

CHAPTER IV

AGRICULTURE AND IRRIGATION

Agriculture is the mainstay of the people of the district. About 75 per cent of the total population of Puri depend on agriculture. Paddy is the principal crop followed by wheat, ragi, pulses and oil seeds. The district also raises more than 50 per cent of the State's total production of coconut. The total net sown area of the district was 4,46,000 hectares during 1973-74, out of which 1,69,000 hectares were irrigated and the remaining 2,77,000 hectares had to depend upon rainfall.

INTRODUC-
TION

Among the allied activities the most prospective ones are forestry, fishing and animal husbandry. Out of these, fishing holds the best prospects for future development both for marine and fresh water fish.

Out of the district's total geographical area of 10,46,000 hectares, 5,28,000 hectares were available for cultivation during 1973-74. Forests covered 2,91,000 hectares. The district has two distinct physiographical divisions, viz., a plain alluvial tract in the south and south-east and a hilly tract to the north and north-west. The river Mahanadi flows on the north-eastern boundary and the small rivers like Daya, Bhargavi, Kushabhadra and Devi traverse the eastern part of the district. The hilly tracts in the west have many hill streams which fall into the Mahanadi finally. The Chilka lake lies in the south-western part of the district.

LAND UTILI-
SATION

The statement below gives a picture of land utilisation in the district in the year 1973-74.*

	(in hectares)
Total cropped area	.. 6,10,000
Net area sown	.. 4,46,000
Fallow	.. 88,000
Forest	.. 2,91,000
Area not available for cultivation	.. 79,000
Other uncultivated land including groves and pasture.	.. 81,000
Cultivable waste	.. 61,000

*Source—Directorate of Agriculture and Food Production, Orissa, (Provisional figures).

LAND DEVELOPMENT

Land Reclamation

Waste land is being leased out every year to landless people for reclamation. These people are also granted loan for this purpose under the Land Improvement Loans Act, Agriculturists Loan Act, and other State aids. This constitutes a part of the accepted policy of the Government to encourage people to cultivate waste lands for growing crop.

Besides the above, reclamation work through Government agencies have been undertaken in some areas of the district. Large tracts of waste land near the Chilka have been reclaimed by the Agriculture Department for the purpose of cultivation. In the irrigated area emphasis is being laid on land levelling, land shaping, drainage and irrigation control for economic use of irrigation water. Besides, huge patches of land adjoining the sea-shore and the Chilka lake are swampy and water logged. These lands need urgent attention for proper utilisation.

Soil Conservation.

The soil of Khurda and Nayagarh subdivisions is red and loamy, and is of laterite origin. The uplands of these areas are subjected to severe soil erosion. On an experimental basis, gully control work was done by the Soil Conservation Unit at Mukundaprasad near Khurda. The project has indicated considerable improvement in soil resulting in increased yield and retention of moisture. Similar soil conservation measures are being extended to other areas of the district. A pasture development centre has been established at Aiginia near Bhubaneswar to demonstrate improved grass cultivation in eroded uplands. Lemon grass cultivation has been taken up over an area of 80 hectares at Niala near Khurda for extraction of lemon oil, which is in great demand for preparation of cosmetics and medicines. For the extraction of lemon oil, 4 distillation units have been established during 1973-74.

For the protection of lands from saline inundation along the sea coast and also in the vicinity of the Chilka lake steps have been taken by the Government since 1915 to cover the entire coastal belt of the district by casuarina plantations, and the implementation of this programme is well under way. The successful casuarina plantation by the Forest Department at Balukhand near Puri, combined with its remarkable financial outturn, served as the main source of inspiration for this scheme. It has been taken up with the purpose to check sand drift, to mitigate the evils of erosion, and to isolate the cultivated lands from the sources of sand by the formation of tree growth on the sand-dunes. Till 1975 an area of about 5,457 hectares was covered with casuarina plantation. In the Chilka area about 786 hectares are covered by casuarina and 43 hectares by cashew-nut plantations. During the period 1971-72 to 1974-75 about 1,080 hectares were covered in the district with casuarina and 4,000 hectares with cashew-nut.

A Soil Conservation Subdivision under an Assistant Soil Conservation Officer was started in this district in 1964. Its main activity was to take up cashew plantation in government waste lands which were exposed to erosion and also in other fallow lands not suitable for cultivation. Puri, Bhubaneshwar, Khurda, Brahmagiri, Begunia and Jatni areas of the district were specially selected for the purpose. About 2,800 hectares had been planted with cashew-nut till 1973-74. The cashew plantation is also undertaken through Community Development Blocks. Recently loans are also given to individuals for cashew-nut cultivation by Land Development Banks and other Nationalised Banks.

Agriculture being the traditional occupation of the people, the farmers of the district were using outmoded production techniques and the cultivation was mostly dependent on the monsoons. Rivers, streams, large tanks and wells constituted the main source of irrigation since time immemorial. In course of time canal irrigation was adopted in some areas. IRRIGATION

Till the end of March 1967, only 25,600 hectares of land received irrigation facilities. In other words, hardly 5.4 per cent of the gross cultivated area was assured of irrigation. Within the next five years there was a considerable improvement and the total net irrigated area stood at 1,09,220 hectares during 1972-73 against the total sown area of 4,62,000 hectares. Thus the percentage of net irrigated area came to 23.50.

The source-wise break-up of the irrigated area in 1972-73 is given below :

Sources	Area in hectares
(1)	(2)
Major and medium irrigation	88,800
Minor irrigation	16,488
Lift irrigation	696
Other sources	3,236

The rapid increase in the area under irrigation has been made possible by the Delta Irrigation system. In this district there are seven branch canals whose distributary net work is spread over the Puri and Bhubaneshwar subdivisions. Khurda and Nayagarh subdivisions are mainly rainfed. There are 162 minor irrigation projects with an ayacut area of 19,206 hectares. Most of these projects provide seasonal irrigation.

The Lift Irrigation Department has installed 63 lift irrigation points in the district. In some points water is lifted direct from the rivers while in most other points water is pumped from tube wells.

The ground water survey and investigation conducted in Nayagarh subdivision revealed that there is immense scope for taking out the ground water resources for irrigation. The topography of Nayagarh and Khurda subdivisions being identical, the expert opinion is that there is similar scope for utilising the ground water resources in Khurda subdivision as well. The Small Farmers Development Agency has proposed to take up the scheme of constructing 12,000 wells, each costing Rs. 2,000 to Rs. 3,000. All these dug wells will be mainly operated by Tenda.

Perennial irrigation facilities have enabled the farmer to go in for double cropping, cultivation of short duration high-yielding paddy, and application of chemical fertilisers. Wheat, groundnut, potato, mustard, maize, jowar in Rabi season; and til, mung, ragi and cowpea in summer are cultivated in these irrigated areas. In the command areas of the minor irrigation projects, lift irrigation points and dug wells, medium duty crops like wheat, mustard, groundnut, til, sunflower, safflower and pea are being grown.

The district has mainly four varieties of soil, viz., saline soil along the coast, a vast area of alluvial soil behind the saline strip, laterite soil in the western part, and a small patch of black cotton soil in the south-eastern part of the district.

Saline soil is found in the sea-coast, around the Chilka and in the islands of the lake. Locally the saline soil is called *lunimati*. During the rains, when the concentration of salt decreases a few varieties of salt-tolerant paddy are grown.

Alluvial soil has its coverage of about one-third of the total area of the district, i. e., about 3,452 square kilometres. It is highly suitable for cultivation. Rice, wheat, sugar-cane, pulses, potato and vegetables are largely grown. Besides, fruit trees like coconut, palm, guava, mango and cashew-nut also grow well.

Laterite soil is found extensively in the forest areas and hilly tracts which comprise Ranpur, Nayagarh, Daspalla and Khandapara areas of the district. This type of soil is not suitable for agriculture.

Black cotton soil, locally called *khalimati* or *kaliyamati* consists of clay mixed with *genguti* or lime concretions. Ordinary *khalia* is black clay with alkaline reactions but does not possess lime concretions. Such soils are found in Bhubaneswar and Banpur areas. It is suitable for cultivation of pulses like *biri* and *mung*.

The red-loam soils in the uplands of the district have developed acidity. It is necessary for these lands to be suitably amended by liming and application of such other materials like rock phosphate, paper mill sludge, basic sludge, etc., to restore its fertility.

The following passage from the District Gazetteer of Puri (1929) throws further light on the nature of the soil and the categories of land available in the district.*

“In an ordinary village the lands fall primarily into three main divisions according to their situation, viz., (1) the low lands retaining rain water and hence called *jala* or wet lands, on which winter rice is grown. These lands predominate in the district and comprise the greater part of the whole cultivated area. (2) The high lands round the village homesteads, which being enriched by manure and household refuse, have a blackish colour and are therefore called *kala* ; they are devoted to vegetables, cotton, and other valuable crops. (3) The riverside lands (*pal*), which being periodically fertilized by deposits of silt are suitable for growing tobacco, sugarcane, mustard, etc. Other common names are *diha*, i. e., homestead land, *gora* or light-coloured land, *nadipatu* or riverside land and *sarpatu* or watery land. There are numerous names again given to different varieties of land according to its composition, colour, etc. Among these may be mentioned *balia matal*, a sandy loam, *chaulia matal*, a friable soil of a brownish colour, *sudh matal*, a muddy soil, *kala matal*, a black fertile soil found in low levels, and *nunia matal*, a soil of a bluish-white colour, found near the Chilka lake, which becomes saltish in the hot weather ; but these names, being chiefly local, are not of great importance.

The main portion of the Khurda subdivision is hilly, but it includes a narrow alluvial strip varying in width from one to three miles, and *zilas* Balabhadrapur and Mughalbandi are entirely deltaic. In *zilas* Khurda and Rameswar, and in part of Dandimal, there are extensive beds of laterite ; but the valleys of *zilas* Dandimal, Khurda, Tapang, Rameswar and Kuhuri, and those in the northern portion of Banpur, are chiefly composed of recent alluvium, consisting of red and brown clays, white, brown and red loams, with more or less sand, detritus and vegetable moulds ; here and there ridges or beds of old alluvium, containing nodular limestone (*genguti*), form the sub-soil, and this alluvium is found in large areas in *zila* Panchgarh and Kuspalla, as also in parts of *zila* Banpur. A portion of the Chilka lake is comprised

*The Ex-State areas of Nayagarh, Ranpur, Daspalla and Khandapara were not included in the district till 1948.

1 Mile = 1.61 km.

within the subdivision, and along its shores are large tracts composed of recent deposits, while the valley of Banpur, extending down to the lake, is composed principally of black Chilka soil. The soil of this valley has been enriched and modified by the silt brought down by the Salia, a small river which flows through a densely-wooded and hilly country. Wherever the waters of the Salia can be taken for irrigation, the soil has become extremely fertile, and yields rich crops of every description. Speaking generally, the soils of Khurda formed of detritus of metamorphic rocks, sandstone and vegetable mould, are for the most part fertile. The great desideratum, however, is water, and if there is a sufficient supply of the latter, even a few inches of soil on the beds of laterite, which cover an extensive area at varying depths, can produce a fine crop of paddy. If, however, the rainfall is insufficient or unseasonable, the paddy rapidly withers and dies”.

CROPS

The principal crops of the district are paddy, wheat, ragi, maize, mung, biri, groundnut, til, mustard, linseed, sugarcane and potato. The important fruit crops are coconut, mango, cashew-nut and banana. Pan (betel leaf) is also popularly grown in the district specially in areas around Puri, Nimapara, Kakatpur, Gop and Balipatna police stations. The area under different crops and their yield rates are given in appendix I

Paddy

Being a tropical coastal area paddy is the predominant crop and is extensively grown in the district. During 1974-75 it covered an area of 3,68,180 hectares and 2,90,670 tonnes of rice was produced, the average yield being 8.9 quintals per hectare. The main paddy producing blocks of the district are Astarang, Begunia, Bolgarh Brahmagiri, Daspalla, Delang, Gop, Kanas, Khurda, Krushna-prasad, Nayagarh, Nimapara, Odagaon, Pipli, Puri and Ranpur.

