18
BLOCK-WISE TERRAIN PLANNING FOR AGRICULTURE AT PANCHAYAT-VILLAGE LEVELS

- POLOSARA
- KODOLA
- KHALLIKOTE
- CHATRAPUR
- KAVISURYANAGAR
- GANJAM
- PURUSOTTAMPUR
- HINJIL
A block is an administrative unit with block development officer (B.D.O.) who is responsible for executing the programmes and plants in the panchayats and villages coming under his jurisdiction. The elected bodies of the panchayats and villages assist him in pointing out the problems and areas where development and implementation of government programmes are to take place. Therefore, the author thought it better to present the terrain-wise planning of all the eight blocks in detail at village and/or panchayat levels in addition to the general planning of the Chhatrapur Subdivision as a whole (Ch.17). This approach would serve the objective of this thesis in a better way in terms of discussion, description, presentation and interpretation.
18.1. **POLOSARA BLOCK**

The block of Polosara is conspicuous by its vast outer segment of the Eastern Ghat (Fig.3.1). Nearly forty villages (including the uninhabited villages) of Gochhabadi and Pandidripada panchayats are located in the hilly terrain (HT) of the Polosara block. Outside the massive eastern hills of the Polosara block, about 29.76% of its agriculturally significant villages are located in the rugged terrain (RT), 50% in the moderately sloping upland terrain (MSUT), 17.86% in the nearly level low upland terrain (NLLUT) and 2.38% in the level lowland (LT) terrains (Fig.12.1).

(i) It has been felt already that the hilly terrain should continue as a densely forested space to check siltation loss, gullying and leaching. On the economic front these hills would conform to the means of providing seasonal employment and other household necessities. Further, it may be noted that these khondalitic hill units should continue to serve as the raw material base for granite polishing operation units. This would rather act as an antidote against unemployment constraint and constraints of overcrowding of cultivated terrain in the block.

(ii) The good terrain (V) in terms of capability (Fig.13.1) constitutes 6.67% of the nearly level low upland terrain of the Polosara block. It comprises only one village, i.e.,
Dhoyakana of the Ghodapalan panchayat. Here, about 75% of the productive space is irrigated and almost no cultivable terrain has been left as waste during 1990-1991. As there is a further scope of harnessing irrigation potentiality in the village Dhoyakana, efforts are to be made to bring about a marginal shift from the traditional homogeneous monocropping of paddy or pulses or oil-seeds to a second or multiple cropping through regular sample demonstration programmes with regard to a rational use of fertilizer, pesticides and scientific tillage, etc. (Fig.18.1).

(iii) The moderately good terrain (W) constitutes 48% of the rugged lands and 30.95% of the moderately sloping uplands. About 30% of the moderately good terrain (MGT) in the Polosara block is irrigated upon its natural availability of moderate water resource and moderate to rich soil potential (Fig.12.1).

The rugged terrain (RT), comprising Hatioto and Khonduru panchayats, represents a part of an isolated subdued plain (Ch.3). The moderately sloping upland terrain (MSUT) constitutes the moderately high upland tracts (Ch.3) of Mathura, Bellagam, Polosara, Khonduru and Madhupali panchayats. In both the terrain situations, the basic granulitic structure (Ch.2.2.1) and plastic earth lithology (Ch.7.7) have made allowance for moderately rapid permeability. The conspicuous brown sandy soil surfaces in parts of RT are subject to soil
erosion while the stiff heavy clay soil surfaces of MSUT are subject to water-logging.

As there is an additional scope of reclaiming 196.58 hectares of cultivable terrain in the MGT owing to manageable conditions in terms of relief, slope, water and soil conservation, efforts are to be directed towards some moderate management practices with regard to an assured water supply, increase in plant nutrients, scientific tillage, etc. In this context the canal network of the Dhangle Irrigation system is to be broadened. Owing to an ameliorating structural lithology the groundwater potentiality in parts of Hatioto and Mathura panchayat villages requires to be tapped at suitable points. A special care must have to be taken to check soil erosion and the problems of water-logging in these parts. The conspicuous salinity of the soil surfaces around these water logged tracts can be exploited for the time-being through the growing of salt resistant paddy. On control of soil and water loss and salinity, the remarkable homogeneity in respect of the cropping pattern may be marginally shifted and diversified in the larger interest of the overcrowded rural population in these parts.

(iv) The fair terrain (X) constitutes 20% of the RT, 57.14% of the MSUT, 26.66% of the nearly level low upland (NLLUT) and 100% (2.38%) of the level terrain (LT) in the Polosara
block. About 70% of the fair terrain (FT) in the RT, 50% in the MSUT and 30% in the NLLUT and LT are irrigated through different irrigation means.

The FT, comprising the rugged parts of Madhupali (Gilunda and Dilaijhuri villages) and Mathura (Mathura and Mardarajpur) panchayats, is represented by differential tropical weathering and dissection of lateritic surface expressions. These reveal a tendency towards poor water resource but medium to moderately rich soil potential (Fig. 12.1). The soils are acidic and suitable for paddy growing.

Parts of Chirikipada, Mathatentulia, Madhupali, Badapankalbadi, Dhunkapada panchayats exhibit an FT character of their MSUT units. The soil potentiality here ranges from moderately rich to rich, while the water resource is moderate. The conspicuously high pyroxenated granulitic substructure of the upland portions of these panchayats result in a greater degree of surface undulations and rapid permeability at regular intervals. During our field work it has been observed that while some dug-wells have brackish water, the others have rich water resource particularly in parts of Bhabarada and Chirikipada villages of the Chirikipada panchayat. In this panchayat the conspicuous waterlogging areas have been alternated by dry surfaces. The fine clay soils in these upland tracts grow extensive sugarcane and pulses while the heavy soils grow
paddy by the support of the canal systems of the Dhanei river irrigation system.

The village Balichai (Balichai panchayat), Ghodapalan (Ghodapalan panchayat) and the Jakkaro panchayat villages in the NLLUT, and Hatibadi and Marada villages of the Mathura panchayat in the LT exhibit the FT characteristics. About less than 30% of the FT in these parts is irrigated. The hard khondalitic basement in these parts allows least infiltration of water and accelerate soil erosion. Therefore, the inland waterbodies in these parts have been either turned to swamps or dry depressions. The riverside uplands in the village Balichai register finger gullies. The agriculture in these parts is rainfed besides its homogeneity in terms of cropping pattern and intensity.

As there is a scope of reclaiming about 270 hectares of cultivated area of fair terrain capability distributed in different panchayats in their RT, MSUT, NLLUT and LT, the observed landuse operation problems need immediate concern for suggestive approach to a prospective planning for agricultural land utilisation as follows:

With the uphold task of Dhanei and Bhaguva irrigation extension schemes after due negotiation with the structural lithology in parts of RT and MSUT would undeniably increase the intensity of irrigation during both kharif and rabi
seasons. The strategic locations of usable ground water availability requires a diagnostic survey by the Central and State Ground Water Survey Departments in collaboration with the Geological Survey of India and the Geo-hydrological Survey of India to compensate the surface irrigation insufficiency in parts of MSUT, NLLUT and LT.

