Embankment | .. | 2·00 |
| Sone | Right | Mohantyparha Embankment | .. | 3·50 |
| Samei | Right | Chudamani Flood Embankment | .. | 2·50 |
| Matai | Left | Road-*cum*-Embankment of Parapokhari cuts | | 16·30 |
| Kansbans | Right | Bedpur Kabirpur Embankment | .. | 6·50 |
| | | **Total** | .. | 67·00 |
| **(B) Salandi Canal Division** | | | | |
| *(i)* Capital Embankment | | | | |
| Salandi | Right | Capital Embankment No. 2, Salandi Right | | 20·00 |
| | | **Total** | .. | 20·00 |
| *(ii)* Orissa Agricultural Embankment | | | | |
| Salandi | Left & Right | O. A. Embankment No. a, b, c, below Rajghat Salandi left and right | | 15·00 |
| | | **Total** | .. | 15.00 |
| **(C) Jajpur Irrigation Division** | | | | |
| *(i)* Capital Embankment | | | | |
| Baitarani | Left | C. E. No. 5 (b) A | .. | 10·00 |
| Kapali and Reb | Right | C. E. No. 4 A | .. | 6·00 |
| | | **Total** | .. | 16·00 |

*(contd.)*

| Name of river (1) | Left/ Right (2) | Name of Embankments (3) | | Length in Km. (4) |
|---|---|---|---|---|
| (*ii*) Orissa Agricultural Embankment | | | | |
| Genguti | Right | O. A. E. No. 10 B | ... | 8·50 |
| Genguti | Left | O. A. E. No. 9 B | .. | 5·50 |
| Genguti | Left | O. A. E. No. 8 B | .. | 4·50 |
| Baitarani | Left | O. A. E. No. 6(a) B | .. | 5·45 |
| Baitarani | Left | O. A. E. No. 6 (b. c. d.) B, Baitarani Left. | ... | 10·50 |
| | | Total | .. | 34·45 |

GENERAL ABSTRACT

| | | |
|---|---|---|
| *(*i*) Capital Embankment | .. | 66·00 km. |
| **(*ii*) Orissa Agricultural Embankment | .. | 116·45 km. |
| (*iii*) Saline Embankment | .. | 175·00 km. |
| (*iv*) Test Relief Embankment | .. | 332·07 km. |

LIST OF SALINE EMBANKMENT

| | | | |
|---|---|---|---|
| (A) Baleshwar Irrigation Division | | | |
| Subarnarekha | Left | Mahasaya Saline Embankment | 1·00 |
| Subarnarekha | Left | Matikencha Saline Embankment | 1·00 |
| Subarnarekha | Left | Bhangamuhan Saline Embankment | 4·00 |

* Capital Embankments have top width of 16 feet.

** Orissa Agricultural Embankments have top width of 12 feet.

*(Contd.)*

| | | | |
|---|---|---|---|
| Subarnarekha | Right | Nangudi Saline Embankment | 2·00 |
| Panchpara | Right | Solpata Bahabalpur Saline Embankment | 14·00 |
| Kantichira | Right | Inchudi Saline Embankment | 6·00 |
| Kantichira | Right | Talapada Saline Embankment | 2·00 |
| Gamai | Left | Aduhan to Mohanpur Saline Embankment | 15·50 |
| Gamai | Right | Chudamani to Bijayapatna Saline Embankment | 22·50 |
| Dhamara | Left | Bijayapatna to Dhamara Saline Embankment | 33·00 |
| | | Baithkola to Choudhury Ghat Saline Embankment | 9·00 |
| | | Total | 110·00 |
| **(B) Salandi Canal Division** | | | |
| Salandi | Left | Parmanandapur to Chardia and Chardia to Haripur Gherry | 39·00 |
| Salandi | Left & Right | Galia guide bank left and right | 8·00 |
| Salandi | .. | Bahu Haripur Road-*cum*-Salt Embankment | 11·00 |
| | | Jantuali Biradia Salt Embankment | 7·00 |
| | | Total | 65.00 |

(*Concld.*)

