CHAPTER - II

RAW MATERIALS

1. AGRICULTURE

Introduction:

The population of Purulia district according to 1971 census is 16,02,875 ranking 14th among the districts and accounting for 3.62 percent of the State population.

The agricultural population of the district divided between cultivators and agricultural labourers as per 1971 census is as follows; (figures within bracket gives percentage to total population):

<table>
<thead>
<tr>
<th>Cultivators</th>
<th>Agril.Labourers</th>
<th>Total Agril.Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,23,883 (13.97)</td>
<td>1,68,089 (10.49)</td>
<td>3,91,972 (24.46)</td>
</tr>
</tbody>
</table>

It is seen from the above that about 25% population is attached directly to agriculture either as cultivators or as agricultural labourers. Agriculture is the primary source of livelihood in Purulia district.

But the low level of income generated in agriculture reflects poor agricultural development. Every year a large section of the district's population has to be provided with the test relief and grants.

Agricultural Conditions and Cropping Pattern:

Although agriculture is the main economic activity in Purulia district, agricultural conditions are extremely poor. In most of the area only a single crop is raised. Area sown more than once in 1979-80 was 33,801 acres whereas net area sown in the same year was 3,93,125 acres. Considering the graduation of the land, the land can be divided into three types. Firstly the land at the lower level is the best land...
and requires no irrigation and the yield per acre is also high. The
second and the third varieties of land come next following upward
graduation. The third grade land which is the high level land is the
worst and mostly fallow land. This is used for the cultivation of
inferior variety of crops like jowar, maize etc. Without the
introduction of contour bunding on high lands crops cannot be
successfully raised there. In the absence of anti-erosion and soil
conservation measures, farming in the district is bound to remain
undeveloped. It can be seen from the table No.2 that the transplanted
paddy constitutes the main crop of the district. The area under amon
paddy accounts for more than 95% of the total area under paddy. The
economic well-being of the farming population of Purulia is determined
by the success or failure of paddy crop of medium high and high land
and balances the economy of the district as a whole. This district is
surplus in respect of cereal production (rice) in normal year.
Target of cropping intensity was fixed to 116.1% in 1979, but severe
drought brought it down to 104.93% and total rice production came down
to 69,220 M.T. against normal production of 2,40,000 M.T.

Though the quantity of rain-fall as a whole is generally suffi-
cient but crops suffer very often from frequent failure of rain in
seasons when they are needed most. Well distributed rain-fall for
production of paddy crop is needed. In 1979-80 due to non-receipt of
adequate rain-fall normal acreage of amon paddy could not be put under
cultivation. The coverage, damage and production of amon paddy during
this year are enumerated below :-

1. Normal acreage under amon paddy .. 5,95,270 acres
2. Total area transplanted in '79-80 .. 3,21,167 "
3. Total area completely damaged .. 1,36,689 "
4. Total area partially affected .. 49,040 "
5. Total area not affected .. 1,36,518 "
6. Total production .. 61,963 MT (Paddy)
   40,000 MT (Rice)

Table No 2: ACREAGE, PRODUCTION AND YIELD RATE OF DIFFERENT CROPS

<table>
<thead>
<tr>
<th>Crops</th>
<th>Area in '000 Acres</th>
<th>Production in '000 Tons</th>
<th>Yield Rate (Qt1 per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aus</td>
<td>15.09</td>
<td>11.12</td>
<td>10.62</td>
</tr>
<tr>
<td>Amon</td>
<td>653.10</td>
<td>592.55</td>
<td>667.89</td>
</tr>
<tr>
<td>Boro</td>
<td>1.97</td>
<td>0.98</td>
<td>1.48</td>
</tr>
<tr>
<td>Gram</td>
<td>2.96</td>
<td>2.47</td>
<td>2.72</td>
</tr>
<tr>
<td>Other Pulses</td>
<td>26.70</td>
<td>11.36</td>
<td>47.42</td>
</tr>
<tr>
<td>Rape &amp; Mustard</td>
<td>4.13</td>
<td>1.24</td>
<td>1.24</td>
</tr>
<tr>
<td>Sugar Cane</td>
<td>3.79</td>
<td>4.45</td>
<td>4.45</td>
</tr>
<tr>
<td>Potato</td>
<td>2.96</td>
<td>2.72</td>
<td>3.46</td>
</tr>
<tr>
<td>Maize</td>
<td>17.00</td>
<td>19.2</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Source: District Agriculture Office

Cont'd... 11
Production of wheat is still negligible. However, its yield rate has improved over the few years; in 1976-77 it was 6.67 Qtl per acre whereas in 1979-80 yield rate was 17.15 Qtl per acre. Other major components of production are maize, oil seed etc. In the year 1979-80 the production was only 99.93 thousand tons. This is due to drought condition in that particular year.

The most important oil seed in Purulia is mustard. The area under this crop is proposed to be increased. Other major components of production are gram, potato, sugarcane, rape seed etc. From table No.3 it is clear that area for different crops is gradually increasing. Detailed production and productivity figure of some of the major crops in the district are given in the table No.2. Table No.3 shows total crop production of the district from the year 1968-69 to 1979-80. The same has been reflected in the figure No.5.

TABLE NO.3 : CROP PRODUCTION IN PURULIA (IN THOUSAND TONS)

<table>
<thead>
<tr>
<th>Year</th>
<th>68-69</th>
<th>69-70</th>
<th>70-71</th>
<th>71-72</th>
<th>72-73</th>
<th>73-74</th>
<th>74-75</th>
<th>75-76</th>
<th>76-77</th>
<th>77-78</th>
<th>78-79</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Crop Production</td>
<td>249.4</td>
<td>305.8</td>
<td>408.2</td>
<td>262.0</td>
<td>275.8</td>
<td>341.7</td>
<td>296.8</td>
<td>311.6</td>
<td>263.3</td>
<td>383.9</td>
<td>332.3</td>
</tr>
</tbody>
</table>

During this period the district had maximum production of 408.2 thousand tonnes in the year 1970-71. The district experienced severe drought in the year 1979-80 when the production figure reached an all time low of 99.93 thousand tonnes. Vegetable cultivation has been found to be extremely profitable specially when irrigation facilities are available.

The problem of rice cultivation in the chronically drought affected areas spreads over mainly in the lands sufficiently above the valley bottom and in the lands situated near or below the ridge.
The lands at the valley bottom is fairly danger-free as water from all sides, that is from lands situated above it comes down as run-off and seepage water accumulates there. But such danger-free land for rice cultivation is available only to the extent of 10% of the total land under rice cultivation approximately. Even in years of scanty rainfall cultivators do get a crop in this area. In the remaining 90% of the area which can be classified as medium and high land, locally known as Kanali and Baid, the farming is rather uncertain and the production of this type of land is dependent on well distributed rainfall. Quite often the lands suffer from periodical drought during transplanting, vegetative and flowering stage. The economic well being of the farming population of this area is determined by the success or failure of paddy crop of this medium high and high lands and balances the economy of the district as a whole. These lands are always under the threatening of drought till the crop is harvested.

**Distribution of Land Holding:**

Another indication of the dependence of the district on agriculture can be had from the fact that about 76% of the house-holds in the district are cultivating house-holds. Again the distribution of land among the cultivating house-holds is skewed. This is evident from table No.4 which shows that over 79 percent of the house-holds (1,55,250) had holdings below five acres of land, while 42.8 percent of the farming house-holds had holdings below 2.5 acres and about 12 percent belonged to the size group of less than one acre of land.

**Irrigation:**

In view of the rocky soil with low water retention capacity, erratic and scanty rainfall as well as the drying up of the rivers, tanks and lakes during the long summer period, large-scale extension or irrigation facilities throughout the district is of utmost importance.
The undulating nature of the land together with irregular rainfall makes the district drought-prone and almost every year a wide area of the district is affected by droughts. The district faced most severe drought in 1979 causing economic set back.

TABLE NO.4: HOUSE-HOLDS ENGAGED IN CULTIVATION CLASSIFIED BY SIZE OF LAND CULTIVATED IN PURULIA (1971 CENSUS)

( Based on 20 percent samples )