The provision of potential irrigation will thus increase the cropping intensity in the MSUT of Chirikipada panchayat and in the RT of the Mathura panchayat. A vast tract of agricultural waste and fallow lands in parts of Mathura, Balichai and Badapankalabadi panchayats can also be brought under cultivation and/or pasture. In this regard rain water conservation and soil conservation measures are indispensable as well over most of the FT. At present substantial quantities of sugarcane and oil-seeds need extensive processing by shifting these minor processing units from the few households to the small scale cooperative agro-based industries with a view to boost rural employment in these parts.

(v) The moderately fair terrain (Y) constitutes 24% of the RT, 11.91% of the MSUT and 66.67% of the NLLUT in the Polosara block. About much less than 10% of the total cultivated area of this unit is irrigated over and above its moderate natural water resource and moderately rich soil potential. The proportion of cultivable waste is very unevenly distributed in all terrain units under the MFT. The proportion is, however, more in the RT and the LT.
The moderately fair terrain (MFT) in the RT has been represented by the villages of Sodoka, parts of Balichai, Rumagad and Ghodapalan panchayats. The conspicuous terrains of these panchayats are characterised by the well-defined high gradient ruggedness, medium soil potential, and poor water resource. The remarkably high upland nature of this terrain consists of very hard gneissic basement which restricts infiltration and causes severe land degradation by way of soil erosion and surface run off. The highly undulating nature of the terrain restricts an easy availability of canal irrigation. Therefore, the chief means of irrigation are naturally dugwells and rain water conservation tanks.

The MFT in the MSUT constitutes Kendubadi and Garaijhuli villages of the Kanochai panchayat, Jagirdengapadar in Jokkaru panchayat, Malatibadi and Khapraganda villages of the Rumagad panchayat. Apart from the moderate gradient ruggedness of the terrain, the landscape has been deeply dissected and undulated. The water resource is moderately rich while the soil potentiality (Ch.13) is medium. Deep dissection and steep slope have limited the cropuse in these parts to rainfed monocropping during the kharif season. During the years of of monsoon failures (1987-88) the cultivated terrain in the MSUT has been subjected to drought conditions and the lowlying waterlogged land is affected by the salinity of soils. In precise the potentiality of the cultivated terrain is lost within
the conspicuous barrenness. Owing to all these adverse terrain conditions operating simultaneously there is naturally a least natural scope for crop diversification. Therefore, an intensification in the mono-crop use is the only available solution and ready answer to any planned cultivated terrain use management question in the moderately sloping upland terrain units under the MFT in the Polosara block.

The MFT in the NLLUT constitutes portions of Dhunkapada, Kanochai, Rumagad and Sodoka panchayats. This nearly level elevated plain of the Polosara block is structurally ameliorating at places with regard to the moderate conditions in respect of water resource availability. The clayey surfaces over most of the MFT in the NLLUT offer moderately rich soil potential. A notable exception in this regard has been, however, observed in the villages of Mandara (Rumagad panchayat) and Patrapur (Sodaka panchayat) where both the water and soil potentials are poor. The low permeability of the khondalitic rock basement in Sodoka and Rumagad panchayats has given rise to extensive soil erosion and runoff. But with assured irrigation and soil conservation practice in parts of Dhunkapada and kanochai panchayats their MFT has been conveniently put to the growing of pulses and/or oil-seeds as second crop after paddy. The MFT in the NLLUT has been observed to be lying as extensive fallow land especially during the rabi season owing to the non-availability of irrigation.
The problems of agricultural landuse under MFT warrant serious consideration and an appropriate and a timely approach to their solutions at least to maintain the stability in respect of productivity and area under crop-use. The progressive increase in irrigation during the recent years is not only accountable solution to the ultimate gain in the productive sector of the RT and MSUT but adequate measures to check soil erosion to protect annual loss of their potential soil surfaces. Extensive pasturing and afforestation in and around the Sodoka and Rumagad uplands and the top-dressing of the nearly level low upland in the Dhunkapada and Kanochai panchayats would serve as the foundation of the total agricultural landuse returns and expansion of potential pasture-based entrepreneurship. These would ultimately extend opportunities of employment.

The terrain of moderate capability (Z) constitutes 8% of the rugged terrain comprising Banamalipali village of the Sodoka panchayat and Bhatakhali village of Rumagad panchayat. About 19.31% of Banamalipali and 40.62% of the Bhatakhali cultivated terrains are irrigated. Owing to steep slopes, deep dissection, poor water resource, low soil potential and low productivity, almost no inch of agricultural land has been left unexperienced in terms of agricultural practice by the dense local farm population. The paddy being dominant, at present no viable alternative in terms of crop sequence is in the present author's thought upon these parts. As soil
erosion is extensively severe a large scale soil and rain water conservation is, however, thought of. An extensive pasture development would definitely provide an effective infrastructure for poultry and livestock farming development to tide over the growing seasonal unemployment situation in these parts of the Polosara block.

18.2. **KODOLA BLOCK**

Outside its northern hilly terrain the RT constitutes 30.72% and the LT constitutes 61.44% of the Kodola block. Agriculture is the single largest occupation here. Overcrowding, laterisation, soil erosion, run-off, land fragmentation and poor underground water potential are some of the crop-use constraints. Therefore, about 1603.66 hectares of good agricultural tracts lie as waste lands (1991). The consequent sequence of cropping is, therefore, limited to monocropping. On the development front the Kodola block exhibits a some amount of untappable natural water resource both above and below its khondalitic rock basement. The available irrigation through different means (Ch.15) is not very far from satisfactory. About 7513.57 hectares out of the total productive a space is under irrigation. There are significant improvements in the fertilizer use and response to the various institutional programmes relating to agriculture and employment. Therefore, efforts have been made by the
author to assess the amplitude of the existing agricultural landuse problems and available potential means in the agricultural sector of the Kodola block. This is with a view to make suggestive approach to agricultural landuse planning in each terrain segment of a given capability class (Figs. 12.1 and 13.1).

(i) The good terrain (GT) in terms of capability (V) is almost absent in the RT and MSUT of the Kodola block. It, however, constitutes a significant 11.70% of the LT above 30 metres from the sea level. About 44% of the GT is irrigated. It has rich soil and water potential. There is a further scope of bringing another 25% of the land under irrigation of the Jagati and Kharkhari canal irrigation systems. The underground water resource is moderately rich at ameliorating acquifer junctions of the underlying leptinytic basement. Since this limited part of the Kodola block is a focus of promise and insurance against crop failures elsewhere in the block, several significant landuse problems have been identified in the GT parts of Digapada, Kodola and Mardakole panchayats in view of planning their cultivated terrain use in the regional physical and general socio-economic perspectives. Such problems consist of soil and water loss through defoliation and unscientific tillage and irrational chemical fertiliser use, casteism, attitude of land-owners and land fragmentations, etc. (Fig.18.2).
In the light of the foregoing discussion the conspicuous landuse problems need to be evaded and the existing cropping pattern of rice-ragi or rice-pulses or rice-oil-seed requires to be intensified upon further activation of the existing means of soil and water conservation. As the productivity is low owing to the primitive tillage techniques in parts of Mardakote and Digapada panchayats it is high time to adopt technology transfer programmes. A detailed underground water survey by the State/Central geo-hydrological divisions to harness the ground water potential as a supplementary help during rabi and during the rain failures in kharif. Recommended use of fertiliser especially organic fertiliser, extensive pasturing and land legislations constitute some of the other urgent measures for the effective use of agricultural land under the GT in the LT of the Kodola block.

