CHAPTER - V
AGRICULTURE
5.1 PRELIMINARY CONSIDERATIONS:

An important requirement for planning is the availability of minimum information about the predominant sectors of the economy of any region. Orissa does not have a normal revenue agency with responsibility of collecting agricultural statistics relating to land utilisation, irrigation and estimates of crop output. Unlike many other States, this State has not yet been covered by the systematic cadastral survey. Therefore, Orissa is among the few States in India where agricultural statistics, both in terms of quality and coverage, are not comparable to other States where a reasonable measure of reliability has been achieved for long. The Agriculture Department publishes every year statistics on these aspects. The data are repeated year after year with minor modifications by the officers of the Community Development Department on the basis of personal knowledge and observation, rather than by any systematic record of actual statistics or their verification. Consequently, it is neither possible to ascertain the reliability of agricultural statistics for any given year nor measure changes in these series over a period of time. For instance, in certain districts for some years net sown area plus double cropped area either
exceeds or falls short of the total cropped area. Similarly large areas are shown under tank or well irrigation. But both from personal observation during my tours as well as by checking with the cultivators and the officials of the Agriculture Department and Collectors, it is found that the published statistics indicate higher irrigation than the actual position in case of Western Orissa. The only relieving feature in this field is that area and output under paddy crop, which occupies 45 per cent of the total cropped area in the districts of Western Orissa, are the outcome of systematic crop cutting experiments. This system is being extended to other crops also but so far the results have not been published. In view of this situation it becomes very difficult to assess the impact of development measures on the agricultural economy of these districts. On the same count, it is also equally difficult to plan for the future. Therefore, it is suggested that the State Govt. should take early steps to establish statistical agency on lines similar to those prevalent elsewhere in the country. The discussion that follows in this chapter is based on the statistics supplied by the State Government duly modified and adjusted on the basis of discussions, observations through personal tours and supplementary data collected from various sources.

Area, output and average yield figures fluctuate from year to year depending on the rainfall conditions. For the purpose of analysis, it is, therefore, necessary to select a recent normal year free from droughts or floods. For these districts, the relevant information is available up to 1989-90 and that too not always covering all aspects. But the years 1985-86 and 1986-87 were the drought years when agriculture was adversely affected.
As such these cannot be chosen as the basis for analysis. But the year 1988-89 was free from these abnormalities and accordingly most of the analysis that follows relates to this year.

5.2 LAND UTILISATION:

According to Agricultural Census of India, the land is basically divided into nine categories, viz, (1) forest (2) barren and uncultivated land, (3) land put to non-agricultural uses, (4) cultivated waste, (5) permanent pastures and other grazing lands, (6) land under miscellaneous tree crops and groves, (7) current fallow lands, (8) other fallow lands and (9) net area sown. Of the total reported area in Western Orissa 46.8% lies under net area sown as against the state percentage of 52.6. Land under forest and permanent pasture, tree crops, groves etc. accounts to 23.8%. Agriculture is the main stay of the people followed by forest activities. For Western Orissa nine categories of general landuse can conveniently be summed up into the following three categories;

(1) Cultivable land-net area sown and the fallow (46.8%)
(2) Un-cultivable land-barren and uncultivated land, land put to non-agricultural uses and cultivable waste (23.3%).
(3) Land under natural vegetation-forest, permanent pastures and other grazing lands and land under miscellaneous tree crops and groves (29.9%).

Since about half of the land is under agricultural purpose and the agricultural landuse is an important precondition for any study on agriculture, an attempt is made here to classify the land available for cultivation under the following categories and mapped with its
areal dimensions (Fig. No. 5.2.1).

(a) Highly cultivated area covering parts of Bolangir, Sonepur and Birmaharajpur sub-divisions of Bolangir district.

(b) Medium cultivated area covering Boudh, Titlagarh, Patnagarh and part of Kalahandi sub-division.

(c) Low cultivated area covering parts of Baliguda, and Kalahandi sub-divisions.

(d) Very low cultivated land with forest covering Nawapara and Dharamgarh sub-division.

(e) Less arable land with high forest covering southern forested belt of Western Orissa mainly southern portion of Baliguda, Phulbani, Kalahandi and Dharamgarh sub-divisions with highly dense forest of the state.

This classification and allotment of areas under different categories given here, are on the basis of the records of the Forest Department and Directororate of Agriculture and Food Production of Government of Orissa.