<table>
<thead>
<tr>
<th>Police Station/District</th>
<th>Size Class of Land</th>
<th>Less than one acre</th>
<th>1.0-2.4 acres</th>
<th>2.5-4.9 acres</th>
<th>5.0-7.4 acres</th>
<th>7.5-9.9 acres</th>
<th>10 acres and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsha</td>
<td></td>
<td>254</td>
<td>874</td>
<td>471</td>
<td>205</td>
<td>41</td>
<td>116</td>
</tr>
<tr>
<td>Bagmundi</td>
<td></td>
<td>310</td>
<td>958</td>
<td>467</td>
<td>189</td>
<td>40</td>
<td>86</td>
</tr>
<tr>
<td>Balarampur</td>
<td></td>
<td>191</td>
<td>725</td>
<td>444</td>
<td>194</td>
<td>56</td>
<td>120</td>
</tr>
<tr>
<td>Barabazar</td>
<td></td>
<td>264</td>
<td>1032</td>
<td>796</td>
<td>437</td>
<td>151</td>
<td>254</td>
</tr>
<tr>
<td>Bundwan</td>
<td></td>
<td>88</td>
<td>577</td>
<td>425</td>
<td>262</td>
<td>56</td>
<td>161</td>
</tr>
<tr>
<td>Hura</td>
<td></td>
<td>251</td>
<td>971</td>
<td>612</td>
<td>300</td>
<td>71</td>
<td>120</td>
</tr>
<tr>
<td>Jaipur</td>
<td></td>
<td>146</td>
<td>714</td>
<td>431</td>
<td>180</td>
<td>53</td>
<td>95</td>
</tr>
<tr>
<td>Jhalda</td>
<td></td>
<td>717</td>
<td>1817</td>
<td>1038</td>
<td>395</td>
<td>104</td>
<td>160</td>
</tr>
<tr>
<td>Kashipur</td>
<td></td>
<td>104</td>
<td>1053</td>
<td>726</td>
<td>362</td>
<td>124</td>
<td>163</td>
</tr>
<tr>
<td>Manbazar</td>
<td></td>
<td>363</td>
<td>2045</td>
<td>1206</td>
<td>602</td>
<td>169</td>
<td>308</td>
</tr>
<tr>
<td>Neturia</td>
<td></td>
<td>230</td>
<td>496</td>
<td>257</td>
<td>86</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Para</td>
<td></td>
<td>382</td>
<td>974</td>
<td>505</td>
<td>212</td>
<td>49</td>
<td>97</td>
</tr>
<tr>
<td>Pancha</td>
<td></td>
<td>179</td>
<td>977</td>
<td>529</td>
<td>270</td>
<td>67</td>
<td>122</td>
</tr>
<tr>
<td>Purulia Mofussil</td>
<td></td>
<td>652</td>
<td>1811</td>
<td>974</td>
<td>472</td>
<td>126</td>
<td>224</td>
</tr>
<tr>
<td>Raghunathpur</td>
<td></td>
<td>317</td>
<td>1188</td>
<td>580</td>
<td>237</td>
<td>60</td>
<td>93</td>
</tr>
<tr>
<td>Santuri</td>
<td></td>
<td>127</td>
<td>452</td>
<td>282</td>
<td>131</td>
<td>31</td>
<td>43</td>
</tr>
<tr>
<td>PURULIA DISTRICT</td>
<td></td>
<td>4,639</td>
<td>16,669</td>
<td>9,742</td>
<td>4,534</td>
<td>1,223</td>
<td>2,161</td>
</tr>
</tbody>
</table>

Source: West Bengal Census Hand Book 1971

Irrigation is the main problem in the agricultural activities of Purulia district. There is no river valley project in this district. Irrigation is mainly done from Bundhs and tanks. Tubewell irrigation
AREA UNDER DIFFERENT IRRIGATION SCHEMES (IN THOUSAND ACRES)

- Others (wells etc.)
- River lift & minor irrigation
- Tanks
- Canal

**Figure 6**
is not possible because of underground rocky structure. Supply of irrigation water, therefore, depends upon rainfall which is erratic in nature.

Irrigation and Waterways Department is playing a major part in irrigation programme of the district. Agricultural Irrigation Department is also taking up minor irrigation schemes. 43 Nos of river lift irrigation schemes have so far been installed in this district. Under small irrigation scheme excavation of tanks, re-excavation of silted tanks, construction of big diameter dugwells, construction of Jore-bundhs on rivulets are being taken up for creating irrigation facilities for increasing cropping intensity.

Considering the scope of rapid expansion of small irrigation scheme by reposing more responsibilities on the Panchayet Samities, 70% of the fund under small irrigation scheme are being spent through Panchayet Samities and the remaining 30% of the fund are being spent by Project Officer, Purulia.

Table No.5 (Figure 6) indicate the progress of coverage under irrigation through different sources :-

<table>
<thead>
<tr>
<th>Year</th>
<th>Govt. Canal</th>
<th>Pri. Canal</th>
<th>Tanks</th>
<th>R.L.I</th>
<th>M.I. Schemes</th>
<th>Others (wells etc.)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-72</td>
<td>980</td>
<td>60</td>
<td>44,464</td>
<td>2,793</td>
<td>3,891</td>
<td>5,886</td>
<td>61,265</td>
</tr>
<tr>
<td>1972-73</td>
<td>5,883</td>
<td>60</td>
<td>55,846</td>
<td>2,454</td>
<td>3,800</td>
<td>8,282</td>
<td>77,965</td>
</tr>
<tr>
<td>1973-74</td>
<td>6,500</td>
<td>250</td>
<td>56,300</td>
<td>2,800</td>
<td>3,800</td>
<td>9,550</td>
<td>79,250</td>
</tr>
<tr>
<td>1974-75</td>
<td>7,500</td>
<td>250</td>
<td>56,900</td>
<td>2,950</td>
<td>4,000</td>
<td>9,550</td>
<td>81,150</td>
</tr>
<tr>
<td>1975-76</td>
<td>8,220</td>
<td>250</td>
<td>57,000</td>
<td>3,415</td>
<td>4,000</td>
<td>8,320</td>
<td>81,205</td>
</tr>
<tr>
<td>1976-77</td>
<td>8,500</td>
<td>250</td>
<td>60,000</td>
<td>1,692</td>
<td>22,285</td>
<td>10,903</td>
<td>103,630</td>
</tr>
<tr>
<td>1977-78</td>
<td>12,500</td>
<td>250</td>
<td>64,000</td>
<td>1,500</td>
<td>4,000</td>
<td>11,000</td>
<td>106,750</td>
</tr>
<tr>
<td>1978-79</td>
<td>18,640</td>
<td>300</td>
<td>70,903</td>
<td>2,525</td>
<td>4,544</td>
<td>12,000</td>
<td>108,612</td>
</tr>
<tr>
<td>1979-80</td>
<td>34,358</td>
<td>100</td>
<td>20,000</td>
<td>1,599</td>
<td>5,000</td>
<td>6,500</td>
<td>67,557</td>
</tr>
</tbody>
</table>

Source : District Agricultural Office, Purulia

Only 14 percent of gross cropped area is covered by irrigation in the district through different sources. e.g. Minor Irrigation Cont'd...15/-
Schemes of Irrigation and Waterways/Agri-Irrigation, River Lift
Irrigation Schemes, Tanks Bundhs, Wells etc.

Suggestions For Improvement of Irrigation System

If this district goes for double cropping, horticulture vegetable cultivation round the year and present cropping intensity is to be increased this can be done by (a) re-excavation of silted tanks (b) construction of Jore-bundhs on rivulets and (c) digging of wells. Lands of this district are undulated and so during rains nearly 75% of the total precipitation finds its way ultimately to river and sea. It is easily possible to harvest a portion of the water by construction of Jore-Bundhs to places having large catchment area. If this can be done further area which is now single cropped area can be converted into a double cropped area with oilseeds, pulses, wheat, vegetable and thereby the cropping intensity may be increased.

High Yielding Varieties Programme

High yielding varieties programme actually started in this district from the year 1967-68 with 618.35 and 300 acres respectively for paddy and wheat. Progress of coverage under HYV Programme is given in the table No.6 below :-

<table>
<thead>
<tr>
<th>Year</th>
<th>Aus</th>
<th>Amon</th>
<th>Boro</th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74</td>
<td>5,000</td>
<td>30,000</td>
<td>2,500</td>
<td>12,000</td>
</tr>
<tr>
<td>Target</td>
<td>3,225</td>
<td>21,434</td>
<td>2,414</td>
<td>11,231</td>
</tr>
<tr>
<td>1974-75</td>
<td>7,500</td>
<td>37,500</td>
<td>5,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Target</td>
<td>4,591</td>
<td>28,387</td>
<td>2,193</td>
<td>19,925</td>
</tr>
<tr>
<td>1975-76</td>
<td>10,000</td>
<td>70,000</td>
<td>6,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Target</td>
<td>6,977</td>
<td>50,908</td>
<td>2,164</td>
<td>36,114</td>
</tr>
<tr>
<td>1976-77</td>
<td>10,000</td>
<td>1,00,000</td>
<td>3,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Target</td>
<td>8,365</td>
<td>69,259</td>
<td>500</td>
<td>12,673</td>
</tr>
<tr>
<td>1977-78</td>
<td>10,000</td>
<td>1,00,000</td>
<td>2,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Target</td>
<td>10,113</td>
<td>77,902</td>
<td>1,600</td>
<td>24,000</td>
</tr>
<tr>
<td>1978-79</td>
<td>14,000</td>
<td>1,22,000</td>
<td>2,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Target</td>
<td>9,509</td>
<td>1,10,259</td>
<td>2,065</td>
<td>29,845</td>
</tr>
</tbody>
</table>

Cont'd...16/-
Year | Aus | Amon | Boro | Wheat
--- | --- | --- | --- | ---
1979-80 Target | 20,000 | 1,50,000 | 2,000 | 50,000
Achievement | 7,954 | 56,763 | 820 | 8,044

Source: District Agricultural Office, Purulia

Above table deals with the progress of paddy and wheat. From the above table it is clear that achievement of HYV Programme is not satisfactory. Progress of maize, jowar and bajra sugarcane is also rather slow mainly due to lack of suitable hybrids and incidence of pests and diseases.

High yielding varieties which are mostly of short duration, ranging from 95-130 days, will best suit the programme. Lands of this district are well drained and have a better prospect for adoption of these high yielding varieties than in water-logged areas.

Intensive campaign have been started and high yielding variety programme is gaining popularity among the cultivators.

There is a need for a more vigorous extension of HYV area in the district so that its agricultural production and productivity may be substantially pushed up from their existing low levels.

Considering the high labour-land and output-labour ratio associated with HYV Technique in agriculture, this would have the simultaneous effect of both reducing under employment in the rural areas and raising the flow of surpluses available for the industrialisation of the district.

Use of Agricultural Inputs

A good number of pump-sets and small agricultural implements (including sprayers and dusters) have been distributed in the district.