(ii) The MGT(W) constitutes 36.17% of the level terrain comprising parts of Mardamkha, Khandianai, Chingudikhol and Beguniapada panchayats. The MGT panchayats virtually constitute the rice granary of the Kodola block. Therefore, the MGT in Kadola block needs a similar attention as the GT. About 43.87% of the cultivated terrain under MGT is under canal, tank and well irrigation. Only 10% of the land has been left as fallow here.

In order to maintain the optimum productivity level of the agricultural landuse in these villages under the MGT, the
problems of minor surface undulations, soil erosion, and swift overland rain water flow and water loss and unreliable rainfall need immediate concern. The potential measures in this regard should consist of soil and water management, extensive topdressing of the fallow lands and bunds, afforestation on either sides of the Waridighai canals, development of compost pits and green manure, etc., in addition to the recommended use of chemical fertilisers and adoption of HYV seeds of short growing season. The extensive pasture land planning would ensure better employment opportunities especially during the rabi season when the area under plough over most of this capability unit is considerably low in comparison to the kharif land utilisation. 

(iii) The FT(X) constitutes 29.79% of the RT, 58.33% of the MSUT and 51.07% of the LT in the Kodola block. About 30% of the cultivated terrain under the FT is irrigated while its cultivable wastes contribute more than 15% of the productive space.

The FT in the RT of the Kodola block comprises the rugged parts of Mathasarsing, Digapada, Kalimeghi, Mardakota, Chingudikhol, Khandianai and Badakhairakhamunda panchayats. Around more than 85% of the cultivated terrain is put to direct agricultural use at present (kharif) in spite of its low soil and water potentials. This is due to no viable alternative
occupation near at hand. It has been observed in parts of Mathasarsing and Kalimeghi panchayats that the movement of rain water and eroded soil takes place in sheets and finger gullies in detriment to the processes of nutrition accumulation by plants and other organisms. This is because of the lateritic and other ferruginous lithology and feruginous quartzitic and garnetiferous gneissic geology. These impede infiltration particularly over most of the RT. Therefore, the soil and water loss in these parts need immediate concern.

The FT in the MSUT constitutes parts of Khallikote Barida, Saurachchina and Sumandal panchayats. About 38% of these upland cultivated terrains is irrigated by the wells and upland tanks. The culturable wastes contribute 7% to their total productive space. The productivity is considerably low (1:1 ratio) owing to low soil and water potentials. The impervious khondalitic basement, sandy and lateritic surface expressions and innumerable bare rocky out crops of Archaean gneiss result in extensive gully and sheet erosion leaving the soil profiles truncated and the soil surface deprived of its expected fertility restoration. Any effective cultivated terrain use planning in these parts is certain to be followed by much indispensable soil-use and water-use planings.

The FT in the LT of the Kodola block constitutes a major part of the Beruanbadi panchayat, parts of Mathasarsing,
Saurachachina, Burujhari, Sumandal, Talasara, Sandhamul and Angargam highland narrow plains (Ch.3). About 31.93% of the FT in these parts is irrigated by the tanks and wells. The cultivable wastes in these parts constitute little more than 15% of the productive space. Deep dissection, mild ruggedness, high plateau character of the terrain, low soil and water potentials of the khondalitic basement, red ferruginous clay and lateritic surfaces and rain shadow conditions are some of the serious physical constraints over above the social ones that are operating and acting against potential agricultural operation in these parts.

In actuality the FT(X) in all the terrain segments precisely reflects all the problems relating particularly to soil and water in acute form. The State Government of Orissa has been trying to give much lift to agricultural development in the Chhatrapur Subdivision as a whole in terms of irrigation, fertiliser, HYV seeds, and programmes relating to opportunities of employment and, etc. But the crux of the planning solutions relating to agricultural landuse in the FT in these parts of Kodola lies in the soil and water management. Therefore, a detailed action plan in this regard should concentrate more upon the soil and rain water conservation, maintenance and expansion of the available irrigation efficiency, underground water survey, land levelling and land consolidation
and so on. These need extension into the Lachipur village of Mathasarsing panchayat, Dhamanakholl (Digapada panchayat), Jogiagula (Kalimeghi panchayat), Sankhalundi and Totapada villages (Chingudikhol) and Mathabarida village (Khandianai panchayat) in the RT. Contour bunding, contour-trenching, terracing, regulated pasturing, recommended use of chemical fertilizer are advisable in the villages of Nimina (Khallikote barida panchayat), Belopada (Saurachachina panchayat), and Titridi village (Sumandal panchayat) under their FT and MSUT conditions. Similarly land consolidation, silt detention, rain water conservation and land legislation against the general attitude of the land-owners are some of the vital measures that are to be taken up seriously for consideration in parts of Beruanbadi panchayat village; Ambthapali, Ragapur and Saurachachina villages of the Saurachachina panchayat; Baniabadi, Sumandal and Sankuda villages of Sumandal panchayat; Talasara and Hanstuli villages of Talasara panchayat; Sandhamul and Krishnasara villages of Sandhamul panchayat and Angargam, Panasadhi, Kolia and Nakuachina villages of the Angargam panchayat.

(iv) The MFT(Y) constitutes 57.45% of the RT, 41.67% of the MSUT and 1.06% of the LT. The agriculture in the MFT is exclusively rainfed and paddy being the dominant crop. The practice of double cropping is confined to the limited tracts in the LT. About 32.22% of the cultivated terrain under MFT is irrigated and waste lands constitute about 10%.
The MFT in the RT of the Kodola block constitutes Chata-
baunsiabagan, Badrakhapali, Mathaberhampur and Mathasarsing
villages of the Mathasarsing panchayat; Beruanbadi panchayat
villages of Satnal and Rampali; Champeitpur, Badakhalandi
and Uajhol, Suari, Khidingi, Bhaliapada, Kesharpur, Surupada
and Bhabinipur villages of the Talasara panchayat. About 31.76% of
the MFT in the RT is irrigated by the rainfed tanks, wells
and shallow tube wells. Here the soil and water potentials
are poor. Agriculture is predominantly rainfed owing to
frequent irrigation failures. Thus, the productivity level
is also below the level of expectation out of the MFT here.
Owing to considerable undulations and unfriendly geo-lithology
the available groundwater resource is marginally poor.
The amount of soil and water loss through soil erosion and
run-off is quite heavy affecting adversely the efficiency
in the utilisation of agricultural land.