There are three regular paddy crops, namely, *biali*, autumn, and winter paddy. *Biali* paddy is sown at the commencement of rain, that is, in May and June and harvested towards the last part of September. The autumn paddy is sown in June and harvested in October. The winter paddy, grown in low lands, is sown in June and is harvested in November and December. Cultivation of Dalua or summer paddy is also popular in this district. Its yield is about 50 per cent more than the winter rice due to low incident of pest and diseases. The popular summer paddy varieties are Bala, Annapurna, Kaberi, Pusa 2-21, Ratna, Jaya, IR-8 and Kumar — all high yielding varieties. Besides these, other improved varieties like PTB-10, MTU-15 are also grown. The

traditional summer rice (Dalua) was cultivated in the Samanga Pat near Puri town. Pea and Kusunda were the two popular local varieties of summer paddy till 1967 when they were replaced by other short-duration high-yielding varieties like Annapura, Bala, Kalinga and Ratna.

High-yielding variety paddy has been introduced in the district since a decade. The trial on the suitability of high-yielding paddy was undertaken for the first time in Orissa in 1965 at the Sakhigopal Agricultural Farm with success. Subsequently the varieties like Taichung Native-I and Tienane-3 were introduced in other parts of the State. At present these varieties has been replaced by CR-1014, Bala, Hema, Kumar, Jaya, IR-8, Kalinga, Ratna, Pusa 2-21 and Kaberi. Besides, there are many promising local varieties, viz., Sonakhila, Padmakesari, Kalagiri, Krushna-bhoga and Bankoie and other improved varieties like T-1242, T-90, T-141, T-442 are also being cultivated in this area.

Wheat is the next important cereal crop of the district. During 1974-75 it was cultivated over an area of 3,128 hectares. The production was 2,891 tonnes and the yield was 9.2 quintals per hectare. Out of the total area under wheat cultivation 2,226 hectares were put under the improved varieties giving much more yield than the common varieties introduced earlier. This crop is grown in November after the cessation of monsoons. The high-yielding varieties like, Kalyanisona, Sonalika and Janaka are now popularly cultivated by the farmers of the district. Wheat

Among other cereals grown in the district important are ragi and maize. The area under ragi was 14,221 hectares during 1974-75, the production being 9,118 tonnes and the yield rate being 6.4 quintals per hectare. This crop is grown both in Kharif and Rabi seasons. Improved varieties of ragi are AKP-2 and Dibyasingha. The later variety has been released by the Orissa University of Agriculture and Technology. Other Cereals

Maize was cultivated over an area of 2,570 hectares in 1974-75. The production was 1,225 tonnes and the yield was 4.8 quintals per hectare. The introduction of composite maize varieties, viz., Bikram, Vijaya and Jawhar etc. have helped the cultivators in getting a higher yield by using their own seed stock. An area of 557 hectares was put under high-yielding maize, whereas the common local varieties were cultivated in 2,013 hectares.

The important areas for these crops are Daspalla, Gania, Krushnaprasad and Odagaon for ragi and Bolgarh and Odagaon for maize.

Pulses

Green gram (mung), black gram (biri), arhar and gram are cultivated in the district. The total area under pulses was 1,50,400 hectares in 1974-75. Production was to the tune of 44,599 tonnes with an average yield of 3 quintals per hectare. Among the pulses, mung is the most important covering 86,230 hectares followed by biri, which covered 43,751 hectares in 1974-75. Important areas producing pulses are Banpur, Begunia, Bhubaneswar, Daspalla, Delang Gania, Gop, Nayagarh, Nimapara, Odagaon, Pipli, Sakhigopal and Ranpur. Pusa Baisakhi, a short duration (65 days) mung variety has been introduced in the district. Though an improved strain, Pusa Baisakhi mung is not suitable to the coastal areas and when grown during December to March suffers from yellow mosaic. The Pulse Research Station at Nayagarh has developed a yellow mosaic-resistant mung suitable to grow in coastal areas during Rabi season. The short duration T-90 biri is also popular among the farmers of the district.

Oil seeds

Til, groundnut, mustard and linseed are the major oil seeds cultivated in the district. Among minor crops mention may be made of castor, nizer, safflower and sunflower. During 1974-75, the total area under oil seeds was 24,284 hectares and the production figure was 16,421 tonnes. The yield rate was 6.8 quintals per hectare. Til was the most important oil seed which covered 8,700 hectares. Groundnut was cultivated in 6,962 hectares followed by mustard (4,932 hectares) and linseed (2,516 hectares). Among the improved varieties of groundnut AK-12-24 is cultivated and the short duration mustard variety M-27 is popular in the district.

Besides, a non-edible oil is extracted from *polang* seeds and is exported outside the State for use in chemical industries.

Commercial Crops

Sugarcane, mesta and jute are grown as commercial crops in the district. Cotton and tobacco are also cultivated on a limited scale.

Sugarcane was grown as a cash crop over an area of 3,950 hectares in 1974-75, the production being 32,780 tonnes (in terms of Gur) with an yield rate of 82.9 quintals per hectare. The important sugarcane producing areas are Bhapur, Gania, Khandapara, Nayagarh and Odagaon. Want of permanent sources of irrigation stand in the way of extension of the cultivation of this crop.

Improved Coimbatore canes like Co 881, Co 997, Co 572, Co1053, Co 419 and Co 740 have been introduced in the district. Out of which Co 419, Co 1053 and Co 997 are very popular and cultivated in extensive areas.

Mesta was cultivated in 1,955 hectares during 1974-75 and 9,775 bales* were produced with an yield of 5 bales per hectare. Jute has been introduced since 1970-71 in the irrigated areas and the jute-paddy rotation is gradually becoming popular. Introduced since 1972-73, cotton is grown in both Kharif and Rabi seasons. In the coastal areas, it is grown after the harvest of medium paddy. Only 28 hectares of land was under cotton cultivation in 1974-75, with an yield rate of 1 bale per hectare.

Pan is grown on a commercial scale in the coastal areas of the district. After meeting the local demand, it is exported outside the district in large quantities. The suitable soil required for its cultivation is sandy loam. The land is cleared of all weeds and grass and is ploughed and harrowed. The plants are grown in small ridges, two feet apart, and are planted with a distance of six inches. They are watered regularly and manured with oil cake. A fence of matted reeds is made around the plantation and the roof is covered with reeds. As the plants grow, they are trained up with supports of reed. After eight months the leaves are fit to be plucked.

Pan (Betel-leaf)

The main vegetables cultivated in the district are potato, brinjal, pumpkin, onion, garlic, radish, cabbage, cauliflower and sweet potato. Potato cultivation is gradually becoming popular as a cash crop. It covered 1,367 hectares during the year 1974-75 and 11,130 tonnes of potato were produced with an yield rate of 81.4 quintals per hectare. The popular improved potato varieties are, Jayanti, Chamtakar, Red Khufri and Chandramukhi. Recently, Dewa, a short duration high-yielding variety has been introduced in the district. This variety is highly resistant to blight disease. Important potato growing areas are Balanga, Baliana, Nimapara, Pipli and Sakhigopal.

Vegetables

Fruits like coconut, banana, mango, jack-fruit, guava, and tamarind are popularly grown by the people of this district.

Fruits

Coconut is one of the important cash crops in this district. Out of the total area under coconut plantation in the whole of the State, Puri alone accounts for 45 per cent of the total average. The area covered by coconut plantation was 5,527 hectares during 1974-75. The total production of Puri, in fact, accounts for more than 50 per cent of the State's production. It grows well in the coastal area where the soil and the climate are ideally suited for the plantation of coconut. Big coconut orchards are found in Puri

*One bale—180 kg.

Sakhigopal, Delang, Pipli, Kanas, Brahmagiri, Krushnaprasad, Baliana, Balipatna, Nimapara, Gop. Kakatpur and Astarang.

Banana is another important cash crop. During 1974-75, 1,763 hectares were under banana cultivation. In the low lying irrigated areas of the district its cultivation can be popularised. Besides meeting the internal demand, there is a scope for exporting banana to Europe and the U. S. S. R. Almost every day wagon-loads and truck-loads of banana are being transported to Orissa from Andhra Pradesh. The agro-climatic conditions of the areas around Chilka lake, Banpur, Tangi, and Brahmagiri are quite suitable for banana plantation.

Many landless agricultural labourers of the district depend on fruits like mango, jack-fruit, tamarind etc., for their subsistence and they supplement their income by planting some of these fruit trees even on homestead land. There is also great scope for the plantation of these fruit trees in Nayagarh and Khurda subdivisions. The landscape in these two subdivisions is undulating with the high lands being covered with mango and other fruit-bearing trees. Cashew-nut cultivation is also popular in the district and has got its importance from the commercial point of view. It is successfully grown in the coastal belt and also in many other areas of the district. During 1974-75, it covered 961 hectares of land.

PROGRESS OF
SCIENTIFIC
AGRICUL-
TURE

Agriculture is the mainstay of the people in this district. The farmers, however, are mainly practising subsistence farming as is revealed from their conditions. Only 18 per cent of the total cultivated area is under cash crop. Paddy is the principal crop followed by wheat, ragi, pulses and oil seeds. The district also raises more than 50 per cent of the State's total production of coconut. Improved seeds, fertilisers and pesticides are being distributed among the cultivators. Introduction of high-yielding and short-duration varieties of crops is also an important factor for the progress of agriculture. Cultivators are gradually being inclined to adopt improved methods of cultivation and make use of better seeds, manures and implements.

Consolidation of holdings is another programme by which the State Government hopes to improve the present state of affairs in the agricultural sector. The average size of the holding in this district is smaller compared to the State average, as 70 per cent of the holdings are less than 5 acres (2.02 hectares) in size. The programme has not yet made much progress in the district.

The State Government is implementing a special project to help the small and marginal farmers of some selected areas in the district to move away from their subsistence farming to the level of commercial farming. Puri has been selected owing to the fact that the small and marginal farmers are numerous in this district. In spite of the low percentage of irrigation and dearth of technical and credit facilities, steps are being taken for stepping up agricultural production. The main objectives to be achieved under this programme are to study different problems of the small and marginal farmers and undertake suitable steps for providing irrigation facilities, fertilisers, seeds, proper storage of produce, marketing and credit facilities.

Use of tractors and power-tillers and pumps are increasing. Other plant protection implements like sprayers and dusters are being used by the farmers of the district for applying insecticides. The traditional wooden plough has been replaced by iron plough in many places. Demonstrations in the cultivators' fields are being conducted by the Agriculture Department to convince them about the modern farming methods. The farmers are also given incentive for follow up action and are encouraged through crop competitions.

The age-old wooden plough, ladder, leveller, spade, sickle and several other big and small implements to suit the local condition of soil and crops are in use. But gradually the farmers are becoming conscious and don't hesitate to make use of the improved agricultural implements if they can afford to buy them. The wide use of these implements like tractors etc., is not yet possible in the district due to many unfavourable conditions like scattered condition of holdings, fragmentation of lands, and poverty of the farmers.

Agricultural
Implements

Iron ploughs drawn by local breed bullocks are becoming popular among the cultivators. Local bullock-driven crushers have been replaced by power crushers to some extent. Power-tillers have also become popular and are in use in the district. A few tractors are also in use by some rich farmers. Some cultivators possess their own diesel pumps for irrigation purpose. The number of various agricultural implements in use in the district is given below.*

Wooden plough	..	2,81,525
Iron Plough	..	3,760
Sugarcane crushers (bullock-driven)	..	1,397

*Source—Statistical Abstract of Orissa 1969 pp. 600-601.

Sugarcane crushers (power-driven)	509
Carts (bullock-driven)	84,430
Oil engines	31
Electric pumps and pumps for tubewells	2
Tractors	71
Oil crushers (Ghani)	577

Improved machinery

A few improved farm machineries are being manufactured by the Agricultural Implement Factory, Bhubaneswar, which suit to the local conditions of Orissa. Some of the popular implements manufactured by this factory are given below :-

1. Mould board plough—This is an improved plough made of mild steel plate with hardened share point easily pulled by a pair of bullocks.

2. One row seed drill—This is suitable for line sowing of jute, mustard and ragi seeds. It is a hand operated single row seed drill. By this, seed can be dropped at required depth, distance and line.

3. Wheel hoe—Hand operated interculture implement used for jute, groundnut and paddy crops.

4. Blade weeder—This weeder is of special quality having one blade and some rakes fitted to it. Suitable in both dry and wet conditions, it simultaneously weeds and hoes in row plantings.