Fertility status of the soil of this district is low and the soil is acidic in nature. The soil contain very little organic
CONSUMPTION OF FERTILIZERS IN TERMS OF N.P.K. (IN MT)

- NITROGEN
- PHOSPHOROUS
- POTASSIUM

YEAR
- 1973-74
- 1974-75
- 1975-76
- 1976-77
- 1977-78
- 1978-79
- 1979-80
- 1980-81

MT
- 1200
- 1100
- 1000
- 900
- 800
- 700
- 600
- 500
- 400
- 300
- 200
- 100
- 0
matter and also deficient in Nitrogen, phosphate and potash. The level of fertilizer consumption has increased in recent years with the reduction in the price.

Consumption of fertilizer (NPK) during the last few years is tabulated below (Figure 7):

Table No. 7: CONSUMPTION OF FERTILIZER (NPK)

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>P</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-74</td>
<td>659.53</td>
<td>240.92</td>
<td>107.46</td>
</tr>
<tr>
<td>1974-75</td>
<td>656.59</td>
<td>167.25</td>
<td>82.81</td>
</tr>
<tr>
<td>1975-76</td>
<td>788.91</td>
<td>142.43</td>
<td>113.49</td>
</tr>
<tr>
<td>1976-77</td>
<td>616.10</td>
<td>154.54</td>
<td>146.28</td>
</tr>
<tr>
<td>1977-78</td>
<td>962.94</td>
<td>211.38</td>
<td>235.52</td>
</tr>
<tr>
<td>1978-79</td>
<td>785.52</td>
<td>139.65</td>
<td>111.74</td>
</tr>
<tr>
<td>1979-80</td>
<td>663.14</td>
<td>159.36</td>
<td>128.80</td>
</tr>
<tr>
<td>1980-81</td>
<td>1200</td>
<td>400</td>
<td>700</td>
</tr>
</tbody>
</table>

Source: District Agricultural Office, Purulia.

Fertility of the soil in the long run also depends to a great extent on the abundant supply of organic matter. With this end in view due emphasis should be given to the increased production of rural compost. It is also necessary to substitute the chemical fertilizer.

**Drought Prone Area Programme**

The entire district is covered by D.P.A.P. D.P.A.P aims at conservation, development and utilisation of land, water, livestock and human resources in areas covered by 74 districts in 13 States. These areas have been selected on the basis of high periodicity of drought, low and erratic distribution of rainfall and low extent of assured irrigation.
Following are the achievements of D.P.A.P in Purulia:

Table No. 8 : ACHIEVEMENTS OF D.P.A.P IN PURULIA

<table>
<thead>
<tr>
<th>Year</th>
<th>Item</th>
<th>Target</th>
<th>Achievement</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>i) Demonstration Under Dry Land-farming and irrigated agriculture</td>
<td>1306 Nos</td>
<td>1268 Nos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii) Improved implements</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii) Dug Wells</td>
<td>1373 Nos</td>
<td>370 Nos</td>
<td></td>
</tr>
<tr>
<td>1979-80</td>
<td>i) Dryland Farming</td>
<td>370 Nos</td>
<td>301 Nos</td>
<td>301 acres</td>
</tr>
<tr>
<td></td>
<td>ii) Commercial Crop Demonstration</td>
<td>170 Nos</td>
<td>163 Nos</td>
<td>164 acres</td>
</tr>
<tr>
<td></td>
<td>iii) Irrigated Agriculture</td>
<td>300 Nos</td>
<td>234 Nos</td>
<td>234 acres</td>
</tr>
<tr>
<td></td>
<td>iv) Vegetable Demonstration</td>
<td>500 Nos</td>
<td>475 Nos</td>
<td>175 acres</td>
</tr>
<tr>
<td></td>
<td>v) Construction of Dug Wells</td>
<td>528 Nos</td>
<td>301 Nos</td>
<td></td>
</tr>
</tbody>
</table>

Source : District Agricultural Office, Purulia

Development Programme for Marginal Farmers And Agricultural Labourers

Purulia district is one of those areas in which special programmes for marginal farmers and agricultural labourers are proposed to undertake during fourth plan. One of the main objectives of the planners of the 4th plan in India was to extend the benefit of Development to the under privileged section of the Rural population. With this end in view Government of India have formulated the Marginal Farmers, and Agricultural Labourers Development Agency, a special project, with accent on supplementary employment of sub-marginal cultivators and Agricultural Labourers in our country. The project is of pilot nature.

During my visit to Purulia I had the opportunity to have a detailed discussion with the Project Officer Sri MRITUNJOY GUPTA of
Purulia Marginal Farmers' and Agricultural Development Agency regarding the activities of this agency at Purulia. It was gathered that about 42.7% of the total farming community in the District have holding less than 2.5 acres and 12% have less than 1 acre. The marginal farmers look for opportunities of alternative employment as casual labourers and share crops in the holdings of the big farms. The project covers the following six police stations (1) Arsha (2) Bagmundi (3) Balarampur (4) Jaipur (5) Purulia Mofussil. This covers 15 to 16 thousand marginal farmers and 5 to 6 thousand agricultural labourers of those above mentioned Police Stations, while these areas have over 40,000 marginal farmers with holdings upto 2.5 acres.

The project agency is acting as a catalytic agent in the promotion of the economic interests of the participants in the programme mainly through generation of gainful employment through promotion of rural industries etc. The task of the agency is also to create common facilities for production, processing, storage and marketing of products through programmes formulated in the light of the problems of the eligible marginal farmers identified. The agency has evolved adequate institutional financial and administrative arrangements for implementing various programmes and make regular evaluation of the performance of the programmes. Only in exceptional cases the agency, with prior approval of Central Government, directly undertake and administer any economic programme.

To create better conditions of agriculture so that the marginal farmers will be able to increase their farm incomes through adoption of HYV seeds, relay cropping of paddy, pulses, vegetables and potato, inter-cropping in small orchards with potato vegetables, soyabean, etc. The project agency proposes to undertake the following programmes:

(a) Development of Irrigation Facilities:
At present only about 7.5% of the arable land in the
project area receives irrigation. In addition to the programme under the rural works project which envisages the sinking of 894 and 3,570 dugwells during 1978-79, respectively, MFALDA proposes to excavate 100 dugwells in 1978-79 and 1,500 during 1979-82.

(b) Soil Conservation Measures:
Terracing and levelling of 10,000 acres of gullied lands as well as reclamation proposed under the project scheme for improvement of arable land will provide mainly off-season, subsidiary occupations to marginal farmers and agricultural labourers.

(c) Horticulture Development:
With increased irrigational facilities, the project is inducing marginal farmers to take to intensive programme of vegetable cultivation in about 5,000 acres around the dugwells in the district and fruit cultivation in about 6,000 orchards covering 2,000 acres during 1976-80 by arranging for finance to purchase seeds, fertilizers, pesticides, planting material, fencing and equipments.

(d) Development of Animal Husbandry:
Another line of development that is helping the marginal cultivators and agricultural labourers to supplement their below subsistance income from land is the development of dairy, piggery and poultry.

(e) Storage, Marketing and Communications:
The project aim at making adequate arrangements to ensure marketing of the produce of marginal farmers at prospective markets so that remunerative prices are obtained. It is also proposed to provide link
roads, means of transport, transit storage facilities, etc to the marginal farmers and agricultural labourers in the areas, but progress is not satisfactory. At Balarampore, regulated market development plan has not yet started.

(f) Custom Service:
To help mechanize the production process for intensive cultivation marginal farmers are being benefitted from custom service facilities for tractors, threshers, sprayers etc at subsidized rates from the Ago-Industries Corporation.

(g) Rural Artisans:
For the repair of agricultural machines and implements, village artisans are being given training in blacksmithy, masonry, carpentry as well as repairing and maintenance of agricultural implements like tractors, pump-sets, electrical fittings etc. Assistance to the trained artisans in the form of supply of improved tools and equipments at subsided rates has also been proposed.

(h) Miscellaneous Employment and Rural Works Programmes:
To provide additional job opportunities to the under-employed agricultural labourers, labour co-operatives are proposed to be formed to take up in a co-ordinated manner the execution of different construction and development works like bench terracing, gully pugging and inner irrigation, etc. Detailed schemes are being worked out.
Remarks:

Low productivity of agriculture, lack of irrigational facilities cause overwhelming majority of the cultivators to live below the subsistence level and every year distress sale of land forces a sizeable number of small owner-cultivators out of land to turn into a landless labourer. The real solution for the betterment of the standard of living of the people in Purulia lies in a two-point programme of improving the agricultural condition in the district and transferring under employed workers from agriculture to a growing industrial sector.

Low agricultural land being very limited in Purulia, attention has to be paid for utilising even the high lands which can also be brought under plough satisfactorily only with proper irrigation. Considerable advance has been made in this respect and production increased substantially but it has not been able to catch-up with increase in population. Use of high yield seeds and multiple cropping seem to be the solution. During dry months cultivation of high yield paddy cannot be done at all without assured irrigation and a good quantity of water is required for the crop as there is usually no rainfall during these months.

Mexican wheat is being cultivated here, but progress is not satisfactory. The greatest advantage of wheat is that its requirement of water is one of the lowest of all important crops. When the advantage of Mexican wheat is properly realised there is no doubt that the farmers in Purulia will adopt it. There must be proper irrigation even for wheat as it can be grown only during the winter months. Under these conditions there would be greater and greater demand for dry weather irrigation not only for crops like Mexican wheat or boro-paddy but also for cash crop like sugarcane which is necessary for manufacture of sugar and alcohol. Leaving aside the question of seeds and fertilizers, the most important factor would,
GEOLOGY

INDEX
ARCHAEANS

- PORPHYRITIC GRANITE GNEISS
- PAGMATITE QUARTZITE
- PARA SCHISTS, PARA GNEISS & QUARTZITE

GONDWANA

- SUPRA PANCHET
- PANCHET

DAMUDA

- DAMUDA
- ALLUVIUM

FIGURE 8
therefore, be irrigation. Large scale cultivation in dry month can effectively compensate for the shortage of low land in the district.