The MFT in the MSUT constitutes Burujhari, Parinuagam,
Kandhatotapada and Basantaban villages of the Burujhari
panchayat in the Kodola block. About 25.97% of the MFT here
is irrigated. The soil potentiality and water resource are
moderate to poor owing to the undulating nature of the re-
gional slope and the light ferruginous quartzitic structural-
lithology. An extensive defoliation of the MFT has led to
serious sheet and gully erosion. Therefore, the agricultural
productivity is low.
The village Badakhairakama (Badakhairakama panchayat) constitutes the MFT in the LT. About 62.07% of its cultivable space is irrigated upon its low potential soil surface and very low water resource. Unscientific tillage and overgrazing have also led to severe soil erosion. The consequent loss of the soil nutrients has resulted in low productivity, and the farm practice is limited to monopaddy cropping. The land remains mostly fallow during the *rabi* season.

It may be noted that an alround agricultural land use optimisation in the villages under the MFT in the RT, MSUT and LT has been based exclusively upon the potential strength of rainfall reliability and soil stability. Therefore, the execution of several soil conservation schemes by the Government of Orissa in these parts at present needs further acceleration with regard to its function and management. This would then be followed by the other infrastructural developments relating to the agricultural landuse.

(v) The terrains of moderate capability or the TMC(Z) constitute only 12.76% of the RT comprising Khaladi (Kalimeghi panchayat) and Agula (Mardamekha panchayat) villages of the Kodola block. Though the water resource is moderate the soil potential is very low and poor because of a high gradient ruggedness, high local relief, deep dissection, severe gullying, run-off and soil erosion. Although about 10% of the
cultivated area under the TMC is irrigated, the negative
terrain constraints limit the effective water-use. Therefore,
the agricultural landuse operation in these parts is limited
to monocropping, i.e., kharif paddy growing under acid soil
conditions. Owing to a total dependence of the dense local
farm population on agriculture for all practical purposes a
planned effort in this regard should be directed towards
extensive afforestation of the gully heads, cover-cropping of
the unused plots, gully control, rain water conservation,
recommended fertilizer use, development of compost pits and
finally the most significant scientific tillage in the
villages of almost all capability units.

18.3. KHALLIKOTE BLOCK

The landscape of Khallikote block in the Chhatrapur Sub-
division truely represents a terrain of great physical inequa-
lities. Its terrain is rather an abridged version of the total
landscape representation of the Chhatrapur Subdivision. A
major portion of the block is defined by varying rock types
of krondalitic suit and soil types formed out of a garneti-
ferous lithology. Its surface configuration displays a much
greater degree of undulations (Fig.3.1) than any other block
of the Subdivision. The entire block is now in a continuous
process of severe soil erosion, leaching, soil profile trunca-
tion and excessive run-off. The average available water
potential of the block is conspicuously low owing to the litho-structural irregularities. Many villages of the block are away from an easy reach of flow irrigation due to the frequent interruptions by the residual hills and bare rock outcrops. About 36.42% of the total cultivated space in the Khallikote block is irrigated by the Kharkhari river and tanks besides the wells at favourable structural locations.

Agriculture is homogeneous all over the block with paddy being the dominant crop. The other crops like pulses, ragi, oil-seeds and vegetable follow according to the norms of location specificity with regard to the conditions of their growth and intensity of cropping. On the whole the agriculture in the block is exclusively rainfed. The kharif cropping dominates. Forestry in this block plays a significant role in the regional economy next to agriculture.

So far as the terrain differentiation in the Khallikote block is concerned it has been represented by the RT (48.59%), MSUT (7.91%), NLLUT (27.68%) and LT (15.82%) outside the massive hills in the north, northeast and east. Most of the nearly level and level terrain units in the block are mere inherited surfaces of the undulating uplands or high residual hills. Apart from the readily distinguishable ruggedness, the conspicuous surface roughness is an integral part of over most of the block. Owing to the litho-structural and surface
configurational diversity, the cultivated terrain capability is not contiguous. It varies more or less as the conditions of the terrain vary. In this manner the GT(V) constitutes 5.25% of the block confining itself to the level terrain only. The MGT(W), FT(X), MFT(Y) and TMC(Z) constitute 23.44%, 57.33%, 4.52% and 9.46% of the block respectively (Figs.12.1 & 13.1).

(i) The GT(V) constitutes 17.86% of the LT comprising the villages of Langaleswar, Chelu, Bilaspur, Gothialikhet and Chandapur in the Bedhanalinakhyapur panchayat in the southwest of the Khallikote block under the command of the Kharkhari River Irrigation Project. About 46.58% of the GT in these parts is irrigated. The available surface water resource is more or less rich with rich soil potential. This region is occasionally mechanically farmed. The clay soil surfaces of the region are deep and fertile displaying occasional truncated soil profiles because of poor infiltration. Waterlogging, soil profile truncation, brackish underground water are the three major constraints which act against the practice of double cropping in these parts. The kharif cropping is dominant and is characterized by inter-cropping of pulses and ragi. If the present supplementary reservoir of the Kharkhari river near Bilaspur village is directed through the canals only after they are properly lined, the irrigation efficiency of the Kharkhari water can be exploited during the rabi season
also. Similarly the present soil conservation schemes in the GT should focus more upon the typicality of the geo-lithological (Chs.2 & 7) composition of the regional soil surfaces. As we observed, the salt resistant Lunishree paddy may be adopted in the cultivated terrain around the water-logged areas of the A.N.Pur panchayat would serve as a planned fillip in terms of the optimization of the productive potential of this capability unit. The use of chemical fertilizer in this regard should be regulated and green manuring is to be encouraged (Fig.18.3)

(ii) The MGT (W) constitutes 6.97% of the RT, 14.29% of the MSUT, 24.49% of the NLLUT and 46.43% of the LT in the Khallikote block. The locational peculiarities of the MGT have been reflected in the typicality relating to its soil water and agricultural productivity in different terrain units of the Khallikote block.

In the RT, the MGT has been characterized by rich soil potential and moderate water resource. About 25.15% of the MGT in the RT is irrigated and chief means being tank irrigation. The anorthocitic rock basement has impeded infiltration and accelerated brackishness of the underground water. Therefore, the agriculture over most of the RT under MGT is rainfed. Paddy is the dominant crop owing to the acid sandy clay soils.

In the MSUT, the MGT constitutes 14.29% of which about 35.24% is irrigated through tanks, wells and other water bodies
such as nala, ponds and swamps. The water resource from all these natural sources is rich but the regional soil potential is medium to moderate owing to dissection and stoniness. The soil surface is predominantly ferruginous red sandy. Paddy and groundnut are the two chief crops. The conspicuous cropping pattern needs improvement and change with the simultaneous removal of the constraints relating to extensive sheet erosion, excessive use of chemical fertilizers and low quality of underground water.