LIST OF TEST RELIEF EMBANKMENTS

| Sl. No. | Name of the test relief embankment | Length in km. |
|---|---|---|
| (1) | (2) | (3) |
| (A) | Baleshwar Irrigation Division | |
| 1. | Gobaraghat Test Relief Embankment | 0·50 |
| 2. | Rairamchandrapur Test Relief Embankment | 1·00 |
| 3. | Balikbad to Chitimisur Test Relief Embankment | 0·50 |
| 4. | Baiganbadia Test Relief Embankment | 0·50 |
| 5. | Sakhbad Test Relief Embankment | 2·20 |
| 6. | Ektali to Rairamchandrapur | 1·00 |
| 7. | Asti-Purulia Test Relief Embankment | 0·50 |
| 8. | Asti to Radhapal Test Relief Embankment | 0·20 |
| 9. | Goutia-Purulia Test Relief Embankment | 5·00 |
| 10. | Raghunathpur Garsahi, Baliapal Test Relief Embankment | 1·00 |
| 11. | Jataka Test Relief Embankment | |
| | *(i)* Dudhia T. R. Embankment | 2.30 |
| | *(ii)* Sonakhai Test Relief Embankment | 0·35 |
| | *(iii)* Chamkasia Test Relief Embankment | 0·30 |
| | *(iv)* Sapua Test Relief Embankment | 0·30 |
| | *(v)* Ganju Test Relief Embankment | 0·20 |
| | *(vi)* Dara Test Relief Embankment | 0·30 |
| | *(vii)* Bajbaje Test Relief Embankment | 0·20 |
| | *(viii)* Duarsuni Test Relief Embankment | 0·50 |
| 12. | Kasaba Test Relief Embankment | 2·80 |
| 13. | Banktia Test Relief Embankment | 1·00 |
| 14. | Jagannathpur-Kathasagada Test Relief Embankment | 4·00 |
| 15. | Sapaurpur Flood Embankment | 6·00 |
| 16. | Brahmana Sabina Test Relief Embankment | 4·00 |
| 17. | Road on Saline Embankment Bhamna to Bansada | 9·00 |
| 18. | Dhamara to Ranapura Test Relief Embankment | 4·50 |
| 19. | Chaumukha Saline Embankment | 6·00 |
| 20. | Almada and Palbudhi Test Relief Embankment | 1·20 |
| 21. | Badadhandari to Asuridina Test Relief Embankment | 2·75 |

*(Contd.)*

| Sl, No. | Name of the test relief embankment | Length in km. |
|---|---|---|
| (1) | (2) | (3) |
| 22. | Sandandari Test Relief Saline Embankment | 1·00 |
| 23. | Panchpara to Kasafal Test Relief Saline Embankment | 8·00 |
| 24. | Pariskhi Saline Embankment | 3·00 |
| 25. | Bansdiha to Abhana Test Relief Embankment | 2·00 |
| 26. | Salpata-Kasafal Test Relief Saline Embankment on Panchpara Right | 9·00 |
| 27. | Jamakunda to Ikadapal Test Relief Saline Embankment on Subarnarekha right | 6·00 |
| 28. | Ulluda Khalabadia T. R. E. on Subarnarekha Left | 7·00 |
| 29. | Chudamani Suan Test Relief Embankment on Gamai Left, | 6·00 |
| 30. | Chargochhia Balaramgadi T. R. Saline Embankment on Burhabalang Right, | 12.00 |
| 31. | Reb Baiganbadia T. R. E. on Subarnarekha Left | 6·00 |
| 32. | Dakhina Praharajpur Tikayatpur T. R. Embankment on Subarnarekha Right | 10·00 |
| 33. | Patuka Sasan T. R. E. on Burhabalanga Left | 0·30 |
| 34. | Raghunathpur-Bakhadabad T. R. Embankment on Burhabalanga Left | 0·30 |
| 35. | T. R. E. from Chakulia to Ghungi on Sone left | 0·30 |
| 36. | Lakshmannath Pirahat T. R. E. on Subarnarekha Left | 1·50 |
| 37. | Nilda T. R. Saline Embankment, Nilda creek of Burhabalanga | 4·00 |
| 38. | Patnas-Parikhi T. R. Saline Embankment on a creek of Burhabalanga | 4·00 |
| 39. | Sartha T. R. Saline Embankment on right bank of Sartha (Panchpara) | 9·00 |
| 40. | Mahulia T. R. E. on Subarnarekha Right | 1·50 |
| 41. | Sartha T. R. Saline Embankment on Left Bank of Sartha (Panchpara) | 8.00 |
| 42. | Chitimishra to Rela T. R. E. on Subarnarekha Left | 3·50 |