5.3 AGRICULTURAL PRODUCTIVITY:

Agriculture is the mainstay of the population in the three districts of Western Orissa. However, agricultural activity in these areas is much depressed as revealed by low income from land. Thus, the gross value of output per hectare of net sown area in these districts averaged to Rs.1586 in 1988-89, the State average being Rs.1733.
TABLE 5.3.1
Agricultural Productivity in 1988-89

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sub-divisions</th>
<th>Gross value of output per hectare of net sown area (in Rs.)</th>
<th>Gross value of output per agricultural worker (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Balangir</td>
<td>1753</td>
<td>1510</td>
</tr>
<tr>
<td>2.</td>
<td>Sonepur</td>
<td>1812</td>
<td>1582</td>
</tr>
<tr>
<td>3.</td>
<td>Patnagarh</td>
<td>1290</td>
<td>1103</td>
</tr>
<tr>
<td>4.</td>
<td>Titilagarh</td>
<td>1563</td>
<td>1292</td>
</tr>
<tr>
<td>5.</td>
<td>Birmaharajpur</td>
<td>1697</td>
<td>1378</td>
</tr>
<tr>
<td>6.</td>
<td>Kalahandi</td>
<td>1308</td>
<td>1182</td>
</tr>
<tr>
<td>7.</td>
<td>Dharmagarh</td>
<td>1162</td>
<td>962</td>
</tr>
<tr>
<td>8.</td>
<td>Nawapara</td>
<td>1061</td>
<td>957</td>
</tr>
<tr>
<td>9.</td>
<td>Phulbani</td>
<td>1232</td>
<td>1062</td>
</tr>
<tr>
<td>10.</td>
<td>Boudh</td>
<td>1417</td>
<td>1271</td>
</tr>
<tr>
<td>11.</td>
<td>Baliguda</td>
<td>1012</td>
<td>981</td>
</tr>
</tbody>
</table>

Orissa: 1733 1258

Source: District Statistical Handbooks, Balangir, Phulbani and Kalahandi districts, 1989-90.

From the computed data in Table 5.3.1 the areal units (sub-divisions) are grouped into three regions in the class intervals of Rs.1000 to Rs.1250, Rs.1250 to Rs.1500 and Rs.1500 and above on the basis of gross value of output per hectare of net sown area in rupees and the Western Orissa has been devided into three regions as per agricultural productivity, that are, high productivity region (above Rs.1500), medium productivity region (Rs.1250 to Rs.1500) and Low productivity regions (Rs.1000 - Rs.1250) (Fig.No.5.3.1).
Such a low land productivity is due to the fact that cultivation is mainly confined to one season. The average per hectare yields of important crops, though comparable with those for the State, are low in absolute terms. This situation can be explained by adverse physical and climatic factors, absence of irrigation facilities, and prevalence of primitive methods of cultivation.

While in several areas in the country plans are underway for continuous cropping (three to four crops) around the year for the purpose of deriving maximum return from land, these districts normally raise only one crop a year. Most of the cultivation being rainfed is restricted to kharif season. During the rabi season the cultivation is confined to small areas where irrigation facilities are available. Thus in Bolangir and Kalahandi while about 75 to 95 percent of the net sown area is cultivated in kharif season, the cultivation is restricted to as low as 15 to 20 percent in the rabi season. Such an uneconomic pattern of land utilisation is the result of factors discussed in the following paragraphs.

In these districts due to tradition as well as food habits, the cultivators have a great preference for growing rice crop which is mostly cultivated in kharif season. After this crop is harvested, the soils have little moisture left in them for the cultivation of second paddy crop. Wherever assured irrigation is available in rabi season, the cultivators are keen to take a second paddy crop. But since irrigation availability is limited during the rabi season area under rabi paddy is very small.
However, it is possible to grow less exhaustive crops in rabi season even under dry conditions but neither the cultivators have shown much interest in it nor the extension agency has made any serious effort in this direction. Another factor restraining the rabi cultivation is the local practice of allowing the cattle to graze freely in the fields after the harvesting of kharif crop. Due to this practice the few farmers who want to grow rabi crop find it difficult to do so because stray cattle damage the standing crops. This could be prevented either by putting enclosures around the cultivated fields or by introducing the second crop on a fairly wide scale so that every cultivator is interested in keeping the cattle under control.

5.4 CROPPING PATTERN :

In these districts, food crops, which generally yields lower value per hectare compared to commercial crops, are grown on a large area. The cropping pattern shows that rice is the most important crop in all the three districts as in the state. It constituted 53 percent of the gross cropped area in these districts taken together, other cereals and millets covered 4 percent and pulses and other 9 percent (Table 5.4.1). Thus the foodgrains accounted for about two-third of the gross cropped area in these districts. The only commercial crops of some importance grown in this area are oilseeds covering 7 percent of the cropped area. Other commercial crops are chillies, ginger, sugarcane, potato and vegetables. But the area under each of these crops is even much below one per cent of the cropped area (Fig.No.5.4.1).
Preponderance of rice in the cropping pattern of these districts is the natural consequence of the favourable agroclimatic conditions for its cultivation as well as its need for local consumption. Other food crops such as millets and pulses are grown in areas unsuitable for rice cultivation. Area under commercial crops at present is extremely limited because of lack of irrigation facilities and inadequate extension work. The scope for changes in cropping pattern is discussed later on.