The MGT constitutes 24.49% of the NLLUT of which 31.52% is irrigated. The region is moderately dissected with low and imperceptible ruggedness. The soil potential is moderate to medium while the water resource is moderate. The agriculture in these parts is monotonously monocropped and rainfed. Most of the lift irrigation points go dry in the early kharif sowing. Drought conditions are frequent when the monsoons fail or arrive late. Soil erosion, run-off loss, deforestation, overgrazing, overuse of chemical fertilizers, deep groundwater table, salinity of soil, leaching, etc., need immediate attention in these parts for a prospective use of agricultural land.

The MGT constitutes as high as 46.43% of the LT of which about 57.11% is irrigated through tanks, rivers and wells. The region possesses the richest of water potentials that are
available in the entire Khallikote block. The soil potential of the region's sandy clay soil surface is moderately rich inspite of high dissection. The agriculture primarily rests upon monocropping while some vegetables are grown as inter crops during the kharif season. The rabi vegetable growing forms the bulk of the kitchen garden produce around the private tanks. As this region has been computed and observed to be more potential in terms of agricultural landuse, double and/or multiple cropping is not far from reckoning.

Thus, while suggesting the location-specific model in view of planning the cultivated terrain use, it has been observed in the foregoing that the constraints of soil and water loss, land surface dissection, water-logging, brackish ground water, overgrazing and deforestation are most spectacular.

The soil conservation measures such as soil detention reservoirs, gully control, nala plugging, rain water conservation ponds are necessary in the rugged and upland terrains of Koirasi and Bikrampur panchayats; Laxmanpur, Kaithada, Ratnapur villages of Aitipur panchayat (NLLUT) and Manapali, Bedhinuapali and Kenchuapada villages of Bedhinuapali panchayat (NLLUT). As the B.N.Pali panchayat is situated in the rain shadow area of the Sakula and Chachina hills, the amount of available rain water, though meagre, need proper conservation for crop security. Underground water survey is indispensable. We believe that if the underground water will be available
in future in these parts, the extensive stretches of fallow land can be reclaimed for agricultural operation. We are sure about the occurrence of huge reserve of groundwater beneath the anorthocite basement. This has been observed in the wells of the Wardarajpur village during our field investigation. The village Kanchana in the level terrain of the Kanchana panchayat needs a demonstrative planned effort for a potential lift in the present pattern of its cropuse which is astonishingly mono-cropping. This is in view of its vast natural infrastructural provisions relating to agricultural landuse. The conspicuous land levelling of the dissected cultivated terrain in the village Kanchana would be the first exemplary step. The other villages of Pustapur and Bhatapada (Kanchana panchayat), and Badarampali village (Kumondo panchayat) in the LT need extensive land levelling, afforestation of their barren lands, recommended use of chemical fertilisers, organic manure, erosion control and rain water conservation, etc., for a potential face lift in their rainfed agricultural landuse operations.

(iii) Steep residual slope characteristics, moderately high gradient ruggedness, deep dissection and moderate to high amplitude of available relief are the conspicuously common terrain characteristics of the FT(X) in all terrain units of the Khallikote block. The FT constitutes 76.74% of the RT of which 32.90% is irrigated. The soil and water
potentials of the region under discussion are moderate to medium. The remarkably pronounced tropical weathering of the region's khondalitic basement, deep finger gullies, very rough and broken-bamboo-like land projections, deep dissection, sheet erosion, increasing defoliation and serious run-off have limited the agricultural operation in these parts to the kharif paddy growing only. The agriculture is purely rainfed. Therefore, the conditions of drought are common during the monsoon failures or due to the late arrival of monsoons. There is at present no any other viable source of alternative irrigation over most of the FT in the RT than to conserve rain water and residual moisture of the dew drops through ploughing in the early hours of the day-break.

The FT constitutes about 85.71% of the MSUT exhibiting a very wide area of irregular and disjointed steep residual slope units, deeply dissected and rough surfaces, dry gullied channels and scattered xerophytic surface plant cover. The severe soil erosion has been more or less controlled in these parts by the institutional initiatives during the recent times. The laterite springs are a rich source of water resource in these parts. About 32.90% of the productive space is irrigated in the FT of the RT. Although the soil potential is moderate, very often the fertility status of this terrain has been depleted by way of overuse of chemical fertilisers and unscientific tillage. This in fact led to an increase in the size of
the regional barrenness. Extensive defoliation in these parts also contributed to the barrenness of potential lands. The agricultural landuse is limited to kharif paddy or groundnut growing. The ever increasing farm population pressure on the cultivated terrain in these parts has led to serious conditions of poverty which has been directly assessed from the peoples' standard of living during the field investigation.

The FT constitutes about 53.06% of the NLLUT in the Khallikote block. The conspicuous surface expression includes frequent rock exposures, dissected morrum surfaces, accacia plant-cover, dry wells, laterisation, gullied surfaces, low water resource and poor soil potential. About 23.51% of the NLLUT under FT is irrigated through tanks and wells that are often away from the location of the cultivated tracts. Thus, the agriculture in these parts is primarily rainfed while paddy and groundnut constitute the conspicuous cropping pattern.

It is, therefore, imperative and desirable to consider the several landuse constraints under this given land capability (FT) unit in different terrain units of the Khallikote block with a view to restore its optimum capability for more productive agriculture. It has been observed during the field survey that the maintenance of stability in respect of even the present mono-cropping pattern in all terrain units under the FT is vital as there seems no any other vital alternative.
in this regard. The Government initiatives in this respect, however, need regular supervision. The several employment generation schemes of the Orissa Government that have been more or less in a paralysing state in the FI unit are to be revived as these schemes in the Khallikote block have been reared upon the regional agricultural base. Therefore, the specific approaches in this respect include land levelling, gully control, rain water conservation, rock bunding of the terraces, social forestry in the RT under FI comprising especially the parts of Badapali highland panchayat in the north of the Khallikote block. These need to be extended also into the villages of Paladhuapali and Bhikapada (Bhikapada panchayat), Keshpur and Langaleswar panchayat villages within the Langaleswar-Dalibati belt on both sides of the NH-5 along the Lake Chilka borderland. A portion of the ferruginous sandy soil surfaces in the Keshpur village (RT) needs desalination of its lacustrine incursed soils for extensive vegetable growing. In a similar manner, the land-levelling, extensive afforestation, groundwater treatment and groundwater survey, conservation of rain and lateritic spring water, social afforestation of extensive cashew plants, management of soil conservation and irrigation points, etc., in parts of Danapur, B.N.Pur, Bada­pali, Tulasipur and B.N.Pali villages of the NLLUT. The villages of Chikili, Bania and Kharinioada of the Chikili panchayat in the NLLUT need special consideration in this
regard. These villages represent the most potential agricultural tracts of the FT. Introduction of HYV paddy, pulses and vegetables in the cultivated terrain of Chikili panchayat obviously would demand an immediate functioning of the now defunct Anthuaghai MIP which is about 4 kms northeast of Chikili. These planned efforts would also take into account the reclamation of swampy clay soil surfaces in parts of Chikili, Sania, Dutiyanuapali, Medipur, Kancharapada and Allapur villages. It may be noted that in the final stage of an effectively planned cultivated terrain use these villages of the Chikili panchayat would undoubtedly act as potential insurance against the regional crop failures elsewhere in the Khallikote block.