The steps being taken to increase rice production include balanced use of fertilizer, intensification of plant protection measures, intensive training programme of the farmers, identification of suitable varieties for different situation through minikit programme, timely planting of high-yielding varieties.

Sincere efforts on the part of the Extension Workers from district to village level will make possible to attain the target of the cropping intensity of 117.3% fixed for the year of 1980-81 by successful implementation of all agricultural development schemes and will help for the quick economic rehabilitation of the farming population.

2. MINERAL RESOURCES

Introduction:

The district comprises pre-cambrian metamorphics, except a limited area to north-east, where sedimentaries of Gondwana age predominate (Figure 8). Unconsolidated Quarternary sediments of Recent to Sub-Recent age are of restricted occurrence and mostly confined to the river channels of narrow width.

The metamorphics are represented by granite gneiss (Chotonagpur Granite gneiss), biotite granite gneiss, calco-granulite, ultrabasic, metabasic, meta-sedimentaries including crystalline limestone, garnetiferous sillimanite, biotite-schist (kyanite and graphite bearing at places) pegmatite and quartz-vein. The gondwana rocks occurring in the north-eastern part of the district comprise a thick pile of sandstone and slate with coal seam.

It is strongly felt from the study of the geology of the area that the district is enriched with varieties of mineral resources.
Prospecting and commercialisation are now being done by the Mines and Minerals Department, Purulia and Mineral Trading and Development Corporation, Purulia.

A list of some mineral resources available in this district is given below:

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lime Stone</td>
</tr>
<tr>
<td>2</td>
<td>Coal</td>
</tr>
<tr>
<td>3</td>
<td>Apatite</td>
</tr>
<tr>
<td>4</td>
<td>China Clay</td>
</tr>
<tr>
<td>5</td>
<td>Feldspar</td>
</tr>
<tr>
<td>6</td>
<td>Quartz and Quartzite</td>
</tr>
<tr>
<td>7</td>
<td>Kyanite</td>
</tr>
<tr>
<td>8</td>
<td>Baryte</td>
</tr>
<tr>
<td>9</td>
<td>Base Metal (mainly Lead and Copper)</td>
</tr>
<tr>
<td>10</td>
<td>Stone Deposit (for road metal and building stone)</td>
</tr>
<tr>
<td>11</td>
<td>Decorative Stone</td>
</tr>
<tr>
<td>12</td>
<td>Fluorite</td>
</tr>
</tbody>
</table>

A discussion on the above mentioned minerals have been made in the succeeding paragraphs.

**Lime Stone:**

Lime Stone is the most important mineral in Purulia district from the point of view of reserve, grade and production.

Important deposite of Purulia district may be divided into two parts viz (1) Jhalda and (2) Hanspathar.

(1) Jhalda:

Jhalda deposite can again be divided into two viz

(a) Jabar and (b) Ichatu-Digardih.

Limestone from this area is mainly used for lime making, stone dusting in collieries and for making mosaic chips.

Cont'd...25/-
(a) Jabar Lime Stone Area - Lime stone of Jabar area occur in a discontinuous zone of metasediments bounded on the north by porphyritic and augen-gneiss and on the south by sillimanite granite mica schist. The lime stone is crystalline, medium to fine grained, siliceous and contains much free quarts.

The general trend of the metasediments is roughly E-W, varying from 85° to 115°, with high northerly dip. According to Shri G.N.DUTTA, the Jabarbal' hill contains the biggest lime stone deposite in the Jhalda area. Very recently, detailed prospecting work has been carried out in this area by the West Bengal Mineral Development and Trading Corporation Limited., in accordance with a contract given by West Bengal Cements Limited. According to this report, the zone of mineralisation in the area is about 30 metres wide. But marketable grade lime stone (with nearly 45 to 50% CaO and 15-20% insoluble content) is found to occur in two distinct bands which are 6 metres and 3 metres wide respectively. The proved reserve of commercial grade lime stone upto a depth of 30 metres comes out to be about 4 to 5 million tons.

However, it is not possible to work so deep without heavy mechanisation as the overburden progressively rises as the beds dip inside the hill. The cost of mining will also depend on the degree of mechanisation and quality of lime stone raised. At present few quarries working in the area work upto a depth of around 6 to 8 metres and the cost of production at pits mouth is around Rs.15/- per tonne.
(b) Ichatu-Digardih: The lime stone of Ichatu-Digardih area occurs in isolated patches interwoven with Archaean quartzite.

Shri G.N. DUTTA of GSI had estimated 1 million tonnes of lime stone reserve upto a depth of 30 metres in the whole area.

In the Ichatu-Digardih area, lime stone occurs in six detached outcrops, the details of which are as follows:

<table>
<thead>
<tr>
<th>Name of Occurrence</th>
<th>Exposed Length(m)</th>
<th>Average exposed thickness (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Digardih</td>
<td>310</td>
<td>25</td>
</tr>
<tr>
<td>2. Talsokra</td>
<td>120</td>
<td>25</td>
</tr>
<tr>
<td>3. Rakshabera</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>4. Ichatu</td>
<td>560</td>
<td>30</td>
</tr>
<tr>
<td>5. Chota Bakad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper band</td>
<td>180</td>
<td>40</td>
</tr>
<tr>
<td>Lower band</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>6. Kudagara</td>
<td>166</td>
<td>17</td>
</tr>
</tbody>
</table>

A recent survey has put gross reserves of lime stones in the Digardih-Ichatu area at 714,750 tonnes upto a depth of 30 m from the surface.

In addition to the five occurrences of Digardih, Talsokra, Rakshabera, Ichatu and Chota Bakad, there are other three occurrences at Kudagara, Belamu and Maramu. Average chemical composition of lime stone over the entire strike length is estimated to be CaO content 40%, MgO 1% and insoluble 27%.

The probable reserves of lime stone estimated in the Belamu-Maramu area works out to be 320,000 tonnes in Belamu, Maramu, Ghutijharna and Bankaghat. Of these, the reserve at Ghutijharna is of good quality and the average chemical composition of lime stone band is CaO content 39%, MgO 1.1% and Insoluble 22%.

Cont'd....27/-
(2) Hansapathar:

Although the siliceous lime stones of Purulia district are known for a long time, they have remained neglected because of its low carbonate content and high percentage of silica. A long belt of exposures of these rocks is seen in Hansapathar and adjacent areas. Shri D.N. SARKAR, Senior Geologist, West Bengal Mineral Development and Trading Corporation Ltd., carried out a detailed geological prospecting work in the area during 1975 to assess the reserve of usable lime stones for cement industry (4).

The calc-silicate - marble assemblage extends from Mouza Balarampur on the West to Dhanara on the east and beyond. However, the prominent zone of this assemblage extends for about three miles from Hansapathar to Dhanara. The carbonate bands run through Hansapathar Raybandh, Asta, Kulbona and Dhanara. Beyond Dhanara, in Paharudih and Amtor, the carbonate bands are very thin and are intimately associated with the silicates and basic rocks.

There are several small quarries all along this belt. The discontinuity of the quarries is supposed to be due to thinning of the bands on either side. The main band often split into several thin bands with increased proportion of impurities.

Two marble bands are prominent in Hansapathar area. In Kulbona, there are five distinctly separate bands and the quality is also better here. These marble bands are of principal interest for the cement industry. A greater part of the rest of the calcareous formation shows abnormally low carbonate content.

Typical analysis result of samples of crystalline lime stone from different areas of Hansapathar are given in Table No 9. The analysis results (shown in Table 9) roughly indicate the quality of marbles and the crystalline lime stones which occur in this area. The stones Cont'd...28/
are not directly usable but require to be upgraded for use in the cement industry. Considerable quantity of lime-silicate minerals are found to be present in these rocks. It is to be seen whether this lime from silicates can be utilised to increase the total lime. A detailed study of the mineralogy of the carbonate bands and their textural relationship, chemical character etc may help to reveal important information as guide-lines for beneficiation and use.

Unlike in Jhalda area, Hanspathar reserve is more or less completely covered by alluvium. Further, this reserve occurs in the flat grounds. As such, there may not be any major problem in mining these rocks. The haulage problem can be solved by setting up the plant somewhere in the vicinity of the deposite and water will be available from Panchet reservoir.

Table No 9 : ANALYSIS RESULT OF HANSPATHAR LIME STONE

<table>
<thead>
<tr>
<th>Name of area</th>
<th>%Ca CO₃</th>
<th>%Mg CO₃</th>
<th>%CaO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanspathar</td>
<td>59.5</td>
<td>0.8</td>
<td>38.49</td>
</tr>
<tr>
<td>Kulbona</td>
<td>67.5</td>
<td>2.5</td>
<td>43.29</td>
</tr>
<tr>
<td>Dharnara</td>
<td>66.0</td>
<td>1.7</td>
<td>40.70</td>
</tr>
</tbody>
</table>

However, before any serious mining contemplated, further extensive prospecting is necessary.

(5)(6)

Coal :

Purulia district is endowed with rich depositories of coal. The southwestern part of Ranigunj coalfields falls in the Purulia district and, as such, sizeable reserves of coal are confined within the wide area bounded by the Damodar river to the north and Panchet, Gourangi and Biharinath Hills to the South.

Exploratory drilling for coal has been carried out in Purulia district in two blocks viz Dishegarh Block - C and Poradiha.

In the Poradiha area, the coal belong to high moisture (over
2%) and high volatile (24 to 36%) category in general. The seams above Dishergarh are non-coking or weakly coking whereas Dishergarh and seams below it show better coking propensites.

In Dishergarh Block - C, only the Dishergarh, Baradhemo and Hijuli seams occur over a considerable area with a thickness of 1.2m and above. Qualitatively, the seams here also contain high moisture and high volatile (27 to 38%).