5.5 YIELD RATES:

The data supplied by the Agriculture Department suggest that the per hectare yields of important crops such as rice, wheat, gram and sugarcane in these districts are generally at par with those obtained in the State except for maize, potato and groundnut where the district yield levels are lower (Table No.5.5.1). However the reliable yield rates are available only for rice. For this crop, the per hectare yields are around 1,000 kgs. in Bolangir and Kalahandi districts as well as in the State. It is only in case of Phulbani that the average rates are low at 920 kgs. However, these yield rates are the district averages and the actual yields vary widely within the districts depending upon the season, type of land and the soil.

In Orissa, three rice crops are taken in a year, viz., autumn, winter and summer. The autumn crop is sown in June and harvested in September, the winter crop is sown in July-August and harvested in November-December and the summer crop is sown in December-
January and harvested in April-May. Of the three crops winter crop accounts for the maximum area (93%), autumn crop (4%) and summer crop (3%) covering the remaining area. Climatically the winter crop is the most suitable crop in the region and hence its yields are highest (Table No.5.5.2). However, since it is a late crop it leaves little time for a second crop. As regards the type of land, medium and low lands are quite fertile and contain a good deal of moisture. Consequently per hectare average yields therein are considerably higher than those in high lands (Table No.5.5.3). As far as soils are concerned the yield rates are high under alluvial and loamy soils but the rice area under these soils in the three districts is limited. On the other hand, sandy and clayey soils, which account for major area under rice, give poorer yields (Table No.5.5.4). Rice in these districts is cultivated mainly as a rainfed crop, the irrigated area being hardly 10 percent of the total area under rice. The small extent of irrigation available to this crop restricts the use of improved agricultural inputs such as fertilisers. In view of these considerations the present yields of rice in these areas are not bad. However, the scope for improvement of the yields will depend on the extent to which irrigation facilities can be expanded. This in turn would determine the use of fertilisers and high yielding variety seeds. These possibilities are examined later on.

5.6 CROPPING INTENSITY:

Cropping Intensity is indicated by mixed cropping in an area. But the view of number crops raised on a particular area during a year denotes the concept of intensity of crops. For example, raising
of two or three crops on whole of the area is certainly more beneficial to a farmer as compared to raising one crop. Thus "area sown more than once" obviously depicts intensity of cropping. As regards the distributional pattern of intensity of crops in Western Orissa certain features are noteworthy. In Balangir, Sonepur, Birmaharajpur, Titlagarh and Patnagarh sub-divisions the area sown more than once are above 20%, whereas in case of Boudh, and Kalahandi sub-divisions it is between 10 and 20 percent and for Phulbani, Baliguda, Nawapara and Dharamgarh sub-divisions it is less than 10 percent. (Fig. No.5.6.1). The area having more area under "area sown more than once" are situated in the Balangir district with perennial irrigation facilities and fertile soil. The intensity is low in the other areas due to unfavourable relief condition, lack of irrigation facility and improper agricultural extension services.

5.7 CAUSES OF LOW PRODUCTIVITY:

(1) The various sources of irrigation in these districts are Government canals, tanks, wells and other sources (such as springs, lift irrigation from rivers and rivulets, etc.). According to the official statistics, net irrigated area in these districts stood at 128,800 hectares in 1989-90 i.e. 12 per cent of the net sown area. Of this total irrigated area, 55,300 hectares are under canal irrigation which is the only dependable source of irrigation. The remaining irrigation is by tanks, wells and other sources, the water supply from which is precarious. Most of the tanks are in derelict condition and need repair and renovation. Water in most of these sources does not last beyond December. The wells are shallow and
hence water supply from them is limited. After monsoon, as time passes the water level goes down and this reduces the extent of irrigation. After making proper assessment of the condition of these sources and taking into account the extension of canal irrigation during 1986-87 and 1988-89, it is estimated that the net area irrigated from dependable sources would be about 90,300 hectares in 1988-1989. This amounts to only about 9 percent of the net sown area. Most of this irrigation is confined to kharif season and that too for paddy cultivation. Thus nearly 91 per cent of the cultivated area is purely rainfed.

(2) By way of fertilisers the only input in use in these districts is the farm yard manure but its quantity is inadequate. The use of commercial fertilisers is limited to the canal irrigated area, mainly for paddy. As against the consumption of two kgs. of nitrogenous fertiliser per hectare of gross cultivated area in the State, the average for these districts is as low as 0.4 kg. Except in a few area and in case of some progressive farmers the use of commercial fertilisers, green manuring, pesticides, improved implements, etc. is practically unknown in these districts. In view of such backward techniques and low irrigation, the existing level of yield rates of various crops could not be called very unsatisfactory.