5. Garden rake—Useful to remove weed, etc., from vegetable plot. It can be used to separate straw from paddy after threshing.

6. Trench hoe—It has dual advantage over the common spade—on one side of it can work on hard soil for preparation of trenches.

7. Plan hoe—Both sides of it are utilised to pulverise the soil and also for row making.

8. Low lift hand pump—This hand operated pump works more efficiently in comparison to *tenda*, *senā*, etc., up to the limited height of 15 feet. It is more popular due to its easy transportation.

The Agro-Industries Corporation has started a Central Service Unit at Puri where improved agricultural implements, sprayers, irrigation pump sets and allied components, spare parts, electrical fittings and other ancillaries are available for sale. There is a proposal to keep a number of power tillers and tractors in this unit for hire purpose. A number of trained technicians will be posted to this unit. Two more similar units are to be opened at Nayagarh and Khurda for the benefit of local farmers.

The present practice in the district is to grow only one crop, namely, winter rice. On a limited area a second crop is grown where facility of irrigation is available. In this district 82 per cent of the cultivated area are under foodgrains and the rest 18 per cent are under cash crops. So the economic condition of the farmers is not sound due to the fact that large area is under cereals. Yet another method of increasing agricultural production is to introduce rotational cropping patterns which are best suited to the local conditions. Such patterns have been developed for the district by the State Agriculture Department and during the past few years demonstrations have been conducted in cultivators' fields under various schemes. Such demonstrations have a good impact on the cultivators and create initiative for intensive cultivation.

Cropping pattern has been prepared both for irrigated and non-irrigated land in the following manner:—

In the high lands of canal irrigated area, early paddy, jute or mesta are followed by mustard, groundnut or potato. As a 3rd crop sesamum or summer vegetables are cultivated. In medium lands paddy or jute are followed by wheat and Dalua paddy. Sesamum or cowpea are raised as the 3rd crop.

In the high lands of rainfed area, groundnut, ragi, arhar, Pusa Baisakhi, mung, cotton and jute are cultivated as the 1st crop. Groundnut is followed by mustard, and jute by safflower. In partially irrigated areas, potato, ragi, T. 9 biri, or maize are also raised as the 2nd crop. In medium lands jute is followed by paddy. Medium paddy is followed by gram, mustard or linseed.

Timely supply of seeds and fertilisers ensures better yield. The District Agriculture Officers have been specifically instructed to maintain quality control of seeds and fertilisers.

The cultivators take care for the production of quality seeds and seedlings. After harvesting, the crop is dried thoroughly and then threshed. It is further dried in the sun for a few days and then stored. Leaves of some indigenous plants and ashes are mixed with the seeds as a precaution against pest attack. For the preservation of seeds the cultivators also make use of cold storages. In recent years, with the introduction of high-yielding varieties, increased attention is being given to the quality of seeds and seedlings for better production. The nucleus seeds are generally supplied by the Agriculture Department and the Seed Corporation of India. The cultivators also raise their own seeds and collect

by mutual exchange. Quantity of seeds supplied to the cultivators by the Agriculture Department during 1971-72 and 1972-73 is given below :—

Category of seeds	Quantity supplied (in quintals)	
	1971-72	1972-73
Paddy	2,757	1,411
Jute	19	18
Ragi	208	21
Groundnut	608	539
Wheat	231	1,350
Mustard	8	12
Gram	..	26
Dhanicha (green manure)	13	31
Mung	190	11

Manures and Fertilisers

The farmers dump cowdung, refuses of the cattleshed and other refuses from the crop, which form the farmyard manure. Silt of old tanks when dried up in summer is also applied in the fields. The oil-cake of neem, mahua and castor, which are unfit for cattle feed, are also used. With the efforts of the Agriculture Department the farmers are gradually adopting compost as a substitute for farmyard manure. A scheme has been prepared to organise Rural Compost Yard in big villages. The villagers are being given financial aid for compost preparation. Besides, compost is also prepared from water hyacinth. In urban areas the compost is prepared from town refuses and night-soil. In 1972, attempts were made to utilise the weeds of the Chilka lake which are abundantly available on the shore. Successful experiments to prepare quality compost with different added chemicals was made and it is now evident that these weeds can be converted into quality compost. Compost production from various sources during 74-75 is given below :—

	(Figures in tonnes)
Rural compost	5,37,281
Urban compost	851
Compost from water hyacinth	12,607
Compost from Chilka weeds	1,000

Green manuring of paddy fields is also becoming popular. Dhanicha is mainly cultivated as green manure. An area of 28,341 hectares was green manured during 1975-76. Chemical fertilisers are gradually becoming popular among the cultivators of the district. But due to high cost of fertilisers and comparatively less area being under improved seeds and crops, their application has not been adequate. Generally nitrogenous, phosphatic and potassic fertilisers are used. Consumption of chemical fertilisers during the last 2 years is given below :—

	(In tonnes)	
	1974-75	1975-76
Nitrogenous ..	10,136	14,560
Phosphatic ..	2,145	2,305
Potassic ..	985	895

Use of modern insecticides and fungicides were unknown to the cultivators in the past. A number of superstitious practices were being followed by the people to ward off the pest and crop diseases. Leaves, barks and ashes of some indigenous plants with very bitter taste and smell are still being used to prevent pests while storing grains. With wide propaganda and demonstrations the Agriculture Department has been successful to a great extent in impressing upon the cultivators on the modern techniques of agricultural practices. Gradually people have adopted scientific methods to control pests and crop diseases. Insecticides and pesticides along with dusters and sprayers have been stored in Community Development Blocks and also in Grama Panchayats within easy reach of the cultivators at times of need. In 1973, there were about 150 power sprayers, 600 compression sprayers, and 300 dusters available in the district for application of pesticides. Many farmers also keep their own sprayers and dusters. The parasite breeding laboratory at Sakhigopal has been able to release a specific parasite to control the leaf eating caterpillar which is commonly seen in coconut plantations throughout the State.

PLANT PRO-
TECTION

Paddy crop is generally attacked by stemborers, gallmidge, case-worm, jassids and blight. Sugarcane is affected by stemborer and topshoot borer. Potato is affected by blight. Rhinoceros beetle and black headed caterpillar are the two major pests of the coconut plants and bud rot is a serious disease of the coconut palm caused by fungus.

Besides, grass-hoppers, caterpillars and various types of pathogens, such as, bacteria and fungi and virus cause a lot of damage to different crops.

AGRICULTURAL FARMS

There are four seed producing farms in the district located at Sakhigopal, Olans, Daspalla and Khurda. Seeds produced in these farms are supplied to the farmers after proper scientific tests. High-yielding and improved paddy, wheat, pulses, oil-seeds, jute, potato, coconut, barley, maize and vegetable seeds are generally produced. The quantity of seeds of different crops multiplied during the last 2 years is given below :—

Name of Crop	1974-75 (In qtl.s)	1975-76 (In qtl.s)
Paddy	835	1,474
Wheat	201	345
Oil-seeds	68	32
Jute	10	14
Potato	50	60
Coconut (in number)	10,124	12,250
Improved Ragi	51	27
Pulses	34	16

Puri Horticulture Farm

The horticulture farm located at Puri mainly produces grafts of mango, sopeta, rose apple, and seedlings of cashew-nut, lemon, guava and papaya. The popular mango varieties grown in this fruit orchard are Baganpalli, Lat Sundri, Sundri, and Langada. During 1972-73, the farm produced 6,135 grafts.

Deras Seed Farm

The seed farm at Deras, near Bhubaneshwar, is under the direct management of the Agricultural Directorate. Established since 1951-52, the farm produces improved seeds of paddy, wheat, maize, pulses, potato, groundnut and other oil-seeds. The farm has an area of 203.50 hectares, out of which about 98 hectares receive perennial irrigation. A small fruit orchard is attached to this farm which produces banana, mango and pineapple.

Progeny Orchard, Khandagiri

The progeny orchard at Khandagiri has been established on an area of 10.80 hectares. It produces grafts and seedlings of fruit plants like mango, litchi, sapeta, Kagzi lime, guava, pineapple and banana. It is being managed by the Horticultural Development Officer of the Agricultural Directorate.

There is a Pulse Research Station at Nayagarh. Its main activities are to find out new strains of disease-resistant pulse varieties. Different varieties of pulse seeds are also tested in this Research Station to know their suitability for cultivation in the State. The Research Station has developed a yellow mosaic-resistant mung, which is suitable for growing in coastal areas in Rabi season.

AGRICULTURAL RESEARCH STATIONS

Pulse Research Station, Nayagarh

The Coconut Research Station at Sakhigopal undertakes research on different aspects of coconut cultivation in Orissa. Coconut varieties from other parts of India and also from outside the country are being put up on trial to know their suitability for cultivation in the local soil and climate. The Research Station also undertakes experiments on the application of different manures and fertilisers and control of pests. The parasite breeding laboratory attached to this Research Station has become successful in breeding a specific parasite to control the leaf-eating caterpillar.

Coconut Research Station, Sakhigopal

Besides, quality seedlings are produced from specially selected seednuts from the plants of the farm attached to the Research Station and also from selected plants of other coconut cultivators. The Research Station has established two training-cum-demonstration farms located at Konarak and Tangi to educate the local cultivators in improved methods of coconut cultivation.

Research is an integral part of the academic programme of the University. Field research is being carried out through different schemes sanctioned by the Central and State Governments. Each Department of the University is also required to conduct some research on field-oriented problems for the benefit of farmers. Besides the Central Research Station at Bhubaneswar, there are six more research stations under this University located at different parts of the State. Considerable emphasis is being given in the research programmes on crop improvement and dry-land agriculture. Many new strains of rice, wheat and Ragi evolved by the University have been tried successfully in the country. Cultivation of paddy-straw mushrooms on a semi-commercial scale was done by the University and found good consumer acceptance. Growing mushroom is gradually becoming popular in Bhubaneswar and the neighbouring areas. During 1975, about 6,500 bottles of spawns of the mushroom species were produced and supplied to different parts of the State for cultivation. A Cashewnut Improvement Project and a Wheat Improvement Scheme have been started recently at Bhubaneswar under the new research scheme sponsored by the Indian Council of Agricultural Research.

Orissa University of Agriculture and Technology

The main objective of the University Extension Programme is to educate and help farmers to adopt new technology for better production. This also provides opportunities for teachers and students to get themselves acquainted with different field problems. Each Department has a Subject Matter Specialist to help and guide extension activities in the field.

AGRICULTURAL EXHIBITIONS AND SHOWS

Agricultural shows and exhibitions are being occasionally held at different places in the district for the benefit of the farmers and the general public. Farmers training programmes, both in the field and in camps, are conducted by the Agriculture Department to educate the cultivators on advanced methods of scientific cultivation with improved seeds, implements and fertilisers. Multiple cropping demonstrations in farmers' field have created a good impact on the agriculturists. Crop competitions in paddy, wheat, sugarcane and oil seeds are conducted every year and prizes are awarded to successful farmers.

STATE ASSISTANCE TO AGRICULTURE

Cash loans under Agriculturists' Loan Act and Land Improvement Loan Act are regularly given to deserving tenants. The Agriculturists' Loan Act was intended for the purchase of seeds and cattle or for any other purpose connected with agriculture. Later, this loan was also advanced for rebuilding of the cultivators' house damaged or destroyed by flood. Land Improvement Loan is advanced for any work which adds to the letting value of land. The land improvement work includes construction of wells, tanks and other works for storage of water, preparation of land for irrigation, reclamation of land for agricultural purpose, etc.

Besides, to improve the agriculture of the district two specialised agricultural programmes have been started in this district. These are the Intensive Rice Cultivation Programme (IRC) and the High Yielding Variety Programme (HYVP). Under these programmes the State Government has made necessary provision for undertaking multiple cropping demonstrations in farmers' fields. The new delta irrigation system covers 12 Community Development Blocks, for which a Command Area Development Programme is being initiated with the assistance of the World Bank. During the 5th Five Year Plan period a new project called the Small Farmers' Development Agency has been taken up in this district. The Command Area Development would cover all the Community Development Blocks of Puri subdivision except Krushnaprasad and Brahmagiri, and all the Community Development Blocks of Bhubaneswar subdivision except Jatni. The Small Farmers' Development Project covers the remaining area of the district comprising Khurda and Nayagarh subdivisions and the Community Development Block areas of Jatni, Krushnaprasad and Brahmagiri.