(iv) The MFT constitutes 8.14% of the RT, 22.45% of the NLLUT and 3.57% of the LT. About 32.07% of the MFT in the Khallikote block is irrigated upon moderate soil potential and poor natural water resource. The present agricultural practice conforms to mono-paddy cropping in general and vegetable growing in favoured tracts only.

The underlying terrain constraints of the MFT in all terrain units are more or less uniform and demanding identical planning attention in all these terrain units. High relative relief, moderate gradient ruggedness, steep slope, high surface elevation, low water resource, deep dissection and low
soil potentials have led the region under the MFT to opt for the rainfed kharif agricultural landuse operation.

The MFT constitutes about 8.14% of the RT of which only 20.13% is irrigated by tanks, wells and other natural water bodies. The chief agricultural crop, i.e., paddy or groundnut is grown on the upland rugged undulating plains of very low natural water resource and medium soil potentiality. The groundwater table is deep and the wells are dry during the pre-kharif land preparation. The extensive lateritic surfaces exhibit no instance of rich agriculture in any part of the MFT in the RT though agriculture is the only occupation here. The existing measures of soil conservation upon this terrain offer no other alternative to agricultural landuse than forestry only.

The MFT in the NLLUT covers 22.45% of the total area of which a meagre 16.34% is irrigated by tanks and well especially during the kharif season. The regional topographical limitations of the NLLUT are very much similar to those of the RT. The salinity of the soil surfaces and low surface undulations upon the khondalitic geology in these parts resulted in moderate soil potential and low water resource. The conspicuous overgrazing, defoliation, unscientific tillage and overuse of chemical fertilisers consistently overshadow the available land capability. In this manner the cultivable land degradation in the NLLUT extends an adverse influence upon the extent of the agricultural landuse operation under the MFT.
The MFT constitutes 32.14% of the LT of which about 24.47% is irrigated. The region has been identified as a rough surface and characterized by a high absolute relief (Fig.9.1). Along the lacustrine margins of the Lake Chilka this region registers a high degree of soil salinity and a cluster of many small residual hills and bare rocky outcrops. The region is prone to severe soil erosion in elongated sheets. The soil potential is moderate while the water resource is quite poor. Therefore, the agriculture in these parts is limited to rainfed cropping of paddy or groundnut.

It has been a general observation that the common constraints in the MFT in the RT, NLLUT and LT have led the present author to lay stress upon land management, soil conservation through extensive afforestation and scientific tillage in the initial states of cultivated terrain use planning particularly in parts of Raisulpadar and Kharidabadi villages of the Bhikapada panchayat, and the Khallikote town and Jemadeipur village in the RT.

Land levelling, desalination of soil, erosion control and pasture land development, ground water survey and organic fertilizer use, lime treatment of acid soils and extensive afforestation measures are essential to restore the land capability in parts of Salabandha, Sidhupali, Bharasa and Damora villages of Mathura panchayat and Ambthapali, Bahadapali, Dhokabali villages of Kanka panchayat in the NLLUT. The effective
implementation of these measures also need their extension into the parts of Dimiria panchayat, Kanka and Pitagadia villages of Kanka panchayat on Chilka in the MFT of the level terrains in the Khallikote block.

(v) The TMC in the Khallikote block constitutes 8.15% of the RT and 3.57% of the LT. In both these terrain units the soil and water potentials are very poor owing to high dissection, ruggedness, hard and impermeable geo-lithology. The significant terrain expressions in the TMC of the RT and LT consist of severe gully and sheet erosion, extensive deforestation, hard and rough culturable space, deep and brackish underground water and severe surface run-off. About 35.02% of the TMC in the RT and 12.76% in the LT are irrigated through tanks and wells. In terms of water availability for crop-use the rain water conservation measures are important and most crucial in the highland RT particularly of Badapali panchayat and parts of highly dissected rugged upland villages of Khallikote panchayat. The Mukundpur village (LT) in the Kumondo panchayat needs extensive afforestation in addition to the effective soil conservation measures that are already implemented by the Government of Orissa. As the granulitic basement of this unit is hostile to ground water resource development and as there is no perennial irrigation source near at hand, the measure of rain water conservation is naturally vital in the RT and LT under the TMC. This is with a view to remove the
the conspicuous problem of land barrenness of the cultivable terrain in these units of the Khallikote block.

To sum up, any planned effort to reclaim about 2786.65 (1991) hectares of cultivable waste and put to agricultural landuse, and to revive the productive potential of this productive space in the block would necessitate a thought upon the Check-dams, rain water conservation ponds, cover cropping and pastoral dressing of the barren fallow lands, compost pit development, soil management and scientific tillage, amendment of high soil acidity and provision of alternative employment during off-seasons basing upon the available agricultural raw materials and geo-lithological resources. The developmental programmes as have been taken up by the Government of Orrissa should be skillfully implemented in this regard.

18.4. CHATRAPUR

Geologically the Chatrapur block constitutes a planation surface. The geologic expanse of the granite-gneiss and khondalites is interspersed by quartzitic intrusions. This presents surface of undulations, ruggedness, poor and unreliable underground water, very unevenly distributed natural vegetation, soil erosion, surface run-off, water-logging, laterisation, coastal and inland swamps, tidal estuaries and so on. The region may, thus, be divided into two major physiographic
regions, namely the inland planation surface and the emergent coastal planation surface. In this block the problems and prospects of regional economic development are primarily associated with agricultural operations. On the problem front, an extensive area of the block has been lying as barren fallow lands. Further, the growing urbanization in the Chatrapur and nearby Berhampur towns, a sizeable farm population is subjected to the practice of daily commuting leaving their productive spaces at the fancy of overgrazing and careless tillage particularly in parts of Badamadhopur, Patlampur, Agastinuagam villages of the Chatrapur block. The coastal border lands exhibiting vast sandy soil surface and dune ridges are virtually left untouched as regards agricultural use owing to the constraints of littoral salinity, low nutrient status and marine incursion of ground water table, etc. Like all other blocks of the Chhatrapur Subdivision, the block of Chatrapur is in need of extensive soil and water management because the available land for direct agricultural use is limited. About 4228.02 hectares (26.36%) of culturable space need to be reclaimed during the recent times (1991).

About 3.80% of the panchayat area of the block is rugged, 7.60% is upland, 21.52% is nearly level and 67.08% is level.