(3) Agriculture in these districts is also adversely affected by the problem of soil erosion which is quite serious in certain areas, particularly in the uplands. The land surface in these
districts being largely undulating, the soils are subject to severe erosion specially under the erratic and intense rainfall conditions obtaining in the region. Faulty farming practices such as cultivation along the slopes and absence of vegetal cover crops further accelerate the soil erosion. Since these districts have a large number of rivers and rivulets, stream bank erosion is widespread down below in the alluvial basin. It is caused by the cutting of the bank due to discharge of run-off into it from the adjoining lands. Extension of farming till the stream edges, clearance of fringe forests and uncontrolled grazing on the stream bank lands are additional factors. This type of erosion is particularly severe in M. Rampur, Karlamunda Bhawanipatna and Khariar blocks of Kalahandi district.

(4) The practice of shifting cultivation, locally called as Podu Chasa, which is widely prevalent among tribals, also causes soil erosion. The areas affected by it are Lanigarh, M. Rampur, Thyamul Rampur, Karlmunda, Jaiptna, Kalampur, Momna and Nawapara blocks in Kalahandi district and Khondmala sub-division in Phulbani district. This practice consists of cleaning patches of permanent vegetation in sloppy lands to cultivate field crops for one or two seasons and abandoning these lands. Because of the steep slopes, the bare soils get quickly washed away and within a few years the land becomes unfit for cultivation.

(5) So far no detailed survey about extent and intensity of soil erosion in these districts has been undertaken. Using the other available information from various sources it is estimated that
in Bolangir district though the area subject to soil erosion is about one-half of the cultivated area, the problem is not as acute as in the other two districts. In Kalahandi and Phulbani districts soil erosion has affected much larger area and the intensity is also greater. To meet this problem the State Government initiated a few schemes of soil conservation during the Second Plan period and further intensified them in the Third Plan. Till the end of 1989-90 an area of about 8,000 hectares has been covered by this programme in the three districts. However, if the land is to be protected from further erosion, steps will have to be intensified in this direction in the near future.

5.8 FOOD POSITION:

In the years of normal rainfall, these districts are surplus in respect of foodgrains. But during drought years this surplus becomes very marginal and in some of these years the districts may have even deficit. In 1989-90, which was comparatively a good year, in Bolangir and Kalahandi districts per capita per day production of rice was 718 grams and 732 grams respectively. Another indicator of food position could be the estimate of surplus after allowing for normal human consumption and for seeds, cattle feed, etc. On this basis using the norm that the adult requirement of cereals in 425 grams per day, these districts had a surplus of 200,000 tonnes of foodgrains, i.e. 26 per cent of the total production in these districts fluctuates widely from year to year depending upon the quantity of rainfall and accordingly the extent of surplus or deficit also varies. For examples, in 1965-66, a drought year, these
districts had a deficit of about 20 per cent of their total foodgrain requirements.

However, the assumptions regarding the consumption requirement for these districts may be slightly on the high side because of the peculiar food habits of the tribals. These people have not yet developed the habit of cereal consumption and live mostly on fruits, roots and meat. For example, in Phulbani, though the per capita production of rice is much lower than in other districts, the tribal people prefer to sell their rice for buying their other requirements. Thus even at a lower level of production, the district has a surplus in a normal year. Even in respect of the other two districts, the actual consumption of pulses may be less than the norm assumed and hence the deficit might be less than that shown in Table 5.8.1.

5.9 **FINDINGS AND RECOMMENDATIONS**:

In the earlier paragraphs, it has been pointed out that the major limitations of agriculture in these districts are utilisation of land confined to only one crop in a year, heavy but erratic rainfall, low irrigation, poor soils and undulating the rain causing soil erosion. Even under the planning efforts, adequate measures have not been undertaken to tackle these problems so far. Consequently, agriculture has remained static for long. Though in normal years the districts yield some surplus in foodgrains it is not enough to make up the deficiency of the drought years. Further, since only small proportion of the cultivated area is under commercial crops
such as oilseeds, sugarcane, spices, etc. little cash income accrues to the farmers. Such a static agriculture unsupported by any worthwhile industrial activity is responsible for the backwardness of this region.

It is, therefore, obvious that if the economy of the region is to be activated, serious attention will have to be given to the development of agriculture on right lines. This becomes all the more necessary, since possibilities for industrial development are limited. Further, even whatever industrial possibilities exist, many of these are depended on agricultural development.