Reserve: A total gross reserve of 129 million tonnes of coal has been estimated from seams of 1.2 m and above in the Poradiha area, out of which about 39 million tonnes have been calculated for Dishergarh seams. In Dishergarh Block - C, a reserve of 277 million tonnes has been estimated, out of which 146 million tonnes belong to Dishergarh.

Coal in working collieries: The district sustains two big collieries viz Ranipur and Parbelia. In the former, Dishergarh and Sanctoria seams are being worked, while in Parbelia Colliery the working is confined to Hijuli and Dishergarh seams.

Apatite:

The presence of apatite - bearing rocks extending between Hatandih in the West and Porapahar in the east over a distance of 35 Km was located in the sixties by the Department of Atomic Energy in course of their survey for atomic minerals. They drilled a borehole near Beldih during this survey, which intersected rich apatite zone. Search for apatite along the shear zone and outside was taken up by GSI in 1970(?) and apatite-bearing zones have been located, so far, at Lanka, Beldih, Paurkidih, Kutni and at Chirugora.

(i) Beldih: Of these, the most important apatite deposite in the district is located near Beldih in Barabazar P.S. Detailed investigations of this deposite was carried out by DK BANERJEE. According
to him apatite occurs in quartz-apatite-vein about 100 metres long and 30 metres wide, in the neighbourhood of the Balarampur-Barabhum Road. The vein is emplaced within the meta-sedimentaries represented by phyllites and schists, with which are associated granulites and granitic rocks. This lensoid phosphate body is located apparently in two detached out-crops, 90 metres apart, of which the latter does not contain any apatite at the surface. The rock is quite massive, brecciated and cherty in nature. Mineralogically the apatite-bearing vein appears to be complicated as different types of rocks are found close together. Although detailed mineralogical investigation has not yet been carried out, the apatite body has been reported to contain, apart from chert, magnetite and limonite, copper, lead, tungsten and also radioactive minerals.

The reserve of the deposite has not yet been worked out in detail. Upto end of May 1976 two boreholes have been drilled down to depths of 150 m and 184.65 m respectively and a good number of mineralised zones have been encountered in both the boreholes.

As a part of the co-ordinated programme, the West Bengal Mineral Development and Trading Corporation has also deployed a shallow capacity drill for drilling in the eastern part of Beldih apatite occurrence. Apatite mineralisation, about one metre in thickness, has also been encountered in a borehole drilled (for lead ore) by the Directorate of Mines and Minerals, West Bengal at a site about one kilometre south of Beldih. The above occurrence indicates the probable continuity of apatite mineralisation.

However, as the investigation is still at a preliminary stage, it will be premature to comment on the total reserve of the deposite. Based on the nature of occurrence in the existing quarry and information available from the recent boreholes it may be safely assumed that the
reserve will be several times greater than that estimated previously by the GSI.

Exploitation of apatite at Beldih has started from the year 1975. WBMDTC, working as an agent of State Government is at present exploiting about 800 tonnes of apatite per month by open cast hand mining. They are working out a further plan to increase the production to 1500 tonnes per month.

Quality of Beldih deposite vis-a-vis other deposits in In India: Fertiliser Association of India carried out a comparative study of various apatite deposits in India and their study revealed that P₂O₅ content of the Beldih phosphates is better than that of many of the other deposits, including the major ones such as U.P and the majority of the Rajasthan deposits. However, the Beldih deposite is high in R₂O₃ content and, therefore, beneficiation techniques for removing these minerals have to be developed. Studies on beneficiating ores from Rajasthan, U.P, and Bihar have already been carried out by different organisations. Unfortunately, Beldih deposite has not yet been tested for ameneability to beneficiation.

(ii) Paurkidih: At Paurkidh, about 15 Km north north-east of Purulia, apatite occurs. The outcrops, contain crystals of apatite measuring upto 10 cm in length.

(iii) Lanka: About 200 metres east of Lanka village several apparently detached outcrops of brecciated limonite rock were located which indicated a P₂O₅ content of 10% to 20%.

(iv) Kutni: The phosphatic rocks comprise apatite-rich lenses, layers, streaks, stringers in sheared and brecciated Pre-cambrian cherty, quartzite, meta-basic rocks and phyllite.

The best outcrop occurs at the north-west end of Kutni. Another lenticular outcrop occurs further north-west separated by a 150 m long barren zone.
(v) Chirugora: The phosphatic rocks, composed of cherty quartzite, iron oxides and apatite, in variable proportions, occur as lenses and thin layers in Pre-cambrian phyllite quartzite country rocks. Discrete lenses of phosphatic rocks, separated by zones without apatite at surface, are distributed over a distance of about 1 Km between Chirugora and Jogiadih. The largest lenticular zone is about 400 m long and 40 m (at the maximum) wide. Several other lenses and layers 2 m to 7 m wide occur between the largest zone and Jogiadih.

The chemical assay and trace element distribution of Beldih deposite is highly indicative of a close similarity of this apatite rock with that of the neighbouring Singhbhum area. Further more, the Beldih deposite is along the Manbhum shear zone, which is parallel to the Singhbhum shear zone. It is interesting to note that phosphate occurrences towards W and E of the Beldih deposite are also reported at Fatepur (about 3.2 Km towards E) and also at Kutni Chirugora areas (about 30 Km towards E). Hence, there is a possibility of obtaining more phosphate deposits along this shear zone. It, thus, is potential of being one of the major producers of rock phosphates in the country.

China Clay:

There are quite a number of China Clay depositories in the district of Purulia. Although it is not the major mineral deposite of the district, it is one of the minerals which occur in different parts of the district.

Two types of China Clay depositories are found to occur in this district: (1) associated with the Archaean granites and (2) associated with the Phyllites of the iron ore series.

The report of D.R.S. MEHTA of G.S.I. in 1948 is the first published account of China Clay resources of Purulia. Subsequently,
RAO (1967) carried out prospecting of China Clay deposits and gave a somewhat detailed account.

(A) Deposites Occurring in Granitic Rock.

(1) Amtor Deposite: The deposite is situated close to Dhatara village. The nearest railway station is Ramkanali which is about 10 Km towards the south-east. Original reserve was estimated by MEHTA (1948) to be 8,25,000 tonnes. More recent estimate by RAO puts the estimated reserve at 1.8 million tonnes. The crude rock, on washing, yields 8 - 10% of pure clay.

(2) Malti- Barachatarma Deposite: This deposite has been known for a long time. It is located at Malti Mouza in Balarampur P.S. The deposite is 0.5 Km from Malti village which is situated on NH - 32, about 46 Km from Purulia town. Nearest Railway Station is Biramdih about 4 Km from the deposite.

The clay shows wide variations in colour, from white to pinkish, yellowish, bluish and even to dark blackish. They are comparatively light in weight as compared to the volume of other clay. Considering mineable depth of 10 m the probable reserve will be in the order of 0.2 million tonne. The reserve will, however, be increased by two to three fold if the different grades of clay are blended properly.

Because of the variegated colour, the Malti Clay is useless for ceramic and other industries. However, as per report of the Central Road Research Institute of India, New Delhi, this deposite could be considered as one of the best suited clays for the pozolana industry in West Bengal. A French Patent issued on 1953 showed that a special type of cement may be produced by inter-ground combination of fly ash/pozolans mixture, blast furnace slag and portland cement clinker. This opens up a good possibility of setting up a pozolana cement factory at Purulia.

Cont'd...34/-
(3) Kalaboni - Kalajhor Deposite: The clay occurs as thin veins and lenticles in the weathered granite pockets, extending from Kalaboni and Kalajhor under Hura and Kashipur P.S respectively at a distance of 19 Km from Adra Railway Station. Mehta (1948) has estimated a reserve of only 610 tonnes of clay in the locality. Detailed examination is very likely to yield better results.

(4) Mahatmara Deposite: The deposit is just by the side of the motorable Jhalda - Gola Road, about 8 Km from Jhalda Railway Station. According to Mehta (1948) the reserve of this deposit is only 5,080 tonnes. Considering the locational advantage the State Directorate of Mines and Minerals, West Bengal have re-examined the area very recently. In the course of such examination, it has been found that a substantial quantity of the China Clay also occurs in the neighbouring Bandulahar and Taldih Mouza, apart from Mahatmara. The nearest Railway Stations of these areas are Jhalda and Muri.

The area is mainly granitic, associated with hornblende gneiss, mica schist and pegmatites. Lateritisation, has taken place over a large part of the area. China Clay is generally found under a cover of lateritic mantle. There are quite a number of large and small pegmatite bodies in the area. Most of these pegmatites are dominantly felspar-rich with subordinate quantity of mica. The felspar of these pegmatites and granites have been kaolinised to form the China Clay in this locality.

The biggest deposite of China Clay among the three localities occurs at Mahatmara. There is an abandoned quarry in this area from where the clay used to be worked earlier.

The reserve of clay estimated in the Mahatmara is about 7,31,520 tonnes (approx). The reserves of the clay deposits at the other two localities i.e. at Bandulahar and Taldhi zone are about 1,52,400 & 4,57,200 tonnes respectively.

Cont'd...35/-
(B) Deposite Occurring in the Iron Ore Formation.

The clay in these localities occur in the form of lenticular bodies. They lie along a roughly east-west zone about 8 Km south of Manbazar.

(1) Khariduara : The Clay deposite occurs along the northern slope of the Thakur Dungri Hill, south of Manbazar.

(2) Sialdanga : The rock is light blue in colour and gives a high percentage of yield (60%) after wash.

(3) Dhanudih and Tamakun : China-Clay, associated with mica-schist occurs near Dhanudih and Tamakun.