(i) The land capability unit, i.e., GT(V) is almost unknown in the terrain of the Chatrapur block except in parts of its
level lands. The GT constitutes about 66.04% of the level terrain of which 55.94% is irrigated and about 12.37% contribute to the cultivable wastes. The soil potential is seemingly rich in the GT of the block. Its water resources consist of rivers, nalas, fresh and saline water swamps. The underground water table is deep and remain virtually dry in summer because of the hard gneissic basement. The cropping pattern constitutes the sequence of paddy-pulse-oilseed-vegetable during the kharif season. The rabi growing of ragi and vegetable is confined to the tank and river-side uplands. Judging the land capability and the land productivity in these parts of the GT, it is quite astonishing to observe a fairly high magnitude of cultivable wastes. The obvious reasons are partly physical and mostly social. On the physical side the extent of land degradation in the GT in parts of Narendrapur, Podapadar, Bipulingi and Chamakhandi panchayats is directly related to extensive soil erosion. The conspicuous barrenness of the productive space has been due to extensive use of chemical fertilisers, extensive pest-prone HYV seeds, defoliation and unscientific tillage. The defoliation of tank and canal sides has resulted in evaporation and siltation. On the social front the small size of land holding and low per capita land (about 0.48 ha) holding have adversely affected the potential agricultural land utilisation (Fig.18.4).
It is, therefore, necessary to consider the above problems which temporarily overshadow the characteristic functioning of the GT in the Chatrapur block with a view to optimize its productive potential in the larger interest of maintaining the stability in respect of agricultural landuse.

A detailed groundwater survey over the whole of the block and the GT in particular, soil and water management in parts of Goba, Khurigam, Singipur, Gangapur, Karatali and Sindhigam level terrains would restore the productive potential of their cultivated space of good terrain capability. Desalination of soil and saline underground water in Agastinuagam, Alipur, Jami and Borango villages of the Padapadar panchayat on sea is essential to raise the productivity level of the GT tracts in these parts. An extensive cashew, casuarina and Kewda plantations along the littoral margins of the Padapadar and Chikal-khandi panchayats are necessary to arrest tidal erosion and dunal migration. Land levelling, extensive pasture growing, use of green manure, top-dressing of the tank and canal sides and river side uplands will be the next action plan to revive the agricultural efficiency of the culturable wastes in the GT in the Chatrapur block. Strict implementation of relevant land legislation measures is vital in all panchayats of the LI under GT. In order to lighten the pressure of rural overcrowding of the cultivated terrain in the GT, pastoral occupations, brickline works, and other similar job-oriented schemes
of the State Government such as social forestry and granite chips making will be the vital instruments to act against seasonal unemployment and rural overcrowding in the good terrain capability units of the Chatrapur block.

(ii) The MGT in the Chatrapur block constitutes 50% of the MSUT, 35.29% of the NLLUT and 3.77% of the LT. Mild dissection, low rugged undulations, soil salinity, erosion and above all, severe surface run-off are some of the notable operational constraints of these terrain units of MGT. The soil and water potential are more or less moderate. The agriculture is characterized by mono-paddy cropping. About 33.67% of the MGT in the MSUT, 29.10% in the NLLUT and 55.22% in the LT are irrigated. The culturable wastes account for 13.98%, 16.48% and 11.33% in the MSUT, NLLUT and LT respectively. It has been observed that about more than half of the MGT in the LT is irrigated through the Rushikulya canals and TPE pipe lines. The chief physical constraint in the MGT under different terrain units of the Chatrapur block consists of poor underground water potential in parts of Kanomona, Tikiria-Berhampur and Puruna-Chatrapur villages of the MSUT, Badaputi, Kaliabali, Basanaputi and Upalputi villages of the NLLUT and Paikapada, Arjipali and Matikhal villages of the LT. The conspicuous marine incursion has resulted in soil and sub-surface water salinity in Arjipali (LT), Badaputi, Kaliabali, Basanaputi and Upalpati (NLLUT) villages of the MGT. It is, therefore,
crucial from the point of view of an absolute regional dependence of the MGT on the agricultural landuse the measures like rain water conservation, desalination of soil and groundwater, run-off control and extensive afforestation of cashew and casuarina would act as bold measures against land degradation in the coastal villages of MGT. As soil erosion problem is very acutely extensive in all terrain units under the MGT comprising parts of Laxmipur village in the NLLUT, Tangnapali, Keranditolanarayanpur, Rampali, Karapali and Govindpur villages in the LT, it needs extensively and carefully managed soil conservation measures. As the village Navuli of the MGT in the Laxmipur panchayat is the most potential agricultural administrative dwelling unit of the MGT exhibiting by far no physical irregularity other than however social, every effort is to be directed towards its fertility restoration of its soils. The human resource relating mostly to the female population needs mobilisation through social and institutional incentives in these parts because of a greater role played by the females in the allied agricultural operations such as the development of compost pits, transplantation, fertilizer application and other related landuse operations in these parts of the Chatrapur block.

(iii) The FT(X) constitutes 50% of the MSUT, 64.71% of the NLLUT and 3.77% of the LT. A small fraction of the FT falls in the RT. The average soil potentiality is moderate
in the RT, MSUT and NLLUT but it is considerably poor in the LT. The water resource of the FT in all terrain units is poor to marginally moderate. About 46.50% of the FT in the RT, 52.23% in the MSUT, 23.35% in the NLLUT and 57.73% in the LT are irrigated with 23.43% in RT, 13.96% in MSUT, 16.48% in NLLUT and 2.95% in LT of the FT are cultivable waste lands. The agriculture is predominantly paddy growing and some groundnut especially during the kharif season. The potential tracts remain more or less fallow during the rabi season. The FT under different terrains exhibit extensive laterisation and a greater degree of dissection, surface roughness, low undulations, low altitude land projections, inland water logged depressions, extensive sheet erosion and finger gullies, deep and brackish underground water table. These have limited the FT's actual productive functions. The socio-economic constraints are rather more awesome as any other block of the Chhatrapur Subdivision.

Therefore, in the light of the foregoing presentation of cultivable terrain constraints and their solutions, the author emphasizes upon an immediate action plan against soil and rain water loss in the FT under all terrain units. Extensive protection of soil and water through the existing soil and water conservation schemes of the government will have to be accelerated in the rugged parts of poitary, Majhidiho and Raghunathpur villages of the RT, Gedalunaidupalem and Chikalkhandi villages.
in MSUT, nearly level low upland panchayat villages of Bhikaripali, Chikalhandi and parts of Chamakhandi panchayats, and the level lands of Chamakhandi and Banabulapali villages. The reclamation of water-logged areas in parts of Bhikaripali panchayat through making provision of diversion channels of the Rushikulya canal No. 15 will definitely diminish the extent of culturable wastes in the NLLUI. The desalination of Tampara swamp near the Patapur village would further enhance the water potential of the Bhikaripali and Laxmipur panchayats. The extensive cashew plantation of the nearly level terrain in the Chamakhandi panchayat will have to be accelerated against the current problems of iron contamination of its soils. The low-land depressions under the FT in all terrains will have to be taken up in view of conserving rain water. It may be noted that the villages under the FT in different terrain units show no promise for rabi cultivation. The efficiency of the kharif growing would, therefore, be enhanced through the recommended use of swampy water, use of HYV seeds and the use of organic and chemical fertilizer.