Agricultural planning in our country normally starts with emphasis on irrigation followed by the intensive use of appropriate inputs. In such a planning the needs and potentialities of rainfed areas, which incidentally cover a very large part of the cultivated land in this country, have not received due attention except in a few cases here and there. In respect of these districts the exploitation of irrigation potential which is limited would, at the most, create prosperity in small patches thereby leaving vast areas unaffected. Therefore, in these districts where bulk of the agricultural land will continue to depend on rainfed conditions, agricultural planning has to be geared to the peculiar requirements of this region. This would primarily involve the introduction of a new cropping pattern. To achieve it a fresh orientation of the extention services in this region as well as the research organisation in the State will be needed.
In the following paragraphs, elevation of land, soil and climatic conditions which have a predominant influence on the agriculture of these districts are discussed. This is followed by an assessment of development potential in these districts. In addition, a suggested programme of development over the next five years (1989-94) on the above pattern is presented. However, this only endeavours to give broad guidelines, the details thereof will have to be worked out by the State Government.

(1) The land in these districts is highly uneven and undulating comprising hills, plateau, valleys and plains with varying slopes. All or most of these categories of land are found even in each sub-division of these districts, though in different proportions. For settlement purpose, the agricultural land in these districts, in the rest of the state, has been classified into four broad divisions (i) 'At' lands lay at the highest of the slope and usually not bunded (ii) 'Mal' lands lay high on slope next to 'At' land which are poorly bunded or not bunded (iii) 'Berna' lands lay along the main surface drainage which are well bunded, and (iv) 'Bahai' lands are the low lying lands on the main surface drainage which are well protected by bunding. Of these four categories 'Bahai' and 'Berna' lands are more fertile and hence more suitable for paddy cultivation. The soil in 'At' and 'Mal' lands are shallow and most of these lands being unbunded are subject to soil erosion. These are suitable for light crops such as pulses, millets, oilseeds, etc. According to the current practice even 'At' and 'Mal' lands, which are not suitable for paddy
cultivation, are used for this purpose. Consequently, the average yields of paddy in these lands are low. It is, therefore, necessary that the future cropping pattern should be adjusted to the suitability of various land categories having different elevations.

(2) Systematic information about soils in these districts and their nutritional characteristics is not adequately available. Since soil is one of the key factors determining the cropping pattern and input use it is suggested that a detailed soil survey be conducted in these areas on scientific lines. The available information indicates that the soil in these districts vary widely depending on the conformation of surface. At one extreme the mountain peaks have bare rocks hardly permitting vegetation, the hill slopes have loamy but rocky soil while the plains and valleys have rich deposits of alluvial soil. Major part of arable land in these districts contains mixed red and black soil which are generally deficient in nitrogen, phosphoric acid, humus and lime in varying quantities. The black soil is suitable for rabi crops like wheat and pulses. Except in high lands and steep slopes these soils have sufficient depth which enables them to respond well to irrigation and fertilisers. In particular, the more promising areas in these districts are the Mahanadi-Tel Basin in Bolangir district, plains of Nawapara sub-division in Kalahandi district and riverine plains of Boudh sub-division in Phulbani district.

(3) Judged by the total amount of precipitation, these districts, with 152.4 cms. per year, fall in a high rainfall zone.
Most of the rainfall is concentrated in four months from June to September. Ordinarily this quantity is adequate for fairly good agriculture in kharif season and for light crops in the rabi season. However, long spells of drought during the rainy season and wide variations in the quantum of rainfall from year to year cause frequent failure of crops. Though these districts show surplus in foodgrains in normal years, widespread famine conditions have prevailed from time to time as a result of recurrent droughts. Therefore, it appears that the development of irrigation should assume high priority for these districts. However, as irrigation potential is limited, attention has to be given to the introduction of measures which could conserve moisture in the soil and also to the selection of light crops which could be grown under unirrigated conditions. These are discussed later on.

(4) In 1988-89, the net sown area in the three districts is estimated at 1.05 million hectares. In addition, 113,000 hectares are under cultivable waste and another 142,000 hectares as fallows. Under the soil conservation programme the land subject to soil erosion is being treated at present. Though much of the land covered by this programme is agricultural, some adjacent patches forming part of cultivable waste are also likely to be reclaimed for cultivation. On the basis of this programme it is estimated that about 11,000 hectares forming part of cultivable waste at present will be brought under cultivation by 1993-94. So far as the fallow land is concerned, there has been a continuous decline in its area over the past years. Expansion of irrigation in new areas and introduction of light crops
in rainfed areas would further reduce the area under fallows. Accordingly, it is estimated that about 26,000 hectares would cease to be under this category. As a result of such a change in land utilisation, the net sown area is expected to rise by 31,000 hectares by 1993-94.