Apart from the above, scattered deposite of China-Clay is known to exist at Sravandih, Hankasara, Khatanga and Belamu. But the deposite except at Belamu has not been examined either by the G.S.I or by the State Directorate and as such nothing is known about the quality and reserve. Only recently State Directorate has done some prospecting at Belamu. A tentative reserve of about 7,620 tonnes of clay has been estimated information about the quality of which is not available.

Published information about the reserve is tabulated below:-

Table No. 10 : RESERVE OF CLAY IN PURULIA

<table>
<thead>
<tr>
<th>Deposite</th>
<th>Reserve (in Tonnes)</th>
<th>% of Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dhatara - Amtor</td>
<td>1,800,000</td>
<td>10</td>
</tr>
<tr>
<td>2. Malti - Barachatarma</td>
<td>200,000</td>
<td>-</td>
</tr>
<tr>
<td>3. Kalaboni - Kalajhor</td>
<td>610</td>
<td>20</td>
</tr>
<tr>
<td>4. Mahatamara</td>
<td>710,520</td>
<td>70</td>
</tr>
<tr>
<td>5. Bandulahar</td>
<td>152,400</td>
<td>-</td>
</tr>
<tr>
<td>6. Taldih</td>
<td>407,200</td>
<td>-</td>
</tr>
<tr>
<td>7. Sialdanga</td>
<td>134,112</td>
<td>60</td>
</tr>
<tr>
<td>8. Kharidnara</td>
<td>54,864</td>
<td>30</td>
</tr>
<tr>
<td>9. Belamu</td>
<td>7,620</td>
<td>-</td>
</tr>
</tbody>
</table>

Source : Geological Survey of India Progress Report

Cont'd....36/-
The main obstruction for developing those resources is the want of suitable infrastructure. Road and Railway communication, electricity and water supply are essential. Many deposits have to be left out for want of all or some of these facilities. For example, for want of a bridge over Kumari river near Manbazar, the deposit of Khariduara-Sialdanga could not be developed. In this respect the position of Mahatamara locality is better. There is no difficulty about the Road and Railway communication. Electricity is not likely to be a problem and the proximity of the Subarnarekha river will solve this water supply problem. Attempt may be made to set-up a China Clay washery in this locality.

*Felspar* :

The important felspar deposits of Purulia are located in two zones, one in the north and the other is running south of that. The felsper bearing pegmatites of Palma, Sanka, Raghunathpur, Tarabari, Bero, Ambari, Bewagoria, Denksila etc can be grouped together in the northern zone whereas starting from Belamu in Jhalda area on the West, another belt runs through the area on Multhol, Raghudih, Belma and extends upto Rangamati, Jinamonipur on the east. Entire mining and exploration of Felspar depositories of Purulia have been carried out by WBMIDTC under the leadership of JK HAZRA, Project Officer and DN SARKAR(10) Senior Geologist.

The variety of felspars available in Purulia district can broadly be divided into three types :-

(A) Green felspar, a mixture of Na and K.

(B) Cream coloured felspar, containing some Na2 O% but less than the green variety.

(C) Flesh coloured felspar, containing high K2O% with traces of Na.

Cont'd.... 37/-
On the southern flank of Balamu hill good occurrence of green felspar is seen. The felspars of this locality are free from other mineral mixtures. Mining is a little bit difficult because it is situated just on the flank of Balamu hill and removal of overburden will be a problem.

In Raghudih-Multhol areas the pegmatites strike almost north-south. WBMIDTC is carrying out exploratory mining in this area. One or two trenches have exposed good flesh coloured felspar but the veins are narrow compared to the other areas.

In Palma WBMIDTC has started mining operation. These felspars generally contain over 14% K₂O. A systematic investigation may reveal a promising reserve in this area.

In Ambari-Tarabari area pegmatite veins are comparatively narrow in size than Palma and other areas and yield cream coloured felspar. Further investigations are necessary for estimation of reserve.

At Raghudih, Palma and Ambari, felspar deposits are being extracted by open cast mining, entirely with manual operation.

The overburden in these deposits is about 3 m to 4 m thick. Removing overburden entirely by manual operation poses no special problem. At shallow depth that is within 2 m to 3 m below the ground level, quartz-mixed felspar is mined. The felspar boulders are broken into small pieces and quartz is separated out manually. This process is tricky and time-consuming and yields less remuneration.

At further depth i.e. about 4 m to 5 m below ground surface, quartz-free felspar are available. These types of felspar deposits mostly do not contain any quartz within felspar and hence yields better remuneration as more output per head per day is achieved.

Cont'd...38/-
At present about 2,700 tonnes per year are being excavated from different mines in Purulia. With better mining methods and transportation facilities, this production rate can be substantially augmented. The approach roads to Raghudih and Ambari are purely fair weather roads and as such materials from these areas can be transported only during the dry season. Palma being located on Purulia - Raghunathpur main road there is no such problem for an approach road.

All the varieties of felspar that are available in Purulia can be used both in glass and ceramics. For the glass industry, K-rich variety is preferred. For the pottery industry, it is almost indispensable. Other important uses are - manufacture of sanitary ware, porcelain ware, as mild abrasives, roofing materials etc. It is used as insulator in the electrical industry.

K-felspars have high demand in the country and abroad. Even the inferior quality is used for the manufacture of insulator.

Selling felspar lumps directly to glass and ceramic industry may not at all earn decent remuneration at the present market price. They are required to be pulverised for subsequent use. At present these lumps are being sent to some grinding mills viz Hindustan Grinding Mills, Bharat Grinders etc at Howrah before being sent to actual users. If a suitable Grinding Mill is set-up in close proximity to the felspar mine, the ground felspar will fetch better price and the whole operation will be more remunerative.

Quartz and Quartzite:

Quartz and quartzites are distributed all over the district as lenses, patches, pockets and bands. A few of them have been observed to possess suitable chemical purity to be used in refractory and glass industry. A list of quartz and quartzite deposite in various places of Purulia is given below. The data are based on the WBMDTC estimation.
<table>
<thead>
<tr>
<th>Location of Reserve</th>
<th>Tentative Reserve</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Senerea, Nutandih area in Raghunathpur P.S.</td>
<td>The quartzite forms a ridge extending from Nutandih in the west to Rangadih in the east for a strike length of over 5Km. It occurs as bands of varying thicknesses from a few cm to over 2.5 m. Taking workable depth of 10 m the reserve comes to 0.6 million tonnes.</td>
<td>The quality of quartzite is very good in the east but becomes stained and highly strained in the west.</td>
</tr>
<tr>
<td>2. Mouzas Bero, Santuri, Dhekshila Ambari, Tarabari Benagar, Gurma Muraldih, Saltora Jagannathdih in Raghunathpur and Santuri P.S.</td>
<td>0.5 million tonnes of combined reserve of quartz and felspar have been estimated.</td>
<td>The core quartz is always of superior grade and even suitable for optical glass as analysed by CGCRI.</td>
</tr>
<tr>
<td>3. Area around Pakuria in Hura P.S.</td>
<td>Quartz veins of Pakuria occurs within granitic country as lenses along the foliation planes. Taking working depth of 10 m the reserves have been estimated as Pakuria east - 15,000 tonnes, Pakuria west - 8,000 tonnes, Shyampur - 12,000 tonnes, Jorberya - 16,000 tonnes.</td>
<td>Quality of quartz have been reported to be good. 30,000 c.ft material have already been extracted for the construction of Hura-Bankura Road.</td>
</tr>
<tr>
<td>4. Mirmi under Balarampur P.S.</td>
<td>The reserve occurs as a massive body forming a tilla. It is associated with basic intrusives in the west. Considering mineability down to 15 m from ground level, total reserve of 0.4 million tonnes have been estimated.</td>
<td>Quality excellent; SiO2 content above 99.8% is not uncommon.</td>
</tr>
<tr>
<td>5. Kanchanpur area in Arsha P.S.</td>
<td>The quartz occurs as vein and also in association with pegmatite for over 50 hectares. Tentative reserve down to 10 m of depth is 0.1 million tonnes.</td>
<td>No detailed work has been carried out in this area.</td>
</tr>
<tr>
<td>6. Belamu area in Jhalda P.S.</td>
<td>Two minor lenses have been located within the major pegmatitic body of Belamu. A reserve of 700 tonnes has been estimated.</td>
<td>The lenses are of pure white variety and are of superior grade.</td>
</tr>
</tbody>
</table>
7. Dharmu area under Joypur P.S. Estimated deposite is 0.65 million tonnes. The deposite is not of superior grade at all places, but in general it is good. It is within 16 Km from Bokaro Steel City connected by good road.

8. Brindabanpur under Balarampur P.S. Quartz lenses occur within the country rock of mica-schist and amphibolite, forming low ridges tending E-W.

Tentative reserve down to depth of 10 m is 45,000 tonnes. The quality of quartz is good but most of the area is under new plantation of the forest department.

Besides the above, G.S.I and other sources reported a number of occurrences which have not yet been fully explored. It is high time to assess quality and quantity of each reported occurrence to feed the ever increasing need of local industries. Quartz being a high bulk and low priced commodity, preference is to be given to those which are situated near a rail head.

Kyanite:

Kyanite is an important raw material for refractory industry. All India production figure of Kyanite shows a gradual decline since 1970, whereas consumption is increasing year by year resulting in a sharp increase of price.

(7)

The Kyanite bearing areas of Purulia district are mostly situated on the western part of Balarampur town. The outcrops are located near the villages Dabha, Ichadih, Rasuldih, Genrua and Bela. Some occurrences have been found around Salboni village, east of Balarampur town.