Inundations in the deltaic area of Orissa are considered to be a natural phenomena, and as such, there has been a perpetual struggle against nature to protect the populated and cultivated areas from floods and destruction. The construction of embankments on both the sides of the river causes deposit of silt in the bed and in due course the river bed rises and the flood level also rises. At times the embankments give way causing havoc in the vicinity. Another cause of inundation is the variation in the level of the sea which during the south-west monsoon forces in at the bay and at the estuaries, raising the level of water. Tides also affect the variation of sea level. The result is that the flow of water from the river is arrested and the capacity of discharge is reduced. High floods generally occur during spring tides. Another contributory cause is the steady northward drift of the littoral sand-strip which forms sand-bars and sand-dunes at the river mouth. At times the rivers being unable to find direct outlet into the sea either form marshy areas or run parallel to the beach for miles till an outlet is found. This decreases the flood slope and increases the flood limit of the river. Yet another cause of concern for the agriculturists of this district is inundation by salt water. The tracts generally affected are those adjoining the Chilka lake, and those near the mouth of Prachi and other rivers. Here the salt water is forced up by the action of the tides and the winds, and sometimes spread, for miles, over the fields. The soil becomes impregnated with salt, which is only washed out when a fresh water flood comes down the river. The salt may, however, still remain causing poor crops for some years to come.

Droughts are due to insufficient rainfall. The economy of the people of the State is fully dependant upon paddy crop and any adverse condition to the crop upsets the entire economy and causes considerable distress. Where the crop shows deterioration the farmer has neither crop, nor money to purchase food stuffs, nor can he get employment to earn money for the same.

Ravages by famines and scarcity due to frequent droughts and floods, have left their indelible mark in the economic life of the people. Historical records show that Orissa has at various times suffered from terrible famines. The great Bengal famine of 1770 was seriously felt in this district resulting in considerable loss of life. A few years later, in 1774-75, another serious scarcity of food grains occurred due to failure of rains. During 1792-93 the last great famine of the 18th century swept away a large fraction of the population.

Natural calamities which have occurred in this district* since the beginning of the 19th century are discussed below.

Na-anka
(Famine of
1866)

The worst and the most disastrous famine that ever visited the State in the last century was that of 1866. As it happened in the 9th 'Anka' or regnal year of the Raja of Puri, it is called Na-anka. It was so disastrous that its memory is like a nightmare even to those who have heard about it. There are people living now who have heard about the great famine from old witnesses in their early days. The entire population was without food. According to the Famine Commission Report of 1878, one-third of the population or nearly a million persons lost their lives.

Although the famine affected the entire State of Orissa, it was more intensely felt in Puri district. The food production in 1864 was not sufficient to meet the usual demand. The next year, i. e., in 1865 the crops entirely failed due to scanty rainfall. Rainfall during that year was only 36.3 inches out of which 5.2 inches fell in September and that was the last rainfall of the year. There was a deficiency of two-thirds of ordinary rainfall which caused the drought.

From October, 1865, prices began to rise about two and a half times the ordinary rates. Distress appeared with all its virulence. In many places people took recourse to the eating of fruits and roots. G. N. Burlow, the Collector of Puri, had applied earlier seeking permission to institute enquiries into the losses to which the Zamindari Estates were subjected to, but his request was turned down by the Board of Revenue. Another urgent request was made to the same effect at the end of November, 1865, and it too, came to grief. The Collector was informed that there should be no grant or remission and only hopes were to be held out to the Zamindars for aids. On the 25th November the Collector communicated telegraphically that starvation had already started in Parikud and Malud and the number of deaths was on the increase. Destitution prevailed. On the 27th November, the Collector wrote to the Commissioner for immediate aid from Government to save the people from starvation and death. He suggested for the revival of salt manufacture as the only remedy to supplement the income of the people who had been deprived of their livelihood by the abolition of salt manufacture. In December 1865, Burlow visited the distressed areas and did not find a grain of rice in most of the houses. The people told him that they had nothing to eat but weeds. But his proposal to revive salt trade was rejected by

* The present Nayagarh subdivision comprising the ex-State areas of Nayagarh, Khandapara, Ranpur and Daspalia was included in the District on 1st January, 1948.

the unsympathetic Board of Revenue. Relief works were sanctioned with a view to providing employment to the people in distress. The Collector submitted a scheme for road-making on a large scale and recommended to pay wages in the form of food instead of money, and that food-grains were to be imported and stored for this purpose. Grants were made for works in the Cuttack-Madras Road and the Cuttack-Puri Road, but the Government did not agree to the proposal of paying wages in kind.

In January 1866, the matter became clear that rice was not procurable at all. The Collector made a request for sanction of advance to purchase rice which was to be supplied to the labourers. But it was turned down. The Commissioner informed that famine relief work had come to a standstill and sought permission to sanction an advance for the purchase of rice. But Government declined to import rice to Puri and insisted on making payments in cash. With this the correspondence came to a close. No further orders were issued till June. In the intervening period, the Collector did his best to ameliorate the distress, but it was beyond dispute that relief works could not operate due to want of rice to feed the labourers.

In the beginning of May distress became so acute that relief operations could not be left to the unorganised charity of the Mahants. On the ninth day of May, the Collector as Secretary of the Famine Relief Committee appealed for public charity through the Calcutta Press. In response to this appeal generous public sent Rs.1,000 and with this amount the Collector opened a Relief House in the town to feed the straving people with cooked rice. Towards May end Government sanctioned a grant to the Committee and appointed an officer to supervise distribution of gratuitous relief in the interiors. At this time some private trade began with the south and rice was imported from Gopalpur by way of the Chilka lake. The supply depended on imports from ports still further south. Imports came to a stop in the mid-June. The expected ship carrying rice could not reach Gopalpur in time. The situation became critical. The Collector reported that rice was scarcely procurable even to feed the prisoners and appealed the Commissioner to send him a supply from the rice which had been sent by the Government to False Point in order to avert a crisis. The selling price in Puri at this time was six seers a rupee and in June it rose to seven seers a rupee on the renewal of supplies from the south. In the meantime, Government had abandoned their resolution not to import rice. A supply reached Puri on the thirtieth of June. The Collector began to make sales of rice to the public at about eight seers a rupee, but was later forced to raise the price. In effect, selling stopped for sometime.

This was a time of great strain. The quantity of grain which the authorities were able to land at Puri from day to day was so small that there appeared to be no hope of carrying on relief operations continuously. In July rice was selling in the market at less than six seers a rupee and the Collector was compelled to sell at this rate. Each applicant in the town was given rice worth one rupee. In August it was found necessary to stop the sales altogether for a time. The Relief Committee was still able to keep their relief centres in operation, but the misery was aggravated with the advent of flood. At the end of August another vessel arrived with rice and during September relief operations were rapidly extended. The shop-keepers were employed as agents to sell the government rice throughout the district.

Rice from Gopalpur also began to come into the district on private enterprise, but in September the Relief Committee recorded that the class whom they had allowed to purchase rice at sixteen seers a rupee had all become pauper having sold all that they possessed. Therefore, the Committee supplied rice to the destitutes gratuitously and left only those who could pay to purchase at the government shops. In October, another scarcity of rice occurred which compelled the Collector at first to reduce the sales at market rates and afterwards to put a stop to sales altogether. The Relief Committee, however, had stocks in hand and could carry on relief operations at all the centres with the old unhusked rice generously supplied by a Mahant. Import of rice in November, the reopening of Government sales and the appearance of new rice in the market had a marked effect on prices. Coarse rice rapidly fell in price. However, the rate stood at twenty-one seers a rupee. There was a considerable improvement in the condition of people by this time. Gradually the relief centres were closed except in places where the distress was severe. People in those places were given gratuitous relief for several months.

The failure of crops in 1864, the drought of 1865 and the flood of 1866 all combined to make the famine more severely felt in Puri than in any other district of Orissa. By June, the famine had reached its height. It prolonged till August unabated. The mortality had reached its culmination at the beginning of the second week of August when heavy rainfall and storm occurred accompanied with flood. The people were completely wornout. They had no shelter. The stark emaciated crowds fell victims to the cold and rain. Uncooked rice was given at the centre till the end of July. Having no shelter to cook rice and famishing with hunger, they devoured the uncooked rice which brought on fatal bowel complaints. The raw rice was also forcibly snatched away from the weak by the strong. This resulted in the distribution of cooked rice. Regarding the total mortality no

correct estimate has been made. But in October, 1866, it was reported that there was a total loss of 2,10,866 lives in the year of which the major portion must have been due to the famine.

The famine had some unique features. It was a man made catastrophe. Some high ranking British officials of that time were responsible to a great extent for the sudden deterioration of the food supply which occurred in May 1866. T. E. Ravenshaw was the Commissioner of Orissa at that time. Although he was sympathetic towards the people in distress he failed to handle the crisis properly. He did not take steps to import rice from outside. On the otherhand he asked the district authorities not to interfere in the prices and rates at which the grain was being sold. The traders took advantage of the policy of non-interference and rice disappeared from the open market. Moreover, Ravenshaw baselessly believed that there was sufficient stock of paddy in the country specially with the Mahants, the Mahajans and the Zamindars. He was confident that sooner or later the hidden stock would find its way to the open market. Cecil Beadon, the Lieutenant Governor, was no less to blame. He paid a visit to Orissa during the period of famine and had come to Puri. But he did not care to visit the worst affected areas of the district, particularly the strip bordering the Chilka lake where mortality was very high. At Cuttack, he held a Durbar on the 17th February. In his speech, he expressed the opinion that Government should not attempt to mitigate the prevailing scarcity and dearness of food by compelling the dealers of grain to sell their stores at low prices. He said, "If I were to attempt to do this, I should consider myself no better than a dacoit or thief, who plunders his neighbour's property for his own use".* He did not hold any detailed enquiry which must have elicited alarming facts. He attached no importance to the complaints of the people about the severe and widespread distress.

The Board of Revenue headed by its President Groat was no less responsible for the widespread famine of Orissa in 1866. The Board resisted all attempts of importing food grains to Orissa till it was too late.

The wealthy persons and zamindars of the locality could have helped to relieve the distress of the people. But they remained callous to the situation and even the principal residents of Puri refused to come forward with a subscription of rupees one thousand each for a local relief fund.**

*. Utkal University History of Orissa, Vol. VI—P. Mukherjee—p. 367-68.

** Ibid. p. 376.

Flood of
1866

About three hundred square miles remained under water for about five to forty-five days. The water was everywhere three feet deep and at places it was ten feet. The rivers overflowed the banks as the result of which there were fifty two breaches on the embankments. More than four lakhs of people were marooned. Cattle suffered the most. They were carried away by herds in the torrent. A good number of live-stock lost their lives. People took shelter on the roofs and tree tops. When the water subsided the survivors found the homesteads completely ravaged.

The duration of this flood was unusually long, but it was not unique. In 1855 the inundation was deeper throughout the district. With the loss of communication, villages were cut off from each other as also from the surrounding country. All the villages looked like islands in the sea. Boats were the only means of transport to establish connection with the marooned villages.

Famine of
1897

Scarcity of food occurred in the years 1877-78, 1885-86, 1888-89, 1897, 1905, 1918—20, 1933 and 1937. The famine of 1897 was the effect of both flood and drought. The big rivers rose to great heights simultaneously. In most of the places the banks were overflowed and embankments breached. The low-lands remained water-logged for over a month. Crops were completely lost. Extensive areas of land were sand-cast. As the flood subsided, the cultivators tried once more. But all the crops, thus cultivated, were lost to drought. Rainfall ceased after September. The drought was also of longer duration. In effect, the general outturn of crops was quite disheartening, while in some places the crops totally failed. The winter rice on which the people mainly depended received the greatest set-back.

About one-ninth of the total population of the district were subjected to the effects of the catastrophe. About seven tracts scattered in both the subdivisions of the district, viz., Puri and Khurda were severely affected. The worst affected area was the tract around Chilka lake, some areas in Chabiskud and Siraj in Puri subdivision, and Satpara and Balabhadrapur in Khurda subdivision. This tract was exposed to the wrath of nature for its geographical position and physical conditions. Relief measures were necessary here in 1877-78, 1835-36, 1888-89 and again in 1908, 1920, 1925 and in other years of scarcity. With this background, the flood and drought of 1896-97 carried a considerable impact on the famine of 1897.