(5) Apart from the small increase in the net sown area, the major addition to the cultivated area should come through intensive cultivation. As stated earlier, according to the current farming practices in these districts, the cultivation is confined to the rainy season. Winter paddy which is the main crop in this region is harvested in December after which very little area is cultivated. There are several reasons for such a practice. Firstly, it is said that the moisture left in the soil after the first crop is not adequate for a second crop to mature, secondly, the paddy crop is harvested by cutting the grains from the top portion of the crop thereby leaving the paddy straw in the field and thereafter villagers let their cattle loose in paddy fields for grazing. Thus the cattle menace during the winter months stands in the way of enthusiastic cultivators to grow rabi crops. Such a practice is particularly favoured by big cultivators who have large herds of cattle. Often they have deliberately let their cattle graze the winter crops of other cultivators and sometimes even the Government agricultural farms. Thirdly, because of the consumer preference for rice, the cultivators like to grow paddy crop in the rabi season. But since it needs a lot of water, it is not possible to grow it as a second crop under
unirrigated conditions. Although the above reasons explain as to why the cultivators are not inclined to sow a second crop, these arguments are not strong for continuing the existing practice. As a matter of fact, if the economy of these districts is to be energised, it is imperative that every effort should be made to introduce a second crop in the region. Taking into consideration the soil, climate and the physical features, it is possible to grow several crops as a second crop in the region as discussed below.

As regards the practice of allowing the cattle to graze in the paddy fields, this is a social problem. The paddy straw hardly lasts for about two to four weeks. As such it would be preferable to cut the entire straw to be used for stall feeding as is the practice prevalent in several parts of the country. Through extension work is should be possible to convince the cultivators to change their present practice. There is already a Cattle Trespass Act which prohibits the grazing of cattle in the fields of others, but it has not been enforced effectively. It is, therefore, suggested that the Act should be enforced strictly so that the cultivators are able to grow a second crop proper fencing of the fields would be another method by which the cattle should be kept away.

So far as the choice for introducing crops in the rabi season is concerned, several drought resistant varieties have been evolved which could give reasonable yield under rainfed conditions. Even the local crops such as moong, black gram, niger, til, peas, khasari and castor are already being grown in small areas as a second crop.
Therefore, they can be extensively introduced in similar other areas. The Indian Agricultural Research Institute has evolved a short duration castor mutant which takes 150 days to flower as compared to about 250 days for local varieties. This variety has the advantage of doing well both under drought periods as well as in favourable seasonal conditions though under the best irrigated conditions the yield can go as high as 3,000 to 4,000 kgs. per hectare. However, under drought conditions the yield of this new variety could be expected much more than the existing yield which is merely 200 to 300 kgs. per hectare. Even at a modest estimate the gross value of castor could be around Rs.300 per hectare. It may be further pointed out that the cost of cultivation of castor crop under rainfed conditions is practically nil except for human labour which is available in plenty during the rabi season. Apart from growing castor as a field crop, it can also be grown during the rainy season on the borders of the fields where with proper fertilisers the yield could substantially be raised.

For introducing a second crop two steps should be taken. First, extension work will have to be done on a very large scale for convincing the cultivators that a second crop is possible in these areas. The extension agency should teach them various cultural practices, help them not only in selecting a suitable crop in the particular area but also in procuring the necessary inputs in time. Secondly, the State Government should undertake continuous research in evolving suitable varieties of crops that could be grown under rainfed conditions in these areas. Similarly, attention should be
Introduction of multiple cropping in different areas would be affected to a large extent by the elevation of land. In high lands, nearly 40 per cent of the net cultivated area could be brought under double cropping while this percentage could be as high as 60 in middle lands and 80 in low lands. Taking into consideration the suggestions given above and the elevation of lands, it could go up to 641,000 hectares by 1993-94. This would give a crop intensity of 160 per cent by 1993-94.

(6) The cropping pattern in these districts will have to be suitably adjusted according to the availability of irrigation, elevation of land and the type of soil. As stated earlier, the gross irrigated area in these districts is expected to reach a level of 168,000 hectares in 1993-94. Of these, 127,000 hectares would be in kharif, 29,000 hectares in rabi and 12,000 hectares in summer (Table No.5.6.1). During the kharif, the irrigated crop could be paddy, hybrid maize, sugarcane, groundnut and castor. However, the high yielding variety of paddy (Taichung) has not been successful in the kharif season as it is susceptible to some diseases. But it has been grown quite successfully during the rabi season. In 1987-1988, 16,000 hectares were brought under high yielding varieties. The area under these varieties could be increased to 24,000 hectares by 1993-94. In rabi, the other important crops under irrigated conditions could be potato, groundnut and hybrid maize. During the
summer, the main crops could be rice, vegetables, fruits and spices.