In Dabha, about one kilometre west of the village Sharidih massive as well as bladed variety of Kyanite occurrences have been found in the valley area and they trend east-west in three parallel zones. The length of the entire mineralised area is about 150 m and the width is approximately 15 m. Isolated small patches are also located which

Cont'd...41/-
need thorough proving. The Kyanite occurrences of this area are of good quality and show an alumina content of over 58%.

In Ichadih, along the foothills of Kadali Pathar range, massive as well as baled varieties of Kyanites are found. Hill slopes are strewn with bladed Kyanite. An old trench, located near the foothill, exposes very hard and good quality massive Kyanite vein of 2 m width. The veins strike almost east-west, total length being about 300 meters. It is expected that several veins of unknown length occurring parallel to each other and striking east-west have formed a narrow belt along the lower horizon of the hill slope. The area is promising and needs detailed investigation.

Kyanite occurrences are also seen near the villages Salboni, Geurua, Rasuldih, Bela etc. All of these show bladed variety. Mining operation was started in the Salboni - Poura area in the year 1961 which produced small quantities of Kyanite till 1965. However, the operation has been suspended since 1965 on account of poor grade of the deposite (40-45% Al₂O₃).

These Kyanite occurrences are near surface and do not show a big deposite at any particular place. Reserves at different places have been estimated assuming a depth of 6m. The figures are given below. However, for correct estimation of reserve detailed investigation with the aid of trenching and pitting is necessary.

<table>
<thead>
<tr>
<th>Name of the Place</th>
<th>Quantity in Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ichadih</td>
<td>8,000</td>
</tr>
<tr>
<td>Dabha</td>
<td>6,000</td>
</tr>
<tr>
<td>Salboni</td>
<td>2,000</td>
</tr>
<tr>
<td>Other Areas</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Kyanite is a costly mineral as is most desired in the refractory industry. In Purulia this Kyanite belt has been left neglected until now and no systematic investigation has so far been made by any organi-
PLAN SHOWING THE BARYTE OCCURRENCES IN HURSI
NOAHATU, UKMA ETC. AREAS, P.S. JHALDA, DIST. PURULIA.

LEGEND:
- BARYTE OCCURRENCES
- PEGMATITES & QTZ. VEINS
- GRANITES, GNEISSES ETC.
- MICA SCHIST

WEST BENGAL 0 1 2 Kms
sation. Considering the value of this raw material and its importance in setting up a refractory plant in Purulia, exploration of this mineral needs immediate attention.

Baryte:

The baryte deposit of Purulia district has been known for a long time and small scale mining operations have also been carried out in different localities. Khedkar (1950) suggested a thorough investigation of these deposits to ascertain the actual reserve of barytes in the district.

The zone of baryte mineralisation forms an east-west belt. Exposed veins of baryte are located in the following mouzas of Purulia district form west to east:

A. Ukma, Noahatu and Hursi (Jhalda P.S)
B. Gunya, Baragram and Goudhudih (Joypur P.S)
C. Multhol and Ragudih (Purulia P.S)

A. Noahatu-Hursi Mouzas

A number of parallel veins of baryte are running through these two mouzas. Maximum width of the mineralised zone is not more than 100 m.

The trench in Hursi, which reached a depth of about 6 m, showed gradual increase in width of the baryte veins at depth. The mineral in the trench is of a massive nature and of off-white variety. This variety can be used in the paint industry. It is understood that about 100 tonnes of this mineral has been sold to the paint industry by W.M.M.D.T.C.

In an adjoining quarry at Noahatu, which has reached down to a depth of about 15 m and where massive white baryte exists, the vein width is about 0.6 m. The vein appears to be in line with the vein located in Hursi.
B. Gunya - Baragram Mouzas

Parallel veins of barytes occur at wide intervals in the Gunya Mouza. Length of the veins so far exposed, appears to be about 10 m to 15 m and the maximum width is about 0.6 m.

Mode of occurrence of baryte in Baragram area is similar to that at Gunya. Some basic intrusives have been found closely associated with the veins of barytes and as a result the barytes are found intimately mixed with ferro-magnesium minerals which are difficult to separate manually.

C. Multhol - Bagudih Area

This area deserves special mention because it offers good quality felspar along with baryte. The baryte bearing veins traverse the granitic country for a long distance and are associated with other minerals viz apatite and galena.

Most of the barytes of Purulia district are coloured. There are a few depositories like Hursi which may yield some white or off-white varieties which can be utilised in paint manufacture. The indicated reserves of barytes in all the areas are estimated to be more than 7,000 tonnes down to a depth of 15 m from the surface. If the width of a particular vein increases considerably at depth it would be difficult to continue mining at depths of more than 15 m economically.

Areawise reserves are given below :-

<table>
<thead>
<tr>
<th>Mouza</th>
<th>Quantity in Tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hursi</td>
<td>1,600 ( two veins )</td>
</tr>
<tr>
<td>Noahatu</td>
<td>2,000 ( three veins )</td>
</tr>
<tr>
<td>Ukma</td>
<td>500 ( one vein )</td>
</tr>
<tr>
<td>Gunya</td>
<td>1,650 ( four veins )</td>
</tr>
<tr>
<td>Baragram</td>
<td>1,050 ( three veins )</td>
</tr>
<tr>
<td>Multhol-Ragudih</td>
<td>500 ( three veins )</td>
</tr>
</tbody>
</table>

The baryte depositories of Purulia are not suitable for large scale mining operations, but as the demand is high and so is the price,
exploitation of these minerals up to whatever depth possible, may be started without further delay. There are reports of baryte occurrences from Jona area in Ranchi district which appear to be the continuation of the same belt. This indicates that a thorough and detailed prospecting is required in this belt.

**Base Metals:**

In Purulia district there are a number of old working of base metals, particularly of lead and copper. They have attracted the attention of entrepreneurs since 1850, but in the early years of this century works were abandoned as they were not commercially rich and were superficial in nature. A brief description of the occurrences of a few of these base metals are given below:

**Copper:** There are as many as five recorded occurrences of copper within the district but none of them has been found as yet to be commercially workable. The first reported occurrence was near village Poorah by Dr BALL in 1870. According to a report, about 15 tonnes of ores were produced from the occurrence near Kantagora and Tamakhum during 1944. In the 1963-64 the Geological Survey of India made an extensive geophysical and geochemical survey over a 9 Km stretch between Tamakhun and Punda. The State Directorate of Mines and Minerals carried out detailed copper investigation near Tamakhun and Bock, during the period 1966-71. A 220 metre long (east-west) mineralized zone, mainly chalcopyrite, with an average thickness of 5.5 m was encountered 17 m below the ground level. The average grade is 1.5% copper and indicated reserve is about 2,00,000 tonnes of copper. MEHRA and BISHAS on the basis of the analysis of test drill samples estimated the proved reserve of about 1,13,000 tonnes with an average copper content of 1.85% and down to a depth of 60 m.

**Lead:** Dr V BALL of the Geological Survey of India first reported the occurrence of galena, the lead bearing ore at Janighor.
near Dhadka in 1870. During 1904-05 M/s Mackinon Mackenzie & Co of Calcutta opened up a deposite of Galena at Beldi, besides prospecting eight other localities such as Kushbani, Lata, Lushi, Panra, Ghagra, Manna, Dallia and Janighor, all within 10 Kilometre radius of Dhadka. Beldi produced 272 tonnes of ore containing 92 tonnes of lead and 134 grains of silver and the deposite petered out at short depth. In 1960-61 the Geological Survey of India carried out an investigation of these depositories and geochemical prospecting showed moderate lead 400 to 600 metres north-north west of Janighor at Lewshai, Mirgicha and Satraguda. Other minor lead occurrences within Purulia district are near Biramdihi, Bhagband and Malthol.

A glance at the distribution of the base metal occurrences in Purulia district shows that these are confined to the southern part of the district associated with low grade schists and phyllites and in a zone parallel to the main Singhbhum thrust belt. Though in recent years ground geophysical and geochemical studies of a preliminary nature failed, a more comprehensive and detailed geological study may be embarked upon before a final conclusion regarding economic viability of the reserve is drawn.

**Stone Deposites for Road Metal and Building:**

Purulia is an Archaen terrain dominated by granitic complex with older parametamorphites of various nature. Basic intrusives are quite common.

Gondwana sediments cover a small tract in the north eastern portion of the district along Damodar river.

Hard, compact, medium to fine grained basic intrusive and lavas are best suited for using as road construction and cement concrete aggregate materials. Quartz and hard dense medium grained quartzite may also be used to some extent for the said purpose.

Cont'd....46/-
The prophyritic granite, as well as the granite gneiss which are available in plenty in the district, are suitable for making blocks or slabs for constructional work as well as for decorative purposes. The Gondwana sandstones are generally soft, but some of them, specially the siliceous and ferruginous sandstone of lower Panchet may also be used as road ballast and for block making.

About two-thirds of the district is covered by granitic rocks and as such quarries may perhaps be opened almost anywhere. However, the prominent hillocks which can be exploited easily for this purpose are located around Raghunathpur (Jaichandi Pahar), Bero, Jhalda etc.

Decorative Stones:

Ornamental stones were extensively used in the past in buildings, temples, mosques and memorials and even now modern architecture makes use of such stone. At present most of the ornamental stone used is marble. Other types of stones e.g. granite are not commonly used in northern India mainly because of uncertainty of supply as there is no such industry in northern India and it is the monopoly of a few firms in South India. There is a big scope for use of ornamental stones in costly buildings and public places because some of the ornamental stones, like polished granite, retain their shining polish for a longer period than even marble and resist weathering and pollution attacks. Purulia district has good reserve of various types of decorative rocks and there is a good potentiality of starting an industry on the basis of this resource.