*(Contd.)*

| Sl. No. | Name of the test relief embankment | Length in km. |
|---|---|---|
| (1) | (2) | (3) |
| 43. | Kunduli to Mahapada T. R. Saline Embankment on both sides of Kunduli. | 5·00 |
| 44. | Kuladi to Badadhandari T. R. Saline Embankment on Panchpara Left | 3·00 |
| 45. | Sahada to Agarada T. R. Saline Embankment on left of Baradia creek of Panchpara | 2·00 |
| 46. | Ambo T. R. E. on Right Bank of Ambo Nalla (Tributary of river Kansbans) | 1·00 |
| 47. | Pinchhabania-Khadkhadia T. R. Saline Embankment on left bank of Pinchhabania Nalla (Tributary Panchpara) | 2·00 |
| 48. | Atapur T. R. E. on right of Sapua | 1·00 |
| 49. | Hatinunda T. R. E. on Kansbans Left | 0·25 |
| 50. | Dumuria to Balda T. R. E. Saline Embankment on Burhabalanga left | 1·00 |
| 51. | Raim T. R. E. on Sapua Left | 0·30 |
| 52. | Baharda T. R. Saline Embankment on both sides of Baharda creek of Burhabalanga | 5·00 |
| 53. | Gobardhanpur Kothisahi T. R. E. on Subarnarekha Left | 2·50 |
| 54. | Gadeisagar T. R. Saline Embankment on the left sea beach of Bay of Bengal | 1·75 |
| 55. | Khandia Muhan to Khaparamuhan T. R. Saline Embankment on left of Kantiachina | 3·00 |
| 56. | Sekhbazar to Sekhasarai T. R. E. on Subarnarekha Left | 6·00 |
| 57. | Nuagan Kainfulia T. R. Saline Embankment on both sides of Kainfulia creek of Burhabalanga | 3·00 |
| 58. | Chaulti T. R. Saline Embankment near Hanskura mouth (500 m. from seashore) | 2·50 |

*(Contd.)*

| Sl No, | Name of the test relief embankment | Length in km. |
|---|---|---|
| (1) | (2) | (3) |
| 59. | Ambulkud T. R. E. on Burhabalanga Left | 1·00 |
| 60. | Kalyani T. R. E. on right of Bansa Nalla (tributary Kansbans) | 0·30 |
| 61. | Panchpara to Panchpara-Gochar T. R. saline Embankment on left of Panchpara creek of Panchpara river | 3·00 |
| 62. | Barensing to Kuligan T. R. E. on right of Malanalla (tributary of Kansbans) | 2·50 |
| | Total .. | 206.60 |
| (B) | Salandi Canal Division | |
| 1. | T. R. Embankment on Kaudia Jor left and right | 5·00 |
| 2. | T. R. Embankment on Matei right | 7·50 |
| 3. | T. R. Embankment on Nunajore left and right | 9·50 |
| 4. | T. R. Embankment on Khandha and Kandiapal | 3·00 |
| 5. | Improvement to existing T. R. Embankment from Chandbali to Hengupati via Tintan under Chandbali block | 26·0 |
| | | 50.00 |
| (C) | Jajpur Irrigation Division | |
| 1. | T. R. E. from Karkar to Raghunathpur | 2·62 |
| 2. | T. R. Embankment from Swainpatna to Maninathpur | 4·60 |
| 3. | T. R. Embankment from Athagadia to Arjunpur | 2·67 |
| 4. | Gandhighat T. R. E. from Samalpur to Sundarpur | 7·35 |
| 5. | Podnak Tintar Salt Embankment | 9·00 |
| 6. | Brahmanipal Badabandha T. R. Embankment | 2·00 |
| 7. | T. R. E. from Nadigan to Phalapur | 1·61 |
| 8. | T. R. E. from Mandula to Talastak | 7·32 |

*(Contd.)*

(*Contd.*)

| Sl. No. | Name of the Test relief embankment | Length in km. |
|---|---|---|
| (1) | (2) | (3) |
| 9. | T. R. E. from Ramasukula to Hasnabad | 9·36 |
| 10. | Talastak Gandhighat T. R. E. on Baitarani Left | .. |
| 11. | Hasnabad to Gandhighat L. T. R. E. on Kochila Right | .. |
| 12. | Nadigan-Phalpur T. R. E. on Kandia Right | 2·50 |
| 13. | Tampala-Sorisahi T. R. E. on Reb Right | 2·50 |
| 14. | Kalyannagari T. R. E. on Reb Left | 1.00 |
| 15. | Karanji-Gunupur T. R. E. on Reb Left | 2.00 |
| 16. | Nenjara-Adibundh T. R. E. on Reb Left | 2.00 |
| 17. | Jaguleisahi-Kusuma T. R. E. on Reb Right | 5.50 |
| 18. | Govindapur T. R. E. on Reb Left | 1.00 |
| 19. | Korua T. R. E. on Kapali Right | 1.00 |
| 20. | Sahidnagar T. R. E. on Nalia Left | 1.00 |
| | Total | 65.07 |