In the unirrigated areas winter paddy which continues to be most important crop so far leaves very little time for a rabi crop as it is sown in July/August and harvested in December. It is necessary to conduct research for evolving a suitable variety of early paddy for the kharif season so that it could be harvested in time thereby making a second crop feasible. The present preference for the winter crop is understandable because its average yield per hectare under existing conditions is quite high (960 kgs. of cleaned rice). However, through research it is possible to introduce a short duration crop which would also give a higher yield. If this is done, there will be a real breakthrough in agriculture in this region. It is, therefore, strongly suggested that the Central Rice Research Station at Cuttack should pay special attention to the requirements of these districts. Based on the elevation of land, types of soil and irrigation details of the suggested crop rotations and cropping pattern are given in tables 5.6.2 and 5.6.3. The estimated gross value per hectare of the major crops is also given which throws light on the relative remunerativeness of the various crops (Table No.5.6.4). These are average figures for the three districts and relate to the year 1989-90. However, the choice of individual crops in a particular village or on a particular price of land will depend on the suitability of the crop for the selected land. The choice will have to be made by the cultivator depending on his resources and suitability of land in consultation with the extension worker. If this cropping pattern materialises, it is estimated
that the percentage of the area under rice to the total cropped area will fall from the present level of 50 to 42 in 1993-94. This is because the area under rice would marginally increase while the addition to the double cropped area would be largely devoted to pulses and other light crops.

The importance of certain crops in different districts will have to be kept in mind because of their suitability in specific areas. For instance, sunnhemp in Kalahandi and Bolangir districts, turmeric in Phulbani, potato in irrigated areas and groundnut in sandy soils in all the districts should be encouraged. Further, cultivation of castor crop should be linked with the soil conservation programme as it helps in the conservation of soil. Similarly in the irrigated areas near towns the cultivation of vegetables and fruits should be encouraged so as to cater to the requirements of the urban population. For instance, the vegetable requirements of the urban population in the newly grown townships around the Hirakud dam could easily be met from the fertile area of Birmaharajpur in Bolangir district. Local fruits, such as mango, guava and papaya, are commonly grown in the region which indicates that the soil and climatic conditions are suitable. However, by and large, the fruit plants are grown in kitchen gardens mostly for home consumption. There are a few orchards maintained by the erstwhile princes and big landlords. Fruits such as hill banana, pineapple and citrus fruits have been introduced in these areas in recent years. An advantage of these fruits have been introduced in these areas in recent years.
An advantage of these fruits is that they can be grown even in semi-irrigated conditions. It is suggested that more area under regular fruit plantations particularly pineapples, mangoes and citrus fruits should be brought in suitable places. Queen variety of pineapple procured from Tripura has been successfully grown under rainfed conditions with proper techniques of soil and water conservation measures in all the three districts, viz. Harishankar (Bolangir), Thumul-Rampur and Lanjigarh (Kalahandi) and G. Udaygiri and Phirangia (Phulbani).

Currently attempts are being made by the State Government under soil conservation programme to grow cashewnut and coffee in these districts. But the programme is only in the initial stage and full economics of these crops is not yet known. Hence, no definite suggestions for expansion of these crops can be made at this stage.

In many parts of the country, the cultivators have found it very profitable to grow timber trees either on the borders of the fields or as a regular crop. This is possible even under rainfed conditions and in land with poor soils. It is, therefore, suggested that the Agricultural Department in consultation with the Forest Department should select suitable species of fuel wood plants and popularise their cultivation first in limited areas and if found successful, extend the programme in larger areas. Growing of trees should be particularly suitable in the sloppy lands. Similarly, development of pastures and the cultivation of suitable varieties of grasses should be encouraged in marginal lands. This programme could be co-ordinated with the development of livestock. The waste
lands and village common lands could be taken up for development of pastures.

(7) As stated earlier, the problem of soil erosion is quite acute in certain areas of these districts. Yet the extent and intensity of soil erosion in these areas are not precisely known as no detailed survey has so far been undertaken. It is, therefore, necessary to conduct such a survey so that areas with different intensities of soil erosion can be identified. It is necessary to implement the soil conservation programme giving priority areas which are subject to serve soil erosion-Anti-erosion measures like contour-bundling, gully control and strip-cropping should be popularised. Extension workers should teach the cultivators the various measures of conservation farming which would maintain the fertility of the soil. The existing practice of ploughing down the slopes particularly in the tribal areas should be discouraged through persuasion and demonstration. On sloppy lands and other cultivated lands subject to soil erosion suitable crops which bind the soil should be planted. Plantation of certain crops such as cashew and coffee has been experimented and the area under them could be increased if the land is found suitable. However, cover crops and leguminous crops could easily be grown as an important measure of anti-erosion. As stated earlier, castor plantation could be extensively encouraged in eroded and terraced fallow lands. In areas under common growing suitable varieties of grasses. Soil erosion in gochar lands can be prevented by developing permanent pastures and by controlling the grazing
of cattle with the co-operation of all villagers. According to the land tenure system the villagers have the absolute right over the land and unless they agree, no gochar land can be developed. High lands which are kept fallow for two to three years can be brought gradually under cultivation by contour bunding and conservation farming. It may be noted that the benefits of soil conservation uncertain lands may accrue over a long periods and this fact may not enthuse the cultivators to adopt the necessary practices voluntarily. But in the interest of preventing the large scale damage to the fertility of the overall area, certain compulsion may have to be enforced. The nature of such steps will have to be determined by the Government looking into the local needs and conditions of the area.