In the mouza Dhunia under P.S. Raghunathpur there is a tentative reserve of 0.15 mil. m$^3$ of dolerite (dyke body) reserve within porphyritic granitic country. The rock takes good polish and almost black in colour. Big blocks, however, cannot be extracted for its well jointed nature. Extraction of slabs upto 45 to 50 cm cube are possible. The area is located about 9 Km from Raghunathpur on
Purulia - Bankura main road. Joychandipahar is the nearest railway station 6 Km from the site.

A good reserve of biotite granite with porphyrites have been located in mouza Bero (North) and Bero (North West) of P.S. Raghunathpur. This is the country rock of the area with formation of a hillock. The colour of the rock is black groundmass with pink or bronze and pinkish white eyelets of various sizes. Extractable reserves are 0.1 mil. m$^3$ and 0.2 mil. m$^3$ in the north and north-west parts respectively. Mouza Gede Beor and Senera under Raghunathpur also have similar rock reserve. Estimated reserve is about 0.30 mil. m$^3$ and colour of the rock are either greyish black or pink with occasional black patches.

An estimated 0.2 mil. m$^3$ reserve of pink felsic granite occurs in Mouza Nowahatu under P.S. Jhalda. In Jhalda massive foliated type white marble has also been located. Total reserve will be of the order of 0.1 mil. m$^3$.

In Kalimati, under P.S. Baghmundi pink granite rock with epidote have been observed. It is the country rock of the area and covers an appreciable lateral extent, but the epidote rich portion occurs as narrow patches. The rock looks very attractive when the epidots are deep green in colour. Tentative reserve is 0.5 mil. m$^3$.

Reserve of grey gneissic granite occurs at Barasini, P.S. Purulia. Estimated reserve is 0.1 mil. m$^3$. The rock, however, does not take attractive polish.

Mouza Maguria under P.S. Hura has a deposite of Dolerite and Gabbro. The gabbro occurs at the core of the basic body with the formation of prominent hillock. The area covered by medium grained gabbro is about 10 hectares. Estimated reserve is 1 mil. m$^3$. The medium grained gabbro gives very attractive look for its mosaic after

Cont'd...48/-
polishing, but shaping to bigger sizes and chiselling are very difficult

Apart from the types of rocks and localities mentioned above, there are bright possibilities of finding useful ornamental stones in other areas of the district. Detailed survey in this line needs serious attention.

**Fluorite:**

Fluorite or fluorspar is an important mineral indispensable for steel, enamel and chemical industries. A few fluorite bearing pegmatite have been located in Sulunglahar, Maramu and at the foot of Belamu hill.

The fluorite-bearing pegmatite west of Sulunglahar, extends for an approximate distance of one kilometre in an E-W direction, though the concentration of fluorite is restricted to a zone, about 250m long and 10-15m wide, near Purandih. Fluorite occurs mostly in small pockets within the pegmatite, in association with beryl, topaz, garnet.

The pegmatite, east of Maramu, running NE-SE, with a length of about 700 m and width 10-20 m also contains a small proportion of fluorite.

The fluorite-bearing pegmatite, occurring in association with granite-rocks on the southern flank of Belamu Hill, is the most important reserve. Preliminary investigation by GSI and State Directorate has revealed the presence of about 1.5 to 2 percent fluorite in this rock. This pegmatite body continues for a distance of about one Kilometre with an average width of 7-10m. Though detailed study is yet to be conducted, the reserve promises to be of economic importance.
3. LIVESTOCK RESOURCES

The district has a substantial livestock population and statistics available from District Livestock Office, Purulia shows a considerable increase in population during the last few years. Table No. 11 gives the number of animals and birds of different categories in the district farms for few years:

Table No. 11 Population of Livestock and Poultry in Purulia District

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td>6,86,000</td>
<td>8,68,500</td>
<td>8,95,300</td>
<td>9,35,400</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>64,900</td>
<td>81,350</td>
<td>1,45,700</td>
<td>1,56,900</td>
</tr>
<tr>
<td>Sheep</td>
<td>55,700</td>
<td>72,800</td>
<td>1,73,200</td>
<td>2,09,800</td>
</tr>
<tr>
<td>Goats</td>
<td>2,46,200</td>
<td>2,58,000</td>
<td>2,74,000</td>
<td>2,97,300</td>
</tr>
<tr>
<td>Pigs</td>
<td>N.A.</td>
<td>6,500</td>
<td>27,540</td>
<td>38,700</td>
</tr>
<tr>
<td>Poultry</td>
<td>3,48,500</td>
<td>5,56,900</td>
<td>8,52,800</td>
<td>12,36,200</td>
</tr>
</tbody>
</table>

Source: Livestock Census

Having considered the normal mortality rate (10%) of livestock population in the district, the annual availability of raw hides, skins and bones is as under:

- Raw hides ... 1,00,000 pieces (approx)
- Goat skin ... 30,000 pieces (approx)
- Raw bones ... 1,500 Tonnes (approx)

Raw hides and skins are now being supplied to Mokamah Bata Shoe Co. Raw bones are supplied to M/s Orient Bone Mills, National Bone Mills and a few other bone mills at Calcutta. Bones are also collected from the adjoining districts like Bankura in West Bengal and Ranchi in Bihar which are now being exported to Calcutta.

At present, there is one Government Poultry Farm at Hatoara, Purulia P.S. Eggs are supplied to wholesale Consumer's Co-operative Society, Purulia. Apart from this, there are about 100 private poultry units and 20 private dairy farms in or around Purulia P.S. The future development schemes for Animal Husbandry have been drawn up by the

Cont'd.... 50/-
Project Officer, Marginal Farmers and Agricultural Labourer's Development Agency, Development & Planning Department, Government of West Bengal. While about 1000 individuals will be covered under cattle development programme, 200 families and 300 families, respectively, will be assisted under the piggery and poultry development schemes during 1978-1982.

4. FOREST RESOURCES

Forest in the lateritic tract of Purulia are spread out in hundreds of blocks interspersed among villages and in close proximity of cultivation. The local population particularly the tribal people have always been dependent on forests in various ways and forests have played a large part in influencing the rural economy.

Forest of Purulia covers an area of 225,710 acres which accounts for only about 14 percent of the district's total land area. Total forest area and its classification in the district has been shown in table No. 12.

Table No 12 : CLASSIFICATION OF FOREST AREA (IN ACRES)

<table>
<thead>
<tr>
<th>Description of Forest</th>
<th>56-57</th>
<th>57-58</th>
<th>58-59</th>
<th>70-71</th>
<th>76-77</th>
<th>79-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserved Forest</td>
<td>25,115</td>
<td>25,115</td>
<td>25,519</td>
<td>27,708</td>
<td>27,693</td>
<td>27,920</td>
</tr>
<tr>
<td>Forest, Protected</td>
<td>186,134</td>
<td>184,185</td>
<td>1,92,255</td>
<td>1,79,965</td>
<td>1,80,000</td>
<td>1,88,790</td>
</tr>
<tr>
<td>Forest, unclassed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8,699</td>
<td>8,699</td>
<td>9,000</td>
</tr>
<tr>
<td>Total</td>
<td>211,249</td>
<td>209,300</td>
<td>217,774</td>
<td>216,372</td>
<td>216,392</td>
<td>225,710</td>
</tr>
</tbody>
</table>

Source : Divisional Forest Office, Purulia

These forests are very poor in large size timber content. Sal trees above pole stage are few and far between. Large size trees are mainly the lac-hosts like Kusum, or fruit yielding species like Mahua etc. Sal is the predominant species particularly in the flat land, at foot hills, in the cooler depressions and on the plateau, but elsewhere miscellaneous species mainly occur like Sidha, Dhau, Doka, Kend, Kusum, Galgali, Bahera, Amlaki, Polash etc. There are also clumps of poor quality bamboo scattered in the district, specially over the hilly areas.
The main forest products are Kendu leaves, fire-wood and poles.

The revenue earned on the sale (by auction) of these products in recent years is shown in Table No. 13:

Table No 13: REVENUE EARNED ON FOREST PRODUCE

<table>
<thead>
<tr>
<th>Product</th>
<th>Sales (in Rs'000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>66-67</td>
</tr>
<tr>
<td>Kendu Leaves</td>
<td>35.2</td>
</tr>
<tr>
<td>Poles and</td>
<td>119.8</td>
</tr>
<tr>
<td>Fire-wood</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>155.0</td>
</tr>
</tbody>
</table>

Source: Divisional Forest Office, Purulia.

The amount of sales by auction for different forests products will give a picture of the commercial availability of the forest resources.

The forests have suffered maltreatment in the past and are still being injured by biotic agencies. Indiscriminate cutting has been the cause of destruction of forests and brought the crop to a degraded status over large areas.

Massive afforestation programme has been launched in Purulia. After nationalisation of forest, many people are highly critical of the curbing on free exercise of the so-called rights of the villagers to free and unregulated enjoyment of forest produces, but unfortunately the benefit that scientific forestry and soil-conservation work are sure to bring to a decadent rural economy is very often lost sight of.

The impact of forestry and soil conservation on rural economy is likely to be felt in two ways viz (a) Directly, on the improvement of the financial conditions of the rural population (b) Indirectly, on improved agricultural prospects in the lands adjacent to forests in particular and to all other agricultural land in general.

Afforestation programme was taken up in right earnest during late sixties. The Kangsabati course, ravaged forest area of the Damodar valley were brought under reclamation. Another scheme for planting...
eucalyptus suitable for manufacturing newsprint and teak for furniture-making has been started. The State Forest Department has taken up a major social forestry scheme aided by the world bank. This will help to maintain the ecological balance.

References

1. West Bengal Census Hand Book - 1971


17. District Live-stock Office, Annual Report to Animal Husbandry and Veterinary Services Department, Govt of West Bengal (1980).