The rest six tracts, smaller in area were in different parts of the Khurda subdivision. The period of relief was not the same for all the tracts. Relief was required in some parts from February to September

and in other parts from April to July. About two thousand and six hundred people were employed daily in relief works and about two hundred and forty were given gratuitous relief everyday.

The scarcity of 1908 was the after-effect of the flood of 1907 in Puri subdivision following on years of poor crops. In 1919 flood occurred in Puri subdivision mostly in Gop and near the Chilka lake due to heavy rainfall. In the previous year (1918), the crops also were damaged due to early cessation of monsoon. All these accounted for the scarcity that again appeared in 1920. There were again flood in 1925 on the western shores of the Chilka lake and in Gop police station area. It was due to heavy downpour in July. It was recorded that rainfall at Pipli during that month alone was thirty-three inches and at all other stations rainfall was double the normal. In order to cope with the situation relief measures in a limited form were carried on. As the result of heavy rainfall in the upper part of the Mahanadi the delta was in spate. With great difficulty, the local officials and the people saved the embankments by strengthening them. Despite this, there were five major breaches in the embankments maintained by the Public Works Department. A case was reported of a place where the villagers made a breach deliberately to get silt-deposit on their land. This breach caused great damage. Attempts were made to widen the mouth of the Chilka and the Raja of Parikud got another mouth opened, but it soon silted up. The worst affected parts were the villages around Brahmagiri and those lying in between Brahmagiri and the Chilka lake. This tract was affected by drought in the previous year. The other tracts likewise affected were parts of Gop and Nimapara police stations. Gratuitous relief was given to these areas for several months.

Other floods
and Scarcities

During the fourth decade of this century noteworthy flood occurred twice i. e. , in 1933 and 1937. The flood of 1933 was due to heavy influx of water in the Kuakhai. In fact, the Kuakhai feeds the entire river system of the Puri district including the Daya, Bhargavi and Kushabhadra. That year the Kuakhai took vast quantity of the Kathjori flood water. So the first flood occurred in July. It receded after a few days. The damage it did was not striking but it weakened the embankments at several points. The second flood came in August and breached the already weakened embankments at different vulnerable points. By the end of the first week the entire Balianta, Balipatna, Nimapara, Gop and Kakatpur police station areas were overflowed. There were breaches in the Daya and Bhargavi embankments. The Chilka had already swollen. It could not drain out the vast influx of water due to narrow mouth and high tides, as a result of which, it completely inundated the Brahmagiri and Krushnaprasad police

Flood of
1933

stations and the coastal areas of Tangi and Banpur police stations of Khurda subdivision. All paddy crops were entirely destroyed in these areas by the saline water of the Chilka. This flood affected an area of about 1,05,600 hectares in both the subdivisions. The cultivators lost their crops while the labourers lost employment. Although famine was not declared, the conditions that prevailed almost bore the semblance of a famine. Relief was given extensively. The hungry were fed, the agriculturists were given Taccavi loans and the poor families were granted money for repairing and rebuilding their houses.

Flood of
1937

Another series of dangerous floods visited the district in 1937. During a fortnight, between 24th July, 1937, to 8th August, 1937, the district had to stand the onslaught of flood that came thrice successively and two of them assumed such dangerous proportions that they kept the low-lying tracts submerged for over a fortnight. In 1936, there was no high flood, but due to continuous rainfall from March paddy fields in the low lying areas suffered considerable damage. In all, 556 villages were affected by this flood and the number of house-damages was 2,579. Later, a cyclone passed over the district in the month of October and did great harm particularly to the betel plantations and early paddy crops. The trade depression which was still continuing had the effect of yielding only a small outturn for the agricultural produce and the natural calamities, though of lesser magnitude, had badly affected the agriculturists in 1936. For these reasons, though the actual damage caused by the flood of 1937 was probably lesser than that of 1933, the sum-total of the effect was almost the same. Gratuitous relief centres were opened at different places in the district. A considerable share of the relief was borne by non-official agencies. Taccavi loans were granted to the agriculturists with a view to encourage them to raise a second crop before the harvesting season. Indirect relief by way of remission, suspension of revenue and suspension of overdue *taccavi kists* was also given.

Cyclone of
1942

A great cyclone passed over the district in the month of November, 1942. It caused extensive damage to the standing crops, particularly in the coastal and the Chilka areas. Numerous houses were destroyed. The distress was accelerated by the influx of immigrants from Bengal and the north-eastern parts of the country consequent to the prevalence of famine conditions in Bengal and the Japanese invasion of Burma in the same year. It necessitated immediate relief measures. The fishermen of the Chilka coastal villages were also given financial assistance for repairing their nets and boats.

In 1954 there was a general failure of rains in the entire state during the months of July and August. During these months thinning and reploughing of fields sown by broadcasting and transplantation of paddy are done. As a result of failure of rains, the State suffered from acute distress which prevailed in certain areas mostly in the districts of Balasore, Dhenkanal, Keonjhar and Mayurbhanj and in pockets in other districts. This acute distress of drought continued till the last week of August 1955. The intensity of distress was such that the State Government were getting ready to meet any eventuality to avert anything like famine. Flood of 1955

Meanwhile there was an incessant and heavy rainfall in the catchment areas continuing for one week ending on the 4th September 1955. This created unprecedented flood in the principal rivers of the State, the magnitude whereof was so great that the State did not ever have the experience of the kind in their living memory during the preceding one hundred years. The flood-water overflowed the banks of the great river systems of the State. Almost all the rivers of the district were in high flood and before reaching the sea they swept the district.

By this flood, a total of 1,087 villages, 2,66,613 people and an area of 1,18,970 acres of cultivated land in Puri district were affected. The damage was really colossal as evident from the table below :

Subdivision	Villages affected	Population affected	Acreage of cultivation affected	Acreage sandcast
(1)	(2)	(3)	(4)	(5)
Puri Sadar ..	755	2,07,516	1,03,278	1,400
Khurda (including Bhubaneswar).	128	16,325	4,415	..
Nayagarh ..	204	42,772	1,12,77	764
Total ..	1,087	1,66,613	1,18,970	2,164

Subdivision	Houses swept away	Houses collapsed	Houses damaged	Casualties	Livestock lost
(1)	(6)	(7)	(8)	(8)	(10)
Puri Sadar ..	38	2,894	4,194	..	13
Khurda (including Bhubaneswar).	..	16	90	..	..
Nayagarh ..	..	101	2,487	9	18
Total ..	38	3,011	6,671	9	31

1 acre=0.404687 hectare

During this flood communication for about 4 days from the 6th to 10th September was completely paralysed in the affected areas of the district. Roads were completely under water over extensive areas. Even the National Highway between Cuttack and Bhubaneswar was under more than 2 feet of water on the 5th evening and continued to be so for the next 48 hours. As a result of the flood in the rivers Bhargavi and the Dhauria in the Puri subdivision, the State Highway between Sakhigopal and Puri town was also under water for about 2 days. On account of the swiftness of the current of the flood water in almost all the rivers even boat communications could not be established with any place during the first three or four days after the breaches occurred. As a matter of fact, until the 30th September, 1955, some of the pockets where people had taken shelter and were marooned could not be approached. Earlier, movement of trains on the Calcutta-Madras line was suspended as the river level of the Brahmani in Cuttack district and the Bhargavi in Puri district touched the respective railway bridges. Subsequently dislocation in train communication had again occurred due to the cyclone that passed over the coastal regions of the districts.

The unprecedented flood had badly affected the post and telegraph service in the district. Mail communications with a good number of post offices remained interrupted for varying periods ranging between the 2nd September to the 17th September 1955. To meet the situation as well as to restore mail communication, officers of the department proceeded to key stations in order to arrange for the restoration of mail communication. Extra posts were created to look after the disruption brought about by the flood in the service.

Breaches in all types of embankments took place. There were a total number of 206 breaches as shown below subdivision-wise.

Subdivision	Private and revenue embankments	P. W. D., river and canal embankments	Revenue, District Board and private roads	P. W. D. road	Total breaches
(1)	(2)	(3)	(4)	(5)	(6)
Puri	33	10	24	4	71
Khurda (including Bhubaneswar).	8	..	..	..	8
Nayagarh	1	64	59	3	127
Total	42	74	83	7	206

In the face of this grave emergency, Government had practically diverted their machinery to the task of giving immediate relief to the marooned and floodstricken people. The Special Relief Department which was specially created to deal with the drought situation took over the entire responsibility of flood-relief work in the State.

Rescue and emergency relief work immediately after the occurrence of the breaches became the foremost concern of the Government. As the people in the protected areas were quite unprepared for this eventuality and were marooned for about 3 to 4 days in almost all places where breaches had occurred and in many places for about a week without any help from outside, the State Government tried to rush food supplies with the help of boats. Since it was not possible to contact all marooned areas by means of boats, food supplies had to be air-dropped. Food stuffs were airdropped in Kakatpur, Nimapara, Astrang, and Gop areas as those places were inaccessible by boat. 72 relief centres were opened in the district to give gratuitous relief doles to the distressed people. These centres served daily on an average 32,774 persons for the whole month of December, 1955. 337 mid-day meal centres were also opened for feeding the children of school-going age. On an average, 29,611 children were fed daily in the centres. For the facility of supplying food-grains in the affected areas, 217 retail sale centres were opened in the district. For the reconstruction or repair of houses an amount of Rs. 1,49,105 was distributed among 5,235 affected persons as house building loans. Rehabilitation loans amounting to Rs. 2,150 were given to two persons of Nayagarh subdivision.

The old, infirm and physically handicapped persons were given doles in the gratuitous relief centres and the able-bodied persons were provided with employment in various relief works. These were of the nature of labour intensive works mostly comprising of earthwork. During 1955-56, 814 test relief works were taken up providing employment to, on an average, 4,437 persons daily. An amount of Rs. 7,94,993 was spent on these works. 203 drinking water projects were taken up at a cost of Rs. 96,075 in which about 249 persons were employed daily. Besides, 119 projects for repairing the Revenue Department roads were taken up at a total cost of Rs. 2,42,821 and the average number of persons daily employed in these projects was 1,027.

Necessary medical aids were provided for safeguarding the health of the people of the flood affected areas. Health staff and medical volunteers were mobilised. They were sent in batches to different medical zones to carry out mass inoculation, disinfection of water

sources, etc. and treatment of patients at their doors. Puri and Banki flood affected areas were formed into a compact health zone. The health staff visited 773 villages, disinfected 2,789 wells and treated 17 cases of cholera, 1,211 of diarrhoea and dysentery, 3,340 of malaria, 1,004 of influenza and 1,926 of other diseases. They inoculated 70,643 individuals in this zone. Besides the help rendered by the Government, the Indian Red Cross Society, the UNICEF and other philanthropic organisations came forward to render valuable services to the distressed people. Timely veterinary aid and cattle feed were also given to save the surviving animals from the grip of disease and death.

Flood of
1956

In 1956, the monsoon set in earlier and there was heavy rainfall throughout the first week of June. The main rivers of the State with their branches and tributaries were in spate. There were floods more than once in these river systems. Although the flood level did not reach the previous year's level, the damages due to water logging caused by heavy rainfall were considerable.

This flood affected 84,685 people, 461 villages and 54,411 acres of cultivated land. The enormity of the damage caused by the flood of the previous year had almost reduced to half this year. Damages caused by this flood have been shown subdivision-wise.

Subdivision	Villages affected	Population affected	Acreege of cultivation affected	Acreege sand-cast	Houses collapsed	Houses partly damaged	Live stock lost
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Puri Sadar ..	369	72,130	47,215	1,253	202	102	1
Khurda (including Bhubaneshwar) ..	16	1,670	2,020	..	..	16	..
Nayagarh ..	76	10,285	5,176	63	..	..	..
Total ..	461	84,085	54,411	1,316	202	118	1

There had been disruption of communication here and there on account of heavy rainfall and flood. Roads in the lowlands, particularly the fair-weather roads, and Kutcha roads on the flooded areas were disrupted. There were 7 breaches in the Revenue, District Board or private roads, and 1 breach in the P. W. D. road in the Puri subdivision. A total of 7 breaches in embankments occurred in the district, of which 5 were breaches in private and Revenue embankments, and two in P. W. D. river and canal embankments.