(8) In tribally inhabited areas of these districts, the practice of shifting cultivation, also known as Podu Chasa, is very much prevalent. Shifting cultivation has caused acute soil erosion and valuable forest wealth is being depleted. In addition, it undermines soil fertility and thus the yields in the long run fall. Practised continuously, the method of shifting cultivation affects rainfall and changes the physiography of the area completely. It is generally agreed that it is a wasteful method of cultivation. However, the main difficulty arises in replacing it by normal farming because of the deep-rooted traditions among the tribal people in this regard. It may be mentioned here that it will be difficult to eradicate this practice in a short period. However, effective steps should be taken by the Government so that it does not remain a popular practice.
the obvious solution to this problem is to induce the tribal population to settle down for permanent cultivation but this could be achieved only over a long period. The Government is already extending educational facilities in the tribal areas and it is hoped that people taking advantage of these facilities could be more easily persuaded to adopt improved practices and take to permanent cultivation. This should have demonstration effect on the remaining population and gradually the entire tribal population may be covered. In the sloppy areas terrace cultivation should be encouraged which would eliminate the dangers of large-scale soil erosion.

(9) The above suggestions have been based on the possibilities of irrigation development and economically profitable under the prevailing conditions of soil, climate and rainfall. As the technological advance in evolving suitable drought resisting varieties is made, changes could be introduced in the suggested programme. To what extent all the recommendations given here would be carried out and to what extent the cultivating community in the area would respond to the new measures is difficult to foresee. However, assuming that all the suggestions are carried out a broad estimate of the output prospects for 1993-94 could be made. The output of food grains which stood at 770,000 tonnes in 1989-90 would reach a level of 1,059,000 tonnes in 1993-94. Assuming that 1989-90 output level is about the same as in 1984-85 which was the best year so far, the above increase amounts to 6.5 per cent per year over the period 1979-89. The major increase in this output will accrue from high yielding varieties of paddy and by hybrid maize in the irrigated areas and from the introduction of pulses and millets as second crop
mainly under rainfed conditions. The other gains in output would also be substantial notably in potatoes, vegetables and oilseeds.

(10) In a purely agrarian society depending on the cultivation of crops substantial supplementary benefits could be realised by rearing of livestock and cattle development. In some of the states such as Punjab and Haryana and in some areas of Rajasthan and Gujarat, income arising from animal husbandry is very substantial. However, in case of Orissa State and particularly in these districts, immediate prospects of increasing the income through livestock development are not bright.

Not only the cattle in this region are of extremely inferior breed but their feed, which mainly consists of rice straw, is highly deficient in nutrition. Both these factors together have resulted in very low milk yields. The State Government has introduced schemes for upgrading the local animals but the results are not at all encouraging except in a few isolated cases. Unless the age-old practice of leaving the cattle to graze in the open fields, which have grass of fodder hardly for a few months to last, is given up and stall feeding is introduced on a wide scale, the present low yields are not likely to increase to any substantial extent in the near future. Therefore, in selected areas this practice could be popularised. Advantage could also be taken of the nearness of townships of Hirakud Project where the demand for milk and milk products is very high. By organising milk collection societies on efficient lines the available milk in rural areas could be collected and sent to the above townships.
This would introduce an element of incentive for the cultivators to pay proper attention to the rearing of cows. In the tribal areas, poultry, piggery and fisheries development would be more appropriate since tribal people have no prejudice taking to these lines of activities. However, the experience in the past has not been satisfactory. The Tribal and Rural Welfare Department of the State Government introduced a poultry rearing scheme towards the beginning of the Fourth Plan, but the scheme did not make much progress. The birds supplied to the district units under the scheme were mostly destroyed by wild animals in the hill areas or else perished as they were not properly looked after. As a result of this disappointing experience, the State Government had to drop the scheme. This shows that proper planning and adequate training to the tribal people are very important for the success of such schemes. Further, unless proper marketing arrangements are made for the sale of the products, the programme is not likely to succeed. Hence it is suggested that with the road development as envisaged earlier the marketing aspect should simultaneously receive due attention.

REFERENCES:


7. Ibid - P.84.

8. Ibid - P.92.


14. Survey of Land Categories of Western Orissa Revenue Division (1986), Revenue Department, Govt. of Orissa, P.62.