During this flood, there was no necessity to reopen gratuitous relief centres in large numbers. In the entire State, there were only 53 such centres. In the district of Puri, 2 gratuitous relief centres were opened in which about 464 persons were served daily. Sixteen mid-day meal centres were revived in the district from April, 1956, in the badly affected areas. These centres served on an average 116 children daily.

The following loans and grants were advanced during 1956-67 :

Loans	Amount	Persons received
(1)	(2)	(3)
Taccavi loans ..	5,29,342	17,116
Land Improvement loans ..	1,53,165	1,417
House-building loans ..	1,88,280	1,451
House-building grants ..	99,765	7,496

The able-bodied persons were provided with various test relief works and were thus employed to earn. As such, a number of 177 test relief works including the incomplete works of 1955-56 were taken up in 1956-57 on which a total amount of Rs. 1,92,883 was spent. On an average, 888 persons worked daily. 177 drinking water projects were also taken up at a cost of Rs. 96,161, out of which 132 were completed. 20 roads were repaired which cost Rs. 27,884.

Flood appeared in the rivers on the 17th July, 1958. The rivers went on rising till the 21st July. On the 19th July flood water was on the point of overtopping the embankments along the Bhargavi and the Kushabhadra. As paddy-fields around the villages were already full with rain water, the flood water added to the volume and entered the villages situated on the unprotected side of the embankment resulting either in collapse or damage to dwelling houses. Onrush of water through the spillways at various places submerged paddy fields of a number of villages even on the protected side of the embankments.

Flood of
1958

According to a rough estimate, 30,496 acres of cropped area were affected by this flood either for being exposed directly to the breaches, or due to water-logging. However, the damage in the major part of the affected area was recouped by transplantation for which the cultivators were given taccavi loans and paddy seeds. An area of 649 acres was sand-cast. There was no loss of life and cattle.

Altogether 400 houses had been damaged in the district, of which 226 houses belonged to only Kakatpur police station. Most of the damage occurred in the villages Baurikana, Bhandisahi etc. which lie between the Devi river and its right embankment. The damage in other police station areas were mainly due to the breaches to which the houses were exposed.

On the 19th July 1958, two breaches occurred in the river embankments-- one on the left embankment of the Bhargavi near Kamasasan in Sadar police station and the other on the embankment of the Kushabhadra near Bisarapur in Gop police station. Both the embankments of Achutpur Nala also breached near Alisibindha in Balipatna police station. Besides this, there were five breaches in private and Revenue embankments and 23 breaches in different roads.

A total number of 1,475 persons were rescued of which 704 belonged to Gop police station, 523 to Kakatpur, and 250 to Sadar police station. In order to enable the cultivators to carry on agricultural operations and to take up transplantation, arrangements for distribution of taccavi loans among them were made immediately after the subsidence of flood. Steps were also taken to grant taccavi loans under Land Improvement Loans Act to the needy cultivators whose land had been sand-cast to enable them to reclaim those lands.

Flood came to almost all the rivers in the district during the second week of September, 1959. Subsequently the rivers Kushabhadra, Devi, Dhanua, Daya, Rana, Kadua and Bhargavi began to swell and overflow the banks. A total number of 846 villages were affected by the flood, cultivation in 81,105 acres of land was damaged and 726 acres of land was sand-cast.

There were 49 breaches in the district during the year. There were 20 breaches in private and revenue embankments, 2 in P. W. D. river and canal embankments, 22 in District Board and private roads, and 5 in P. W. D. roads. Among them, the breach in the left embankment of the Kushabhadra at Bisarapur near Gop was the notable one. This breach made a wide opening and caused widespread devastation to a number of villages in Gop and Kakatpur police stations. This was the second great breach in the State during the year 1959, the first being at Simalda in the Cuttack district.

Not only the cultivated lands were ravaged but the dwelling houses too were extensively damaged. In the whole of the district, 372 houses had collapsed and 1,030 were partially damaged. This apart, the flood took a toll of two lives.

Flood of
1959

In order to cope with the situation, 29 boats were engaged in the district for carrying on rescue and relief operations. Casual relief was given in the badly affected areas.

Relief
Operations

Curative and preventive measures against the spread of epidemics were taken in the flood-hit areas, and 20 health centres were opened under the supervision of 3 health officers and 3 doctors. The Assistant Director of Health, Southern Range, Berhampur had his camp at Nimapara to supervise the health measures. No epidemic, however, broke out.

A severe cyclonic storm which at 1-30 p. m. on the 26th October, 1968 centred in the Bay of Bengal about 250 km. south of Gopalpur in the district of Ganjam, crossed the Orissa coast near Gopalpur and swept over the coastal areas of the districts of Ganjam, Puri and Cuttack at a speed of about 144 km. per hour between the period from the 26th to 28th October, 1968. The storm was accompanied by incessant heavy rain. Rainfall recorded at different subdivisional headquarters of this district during these two days was 427.10 m.m. in Puri, 525 m.m. in Khurda, and 318.60 m.m. in Bhubaneswar.

Cyclone of
1968

The unprecedented rainfall within the short period marooned several villages and took the inhabitants unawares. The rivers and streams and the Chilka lake swelled unexpectedly and quick discharge of water into the sea was not possible due to the high tide which occurred immediately after the rains. Extensive areas therefore remained submerged under 6 to 10 feet of water for a period of one week or so. The cyclone moving at a high velocity and accompanied by torrential rains caused extensive devastation with colossal damage to life and property of the people.

Before normalcy could be restored a second spate of cyclone accompanied by heavy rainfall swept over the area between the period from the 11th to 13th November, 1968 and caused equally severe damages.

Worst damage was done to the Calcutta-Madras National Highway which had been breached at 17 places between Jankia in Puri district and Golanthara near Berhampur in Ganjam district. The railway track from Khurda to Chatrapur had also been severely damaged and in spite of intensive repair work restoration of normal railway traffic on this line was not feasible till February, 1969. Widespread damage had been caused to irrigation projects, embankments, electric transmission lines, telephone lines, etc.

A total number of 2,610 villages in the district covering an area of 1028.50 sq. km. and a population of 7,73,126 were affected. The catastrophe took a toll of 39 human lives. As many as 47,855 houses were damaged or had collapsed. Both the cultivators and the fishermen sustained severe loss. About 91,459 hectares of cultivated land were affected, 2,860 hectares were sand-cast and 85,756 hectares were water-logged. The standing paddy crop was seriously affected by the inundation of sea water, high velocity of the cyclone and long submersion of the paddy plants at a time when it was going to be ready for harvest. The estimated loss of paddy in the district was about 8,14,540 quintals. In addition, the plantations of casuarina, banana, coconut, betel vine, sugarcane, fruit orchards and vegetable gardens were also badly damaged. The fishermen population were adversely affected by this catastrophe which took place at a time when they were making preparations for the fishing season. The estimated loss to the 60,000 fishing population in about 260 villages living on fisheries in the Chilka area was Rs. 70.55 lakhs in the shape of boats, nets, traps and *janos*. Besides, the Government fisheries at Kausalya-ganga, roads, flood embankments, irrigation projects, etc. sustained heavy damage.

Immediately after the occurrence of this widespread calamity steps were taken to rescue the marooned people. Relief in the shape of food and other necessities were given to the affected people and all available resources were pressed into service. House building grant, and grants to the fishermen and the poor betel leaf growers were given who could not rehabilitate themselves without Government help.

Taccavi loans were granted to the affected people for buying seeds and bullocks and for reclaiming the damaged and sandcast lands. Measures were also undertaken by the Health and the Veterinary Departments in the district for the welfare of the people. Labour intensive works, mostly comprising earth works, were undertaken to provide employment to the affected people. Besides, various works of the nature of cyclone damage repairs undertaken by the Government also provided employment to the people.

On account of heavy rainfall in the catchment areas of Mahaandi all the rivers in the Mahanadi system, namely, Daya, Bhargavi, Kushabhadra, Devi, Kadua and their tributaries were in high spate from the 27th July, 1969. The rivers Kusumi, Luni, Joda, Duanta, Kuanria, Malaguni, Salia and the hill streams of Nayagarh and Khurda subdivisions were also in spate. As a result, 1,179 villages with 4,71,043 people were affected. Agriculture in 62016.40 hectares (1.55,041 acres) of cultivated land was damaged.

Flood of
1969

The district was affected by various natural calamities like drought, flood, cyclone, saline inundation, etc. during 1970. Calamities of 1971

Due to continuous heavy rainfall from the 19th to the 21st June, 1971 in Puri, Brahmagiri and Krushnaprasad Blocks, vast extent of cultivable lands were submerged for a long period. The second round of flood came on the 20th July, 1971 which effected areas in Puri, Nayagarh and Khurda subdivisions. The third came on the 10th August in which the water level in Kushabhadra reached the maximum. Almost all the rivers were in high spate.

Even before the flood-afflicted population had time to recover from the debilitating ravages of the repeated onslaughts of the swollen rivers, yet another unprecedented and shattering catastrophe suddenly struck and overwhelmed the people of Orissa. Shortly after the midnight of 29th November, 1971 while the people were all asleep, the coast of Orissa was lashed by a savage and disastrous cyclone which caused great devastations in the districts of Cuttack and Balasore. Its effect was also felt in this district which caused considerable damage to crops and houses.

About 4,53,545 people in an area of 1062 sq. km. (410 sq. miles) were affected. Crops were damaged in 1,01,108.80 hectares (2,52,772 acres). In addition to taking three human lives, the cyclone damaged 62,911 houses in the district. The State Government made all possible efforts to relieve the distress of the cyclone-affected people.

Floods in the rivers of Orissa, particularly in the Mahanadi, had even engaged the attention of the early Hindu kings of Orissa. The stone embankments built to protect the city of Cuttack from the inundation of the rivers Mahanadi and Kathjori about 900 years ago, still remains as a great bulwark of engineering skill. Flood Control Measures

There is a long gap in history which makes it difficult to trace when and how the miles of earthen embankments were constructed at the vulnerable places so as to train the course of rivers in the delta areas. It is believed that some of these embankments existed during the rule of the Hindu Kings and the Marathas.

The Maddox Settlement Report (1900) mentions that the rivers of the Puri district have from time immemorial been restrained within embankments. The total length of embankments existing at the time of the Settlement was about 257 miles. In 1948, the Public Works Department was maintaining 308 miles of embankments in

the district excluding the present Nayagarh subdivision. The total length of embankments in the present district of Puri was 346 miles during 1953-54.

The British Government paid attention to flood control since the middle of the 19th century and implemented various schemes to construct weirs, canals and embankments. Eminent engineers like M. Vishweshwaraya and other experts were approached for advice and flood advisory committees were formed from time to time for recommendation on flood control measures.

An area of 6.878 lakh hectares, mainly in the coastal districts of Orissa, is susceptible to floods and saline inundation out of which the Mahanadi basin alone covers 71,700 hectares of the districts of Cuttack and Puri. Flood protection works are mostly confined to the delta area where damaging floods are frequent. New flood embankments are being constructed every year along with the improvement of the old embankments. After the severe flood of 1955-56, a systematic flood control construction programme has been drawn up for the State with the financial assistance of the Central Government. Besides, the Hirakud Dam Project was executed in 1948 with fourfold objective, viz., flood control, generation of hydro-electricity, irrigation, and to a very minor extent, initiation of preliminary steps for the development of navigation. This multipurpose reservoir on the Mahanadi has been capable to reduce the intensity and the duration of high floods in the coastal districts to some extent. The good effect of Hirakud dam was felt during the severe floods of 1955-56 and subsequent floods. According to the opinion of engineering experts, if all the water had been allowed to pass from Sambalpur, the entire delta region of the districts of Cuttack and Puri would have been a sheet of water including the city of Cuttack during the 1955-56 floods.

A Meteorological Centre has been established at Bhubaneswar since October, 1974 for the issue of all types of weather forecasts for the State of Orissa.

Every day weather forecasting is being done through radio and warnings for adverse weather like thunder squall, heavy rain, hot or cold waves, etc. are given in the daily weather bulletins. The forecast has been of much help for taking timely action to control flood and to protect bridges and dams. Being a coastal State, Orissa suffers from the vagaries of cyclonic storms visiting from the Bay of Bengal. To keep a close watch on cyclonic storms, the cyclone warning unit of the Meteorological Centre issues daily bulletins for Orissa coast, for the guidance of ships plying near the coast, warning for the fishermen

Weather
Forecast

and also to other ports. The public are also warned of the approaching cyclonic storm by repeated broadcasts from the radio. The Meteorological Unit gives data to the Central Flood Forecasting Division for the major rivers of Orissa like Subarnarekha, Burhabalang, Baitarani, Brahmani, Mahanadi and Vansadhara. Precipitation forecast is also supplied to the Hirakud Dam authorities for estimating the flood intensities.

The local breeds of cattle are generally stunted in growth and are poor in quality. Bullocks and buffaloes are employed in ploughing and pulling carts. Cows and she-buffaloes are maintained for milk purpose. Goats, sheep and pigs are reared for table purpose. In the past, a few country-bred ponies were kept by well-to-do people for riding. Poultry birds including ducks are maintained mainly for their meat and the local breeds are very shy layers. During past few decades steps were taken to improve the local breeds of cattle by crossbreeding with Hariyana and Red Sindhi bulls. During recent years Jersey breed has been successfully introduced in the district. Improved breeds of poultry viz., White Leghorn and R. I. R. (Rhode Island Red) have been introduced to improve the local birds.

ANIMAL
HUSBANDRY

The live-stock population (according to live-stock Census, 1972) are given below:

Cattle	..	11,81,380
Buffaloes	..	86,643
Goats	..	1,97,365
Sheep	..	1,34,520
Pigs	..	1,697
Horses and Ponies	..	1,916
Mules	..	128
Donkeys	..	101
Fowls	..	3,07,543
Ducks	..	21,530

The pastures and grazing grounds available in the district are not sufficient for all categories of animals to graze for the whole year. Only the Puri subdivision abounds in grazing lands and the cattle of this area maintain good health. In the forest areas of Nayagarh subdivision and Banpur area in Khurda subdivision enough grass is available during the rainy season. In summer the grass fields dry up in the hilly tracts. The cattle of the district remain underfed during the summer months depending mostly on paddy straw.

Fodder and
Cattle feeds

To substitute the shortage of natural pasture, fodder cultivation has been taken up throughout the district, in 27 Government institutions and also by 38 farmers. Two fodder farms have been started in the district to supply fodder seeds, seedlings and root stocks to interested farmers. The common fodder crops grown are guinea grass, elephant grass, napier grass, para grass, M. P. Chari grass, and barseem. In recent years particular attention is being given to preserve the greens in the form of silage and hay. Silo pits have been dug at some veterinary centres for demonstration.

Agricultural by-products like rice bran, wheat bran, edible oil cakes; and pulses like Biri and Kulthi are commonly used as cattle feed. Premixed cattle and poultry feeds are marketed by a number of private firms and also by the Orissa Agro-Industries Corporation, a State Government undertaking. Besides, the premixed balanced feed is being supplied by the Animal Husbandry Department as subsidy to the poor farmers having graded heifers to encourage rearing of improved breeds.

Milk Supply There were 4,17,813 milch cows and 27,818 milch buffaloes in this district according to 1972 livestock Census. Although the general health of the cattle is good, the daily average milk yield of a local cow and she-buffalo is about $\frac{1}{2}$ to 1 litre respectively. They also remain dry for most part of the year.

In order to regulate the supply of milk at reasonable rate, 9 primary Milk Producers' Co-operative Societies have been organised in some coastal areas of the district. The State Government have provided a share capital of Rs. 2,000 each for marketing the milk collected by these societies. Recently a co-operative milk union has been formed at Puri town with State Government share capital of Rs. 50,000. It has been experienced that the establishment of milk unions and consequent appearance of an assured market for milk creates among the farmers an incentive for the adoption of measures to improve milk yield.

Dairy Farm The Kalyani Rural Dairy Farm is situated at a distance of about 3 km. from Phulnakhra on the Phulnakhra-Niali road. It was established in 1963-64 and is being managed by the Animal Husbandry Department. It maintains 177 heads of cattle at present mostly of Haryana breeds. Besides, three Haryana-Jersey cross and two Murrah buffaloes have been kept in this farm. To upgrade the existing breeds, eight pure Australian Jersey bulls are being maintained in the farm. The average monthly milk production of this dairy is 3,400 litres, which is mainly marketed to Bhubaneswar.

Two *gosalas* have been established in the district located at Puri and Jatni. They are managed by private trustees and the milk produced in these *gosalas* is sold locally.

The production of milk being much less than the actual requirements there is much to be done for dairy development in the district. People in urban areas have to depend upon the unreliable milkmen for their supply of milk. Adulterated milk is sold invariably by these milkmen inspite of the checks exercised by the authorities. There is enough scope for the development of modernised dairy farms near important urban centres like Bhubaneswar, Puri, Khurda, Nayagarh, etc.

Since last 20 years the State Government has started implementing various schemes for the creation of graded cattle of improved progeny, particularly crossbreed animals of exotic species and high-yielding varieties. The breeding is done both by natural process and by artificial insemination. At present there are 9 Haryana bull centres and a Murrah buffalo centre in the district. Artificial insemination facility has been provided in 7 artificial insemination centres and also in 45 veterinary institutions. The crossbreeding is generally done with Haryana and Red Sindhi, the two improved Indian species. In recent years artificial insemination with Jersey breeds has been introduced in the district. This foreign breed has been successfully reared in some other parts of India. Introduction of this high-yielding variety to increase milk production has become popular among the people of this district. Haryana semen is being supplied to the artificial insemination centres from the Semen Collection Centre at Khurda veterinary dispensary and Jersey semen is supplied from Cuttack and also through the Nimapara Collection Centre.

Cattle
Breeding

The goats, sheep and pigs are reared only for meat. The climatic condition of the district is not congenial to the woolly breed of sheep. The local breed of goat yield very little milk, barely sufficient for their kids.

Sheep and
Goats

In order to upgrade the local goats, Betal bucks were supplied to selected villages and were also kept in different veterinary institutions. This practice has now been discontinued. There is a proposal to take up goat development in the district by the Small Farmers' Development Agency during the Fifth Five-Year Plan period.

Poultry

The local poultry birds do not require any special care for rearing and they collect their own food. Being shy layers, these small sized birds are not prized for egg production and are mainly used for table purpose.

In order to improve the local breed by crossbreeding with improved varieties and also to attract local people for keeping poultry for profit, poultry farms and poultry units have been started at different parts of the district by the State and Central Governments.

Poultry Farms

An All India Poultry Development Centre has been started at Pipli since 1958 under the India Poultry Development Scheme. It maintains 100 laying birds of White Leghorn breed. During 1972-73, three poultry units were established at Puri, Khurda and Jatni, each having 100 layers. Eggs for hatching and table purpose are sold from these poultry centres. Besides, a poultry farm has been established at Bhubaneswar under the Intensive Poultry Development Project with a provision of 1,000 layers. It supplies eggs, chicks and adult birds. The Poultry Project at Bhubaneswar looks after poultry units with 300 and 100 layers in and around Bhubaneswar in the private sector. The organisation assists the poultry growers with all extension facilities in supply of chicks, rearing and marketing their poultry and poultry produce.

The organisation has opened a poultry feed analytical laboratory and a cold storage to assist the growers in every respect to make it a regular industry.

Recently custom hatching of duck eggs has been taken up in three centres located at Pipli, Kanas and Beroboi veterinary dispensaries to encourage duck rearing among the local people. So far 25 persons have availed of this opportunity and have received about 800 ducklings.

Central Poultry Breeding Farm, Bhubaneswar

Established at Bhubaneswar in 1959, the Central Poultry Breeding Farm is under the control of the Central Government. It has been established to supply poultry birds of various improved breeds to different States in the Eastern Zone. It rears about 5,000 layers and 10,000 chicks. Improved breeds of White Leghorn, Rhode Island Red, Australorp and Meat Line birds are being maintained in this farm. It produced 5,70,000 eggs and 98,000 chicks during 1973-74. Most of the eggs and table birds are sold locally.

This farm has started a breeding programme to evolve high production strains of poultry.

Pre-mixed balanced poultry feed is being prepared at the government feed mixing centre at Bhubaneswar. The feed is supplied to different poultry farms in the district and also to private poultry keepers. Recently the management of the feed mixing centre has been taken over by the Orissa Agro-Industries Corporation. Besides this, a cattle and poultry feed organisation has recently been established at Laxmisagar near Bhubaneswar, in the private sector.

Poultry Feed
Mixing
Centre

Cattle fairs are held every year during March-April at Hari-raipur and Ghoradia in Delang police station, and at Kantia in Janni police station. Graded cattle of Haryana, Sindhi and Jersey breeds are brought for sale along with the local breeds. About 3,000 animals are transacted in these fairs. Transaction of cattle of the local breeds also takes place in the weekly markets at Bahadajhola, Kantilo, Balugaon, Daspalla, Gediapalli and Gop.

Cattle Fair
and Shows

Cattle and poultry shows are organised regularly by the Animal Husbandry Department to encourage people to possess exotic species.

The common contagious diseases of the cattle in the district are haemorrhagic septicaemia, blackquarters, rinderpest, and foot and mouth diseases. Besides, cattle suffer from diseases caused by different parasites. Haemorrhagic septicaemia and blackquarter generally occur during rainy season. A large number of cattle are infected by foot and mouth diseases. Although cases of mortality are few, it causes a great economic loss particularly to the farmers, as the affected bullocks become incapable for work and agriculture is handicapped. Common poultry diseases are ranikhet and fowl pox.

Cattle and
Poultry
Diseases

Periodical preventive vaccinations are being given for preventing contagious cattle and poultry diseases. The costly vaccine of foot and mouth disease is given only to the graded animals free of cost.

Tables showing number of attacks and deaths from various diseases and number of cases treated in different veterinary institutions are given in Appendices II & III.

There is one veterinary hospital at Puri and 35 veterinary dispensaries at different places in the district. Besides, 69 live-stock aid centres and 24 artificial insemination centres are functioning in rural area.

Veterinary
Institution

FISHERIES

The district has a coast-line of approximately 150 km. and the major portion of one of the biggest brackish water lakes, the Chilka. Besides, inland waters like rivers, swamps, irrigation projects, and tanks are the sources of fresh water fish. The water area of tanks available for pisciculture is 3,244 hectares.

Although the district has a long coastline, it is surf-beaten and is not suitable for the operation of mechanised boats. Sea fishing is done by indigenous method up to a depth of 5 fathom (30 feet). The estuaries and the brackish water areas including the Chilka lake are known for their rich sources of fish supply. These waters maintain optimum conditions for the quick growth and well-being of important food fishes, prawns and crabs. The Chilka lake has an area of 906 sq. km. in summer, and 1,165 sq. km. in the rainy season. A 35 km. long channel called the outer-channel connects it with sea. It receives fresh water from the river Daya, one of the deltaic branches of the river Mahanadi, and several small local streams and Nalas. The prosperity of the fisheries of the lake is dependant on the width of this natural mouth of the lake. Fed by fresh as well as saline water, it supports a good brackish water fishery, but most of the important commercial fishes of the lake are of marine origin. A few fresh water fishes enter into the lake temporarily till the increase of salinity when they either die or are driven back to the rivers. Many of the marine fishes enter the lake in juvenile stage of their life through the outer channel. The lake seems to abound in necessary food materials, which together with the protection of nature, helps in the quick and safe growth of the fishes. Besides the fishes, the lake harbours various types of prawns and crabs of prime economic importance.

The deep sea fishing is done by very few local Oriya fishermen. The settlers from Ganjam and the South called Nolias carry out most of the sea fishing in Puri coast. The fishermen of Chilka belong to different castes, viz., Keuta, Niari, Kartia, Gokha, Kandara, and Tiar, who are all Oriyas. The Nolias live on the sea coast.

Production of marine and inland fishes in the district has been discussed in Chapter-V (Industries).

For fishing during the calm months, the Nolias use the gill nets and the seine nets, and at times make excellent hauls of Chingudi (prawn), Bijram, Chandi (pomfrets), small soles, etc. A kind of herring is also found in abundance. With the shore-seine net the fishermen cannot go far out, as one end of the rope to which the net is attached is left on the beach, where the net is eventually hauled.

With small gill nets or hooks and lines the Nolias go to a distance of 3 to 5 km. in calm weather in catamarans, but their hauls are small. During the prevalence of the south-west wind, when the seine cannot be used, a little fishing is done with gill nets not far from the beach.

In the Chilka lake, fish are caught in the shallow water near the banks from October to November by means of fixed cruives (janas) each of which is over a mile long and several hundred yards wide. Prawns are caught in abundance from January to March in bamboo traps called Baza; and Dhoudi, fixed to screens of the same materials. Prawns are also caught in large numbers during May to July in Khadijal in the lake. In the Janas, the fish that come for shelter and food in the shallow water near the bank, are cut off from the rest of the water, and are kept confined for daily capture until the enclosure dries up and the whole of the fish is caught. This method is much in vogue in the Chilka, a single jana often covering more than a square mile. Another common method of catching fish is the erection of a 'baja' or 'patta', i. e., a screen of split bamboo is set up in shallow water with a small space left in the middle, where a bamboo trap is placed, in which the fish are caught as they go through.

The cast net with iron weight is in common use for smaller catches. It can be worked by one man either from a boat or on foot. It is dexterously whirled over the head and then cast, when it falls in the form of a circle. Drag nets are often used with boats and a good many of them are provided with a purse; one of these nets, the 'barajal', though a drag net, has as its main portion a large pocket, and may therefore also be termed a purse net. For deep-fishing the fishermen use a large net called 'catamaran jal'. One corner of the latter is held by a rope from the catamaran, the opposite corner is heavily weighted, and the rest of the net is kept stretched by means of floats and weights carefully arranged. When a shoal of Kavlā (*Clupea fimbriata*) pass through, many get entangled in the meshes, the floats sink, and the net is drawn up with the fish all hanging by their gills. Among other contrivances are baited hooks. There is a spot close to the Puri beach, which is named Pedraya by local fishermen, where ballast used to be thrown in the days when the ships came in. At this place, lines sixty feet long, are cast from catamarans to catch big bottom fish, two men with four hooks fishing from each catamaran, and using cuttle-fish as bait.

Another ingenious device is the *phand* or noose used at the Nalabana island in the Chilka lake. This is a cord made of fibre extracted from the stalks of palm-leaves. A series of loops of gradually diminishing diameter are made of the twisted fibre, which are joined

at regular intervals by a thin string of the same material. The loops look like tapering bags, which are attached to the reeds just a little below the surface of the water. Fish come to Nalabana through the shallow channels to feed, but having entered the thick reeds, lose their way and make for any openings they can find. Once a fish put its head inside a *phand*, it is unable to recede, and in its mad struggle gets more entangled and is often killed at once.

Improvement
of Pisciculture

The Fishery Department has implemented a scheme to pay 25 per cent subsidy on loans obtained from the banks for renovation of existing tanks and rearing of fish. The Revenue Department have handed over about 2,225 hectares of water area to different Grama Panchayats of the district for pisciculture. But these water resources are now being auctioned by the Grama Panchayats to private persons at a nominal rate, and the expected revenue is lost. Scientific methods of rearing fish has not yet been popular among the people in the district. Modern methods of pisciculture has been adopted only in 8.09 hectares of water area.

In recent years, nylon gill nets have been introduced to replace the traditional nets made of cotton yarn. Nylon nets and different types of synthetic floats are becoming popular.

In order to increase the production of fish from marine resources, a Fishing Co-operative Society has been organised at Puri since 1975. It has been proposed to include more fishermen under the co-operative fold and provide sufficient boats and nets for better production. There is a proposal to have a jetty on the Devi river mouth at Astarang, so that mechanised boats can be put in operation for deep sea fishing. It is worthwhile to mention that recently the specialists of the World Bank visited the lake Chilka and suggested for the establishment of a brackish water demonstration fish farm near Panasapada to demonstrate the modern techniques of pisciculture to the fishermen of Chilka. For the development of brackish water fish farming one Co-ordinated Research Scheme of I. C. A. R.* has started functioning at Keshapur (Ganjam district). This will also help the fishermen of Chilka area.

A rural aquaculture project is being implemented in this district by the Central Government. Six hectares of private water area have been taken up to demonstrate intensive pisciculture near Bira-harekrushnapur and Atharnala area. Besides, a big project for the establishment of a Central Experimental Fish Farm at Dhauli has been started by the Central Government.

*I. C. A. R. - Indian Council of Agricultural Research.

The State Government has started a pisciculture centre at Kausalyaganga near Dhauli. Established in 1957-58, it produces quality fish seeds of Indian major carps and exotic carps by hypophysation, and conducts research on various topics of fresh water pisciculture, viz., intensive fish production by composite fish culture. During 1975, the centre produced about 40 lakhs of quality seeds of Indian major carp species and 8 tons of fish for table purpose.

Pisciculture
Centre,
Kausalya-
ganga

Besides, a training institute has been attached to this centre for imparting training on modern methods of pisciculture to 20 candidates who are given a stipend of Rs. 75 per month. The duration of the training is six months.

The Biological Research Station at Balugaon was established in 1946-47 by the State Government to conduct biological investigation into the fish and fisheries of the Chilka lake. In 1956-57, an investigation Unit of the Central Government (now under I. C. A. R.) started functioning in this Research station and continued the investigation on the fish of Chilka up to 1965.

Biological
Research
Station,
Balugaon

Both the State Fisheries Department and the Central Inland Fisheries Research Institute have conducted survey and research on the biology of migration and changes in the hydrological features of the lake. The research work done so far has given an insight into the breeding grounds, breeding habits and migration of fish etc. to plan for the improvement of the fisheries in the lake.

Established in 1959-60, the Technological Research Station has mainly worked on the manufacture of hydrolysed protein, fish meal, liver oil and canned fish. At present, studies are being carried out on bacteriological spoilage of Chilka fish, chemical composition of Chilka crab, and economic utilisation of trash fishes etc.

Technologi-
cal Research
Station,
Balugaon

The district has nearly 30 per cent of the total geographical area under forest. During 1973, it extended over an area of 3,173 sq. km. The forest comprises 1,627 sq. km. of reserved, 664 sq. km. of demarcated and 882 sq. km. of undemarcated protected forests. The area under forest is mainly concentrated in the Community Development Blocks of Bhubaneswar, Daspalla, Bhapur, Odagaon, Astarang, Balipatna, Gop, Khurda and Khandapara.

FOREST

The forests are intimately connected with the economy of the people. The forest-based industries and forest exploitation works provide employment to a large number of people. The forests serve as grazing ground for the ever-increasing cattle population and also meet the requirement of timber, fire-wood, bamboo, cane etc.

Besides, the forests supply many edible fruits and roots for human consumption. A large number of poor people of the district live on these fruits and roots when they go short of their agricultural produce.

**Forest Pro-
duce**

Timber, fire-wood, and bamboo are the principal forest products. Among the minor forest products mention may be made of canes, kendu leaves, broom grass, sabaigrass, *sunari* bark, and *kuchila*. Besides, non-edible oilseeds like *mahua*, *neem*, *karani* and *polang* are obtained from the forest.

Chief categories of timber available are *sal*, *teak*, *bija*, *bandhan*, *gambhari*, *kurum*, *kongra*, *asan* and *dhaura*. After meeting the local demand a small quantity is exported outside the district. Most of the bamboo forests have been leased out to the Titaghur Paper Mills, Chowdwar.

A few cottage industries like cart-making, basket making, bamboo-mat, date-palm mat, brooms, leaf plates etc. depend on the forest for the raw materials.

Shifting cultivation by burning forest areas was a common practice with the poor people living near the forests. Besides, unrestricted and irregular felling done in the past was also responsible for the rapid deterioration of the forest in the district. Scientific exploitation was gradually introduced since the beginning of the present century to preserve the forest to meet the growing demand of local people and to obtain substantial revenue for the State exchequer. The forest has been discussed in details in Chapter I (General).

The following statement shows the revenue earned from the forest during 1973-74.

	Rs.
Timber ..	39,70,534
Fire-wood ..	4,47,849
Bamboo ..	6,41,637
Kendu leaf ..	24,964
Other minor forest produce ..	1,05,731
Total ..	51,90,715

APPENDIX I

Area, Production and Yield Rate of different crops for the Agricultural year 1974-75*

Sl. No.	Crop	Area (in hectares)	Production (in tonnes)	Yield Rate (Quintals per hectare)
(1)	(2)	(3)	(4)	(5)
1	Rice	3,68,180	2,90,670	7.89
2	Wheat	3,128	2,891	9.2
3	Ragi	14,221	9,118	6.4
4	Maize	2,570	1,225	4.8
5	Jowar	17	7	4.0
	<i>Total Cereals</i>	3,88,116	3,03,911	7.8
6	Tur (Arhar)	1,325	398	3.0
7	Mung	86,230	24,911	2.9
8	Biri	43,751	15,468	3.5
9	Cowpea	174	38	2.0
10	Other Rabi Pulses	18,020	3,604	2.0
	<i>Total Pulses</i>	1,50,400	44,499	3.0
11	Ground nut	6,962	9,276	3.3
12	Til	8,700	4,031	4.6
13	Castor	432	137	3.2
14	Mustard	4,932	1,631	3.3
15	Linseed	2,516	1,006	4.0
16	Nizer	409	123	3.0
17	Safflower	160	96	6.0
18	Sunflower	173	121	7.0
	<i>Total Oilseeds</i>	24,284	16,421	6.8
19	Potato	1,367	11,130	81.4
20	Sweet Potato	251	464	18.0
21	Onion	1,451	2,867	19.7
22	Other (Kharif) Vegetables	16,571	1,00,740	60.7
23	Other (Rabi) Vegetables	15,932	97,481	61.6
	<i>Total Vegetables</i>	35,572	2,12,682	59.8

* Source—Director of Agriculture and Food Production, Orissa.

(1)	(2)	(3)	(4)	(5)
24	Chillies ..	536	446	8.3
	Coriander ..	257	107	4.2
26	Garlic ..	543	456	8.4
	<i>Total Condiments and Spices</i>	1,336	1,009	7.5
27	Mangoes ..	9,900	..	..
28	Bananas ..	1,763	..	..
29	Citrus Fruits ..	412	..	..
30	Papaya ..	290	..	..
31	Cashew-nut ..	961	..	..
32	Coconut ..	5,527	..	..
33	Other fresh fruits ..	552	..	..
	<i>Total Fruits</i>	19,405	..	..
34	Sugar-cane ..	3,950	32,780	82.9
35	Tobacco ..	134	40	3.0
36	Jute *	802	6,282	7.8
37	Mesta *	1,955	9,775	5.0
38	Cotton *	28	28	1.0

*. Production and yield rates in bales of 180 kg. each.

APPENDIX II
Attack and death of cattle and poultry from various diseases (1970-71 to 1974-75)

Year	CATTLE							POULTRY			
	Rinder-pest (2)	Haemorrhagic septicaemia (3)	Foot and mouth disease (4)	B. Q. (5)	Anthrax (6)	Surra (7)	Other parasitic diseases (8)	Total (9)	Contagious and parasitic (10)	Others (11)	Total (12)
1970-71											
Attack	..	9	277	..	..	..	3,852	4,138	1,932	..	1,932
Death	..	8	2	..	..	..	13	23	110	..	110
1971-72											
Attack	..	..	5,446	..	..	12	50	5,508	314	..	314
Death	..	..	..	..	..	2	11	13	143	..	143
1972-73											
Attack	8	6	891	21	..	50	488	1,464	539	278	817
Death	4	4	4	20	..	2	152	186	168	112	280
1973-74											
Attack	..	..	1,026	..	..	11	904	1,941	1,463	..	1,463
Death	..	..	39	..	..	1	37	77	144	..	144
1974-75											
Attack	..	10	988	..	..	..	1,079	2,077	1,236	..	1,236
Death	..	4	33	..	..	..	76	113	159	..	159

APPENDIX III

Cases treated in different Veterinary Institutions during 1970-71 to 1974-75

	No. of Cases treated				
	1970-71	1971-72	1972-73	1973-74	1974-75
Veterinary Hospital and Dispensaries.	46,947	211,443	233,553	235,780	234,531
Live-stock Aid Centres . .	42,175	182,307	190,204	219,081	230,53