(iv) The MFT(Y) consists of only 7.55% of the level terrain comprising Sundarpur (Sundarpur GP), Daneiberhamour, Patapur and Landabaunsa (Bhikaripali GP) villages of the Chatrapur block. The region registers high local relief, deep dissection and frequent surface undulations. About 57.61% of the MFT is irrigated, while about 27.82% constitutes the
culturable wastes. The soil potentiality of the MFT in the LT is moderate while the water resource is moderately rich. This potential belt stretching from the village Sundarpur to the village Landabaunsa is conspicuous by its swampy depressions, humic clay and dry lateritic soils. The regional agriculture is expressive of paddy and dhanicha growing while a large and contiguous tract has been left as fallow for the last few years on both physical and social grounds. In the context of unusable groundwater it is affected by the salinity of the huge inland water-logged swamp near the Patapur village. It has been observed during the field work that the area needs extensive afforestation around its khondalitic residual hilly foot slopes and other lateritic hilly surfaces around the Patapur swamp. This is in view of seizing further siltation loss into the swampy depression. The measures of desalination and introduction of salt resistant paddy suitable to water-logged areas would restore both water and soil potentials of the region. The stringent land legislation measures and selective land cover dressing (Plantation crops such as tamerind, accacia and horticulture plantation of banana and, etc.) will surely increase the productive potential of the agricultural landuse units under the MFT in the LT of the Chatrapur block.

To sum up, it has been observed from the foregoing discussions that management with regard to soil, water and land in addition to relevant surveys relating to the possibilities of
ground water and surface water irrigation efficiency, is essential and vital over and above the social constraints that are historically and traditionally active in this block of the Chhatrapur Subdivision.

18.5. KAVISURYANAGAR

Kavisuryanagar block is distinguished from the other three northern blocks of the Chhatrapur Subdivision in respect to its agricultural landuse development. Here the proportion of the cultivated terrain is much higher and the cropping pattern is comparatively more diverse. The higher percentage of cropped area is devoted to paddy, pulses, oil-seeds and vegetables. The block presents a typical combination of low and upland topography. Severe soil erosion and water-logging and run-off have, however, been initiated by the granulitic rock basement which have been further aggravated by the misuse of the land in many parts of the block. The comparatively rich water resource provides opportunities to grow diverse crops. Extensive localised irrigation in this block stabilizes the agricultural activity which is the dominant occupation of the people in the Kavisuryanagar block.

About 15605.63 hectares of the total panchayat area of the block is under agriculture of which about 33.20% (1991) is irrigated. There is still a scope of reclaiming about
7.29% (1991) of the total productive space. Although the agriculture is diversified in the block there is conspicuous regional variation owing to the corresponding variation in the terrain capability ensuring agricultural use.

The terrain of the Kavisuryanagar block has been constituted by the RT (31.58%). About 20.84% of the RT, 41.73% of the MSUT, 24.31% of the NLLUT and 71.69% of the LT are irrigated. The cultivable wastes in the RT, MSUT, NLLUT and LT stand at 22.95%, 18.83%, 14.60% and 10.04% respectively.

(i) The GI(V) constitutes 4.17% of the RT and 33.33% of the LT. About 61.77% of the GT in the RT and 87% in the LT are irrigated. The proportion of cultivable waste is more in the RT (12.74%) than the LT (0.85%) under GT. In both the terrain situations the soil potential of the GT is rich while the water resource is poor in the RT because of its hard granulitic terrain and plastic earth lithology (Ch.7). The GT in the Sanapankalabadi (Belasara GP) and Baliasara (Baliasara GP) villages in the LT have been served by river irrigation and shallow underground water table while the GT in the RT is traversed, however, by the nonperennial Dhanei river but has very poor under ground water. The conspicuous cropping pattern consists of HYV paddy growing which is followed by pulses, oil-seeds and varieties of vegetables. Owing to unscientific tillage and overgrazing in parts of the
Jharada village in the RT resulted in small finger gullies, sheet erosion and run-off loss during the recent times particularly at the wake of a dense farm population. During the **rabi** season a very large proportion of the cultivated terrain remains fallow owing to no concerted effort towards effective farming by the farm population inspite of several popular government programmes in respect of soil conservation and water management. It is, therefore, necessary to thrust also upon the **rabi** cropuse for providing stable sustenance to the overcrowded farm population in these parts of the GT in both RT and LT. The seasonal employment in the FT can partly be met through extensive pastoral occupation over its erosion prone tracts particularly of Jharada and Mohanapali (LT) villages.

(ii) The MGT(W) constitutes about 12.50% of the RT, 28.21% of the NLLUT and as high as 55.56% of the LT. The soil potential of the MGT is moderately rich in the computed units (Fig.12.1) and the water resource is moderate. About 39.15% of the MGT in the RT, 28.94% in the NLLUT and 75.87% of the MGT in the LT are irrigated through tanks, wells and partly by the **Bhaguya and Dhanei canals**. The cultivable wastes constitute 5.23%, 14.32% and 0.59% of the MGT in the RT, NLLUT and the LT respectively. The agriculture in these parts is characterized by the dominant paddy growing during the **kharif**
season. While the *rabi* cultivation consists of vegetables. Sugarcane is an important second crop in the MGT of the level terrain in parts of Kavisuryanagar town. Pluses, oil-seeds and vegetables are some of the crops in parts of Sunapali panchayat in the NLLUT and Deulasara panchayat in the LT. The constraints of regional undulations in parts of Sunapali panchayat in the RT have limited the cropuse to an outstandingly monocropping although the regional clay and sandy clay soil surfaces exhibit a moderately rich soil potential in combination with moderately rich water resource. In view of a moderately good land potential, the productive potential of the cropuse can be harnessed through the land levelling measures in the Subulia panchayat in both *kharif* and *rabi* seasons. The introduction of short growing *rabi* pulses and HYV vegetable growing will be an additional employment generating landuse practice in the RT under MGT. The same is true in case of the Sandhamara and Sinduriapada MGT villages of the Baliasara panchayat in the NLLUT (Fig. 18.5).

Since the MGT in all terrain units of the Kavisuryanagar exemplifies a cultivated terrain potential the optimization of which mostly rests upon the diversity of the occupational structure in response to several government programmes in order to wipe out the most serious landuse problem of overcrowding. In this respect a planned and well-coordinated effort will be worthwhile with regard to extensive *rabi* cropuse or
extensive pasture land development and social forest landuse of the MGT in the RT, NLLUT and LT of this block.

(iii) The FT(X) constitutes 29.17% of the RT, 25% of the MSUT, 53.85% of the NLLUT and 11.11% of the LT in the Kavisuryanagar block. About 38.91% of the FT in the RT, 61.77% in the MSUT, 25.69% in the NLLUT and 19.28% of the FT in the LT are irrigated. The conspicuous cultivable wastes in the FT constitute 7.55% in the RT, 12.74% in the MSUT, 0.85% in the NLLUT and 79.89% in the LT. The bare rocky patches in parts of Madhurjhol and Duanpali of Subulia panchayat exhibit dissection of the discontinuous rugged uplands. The soils are mostly red ferruginous sandy or sandy clay. The pasture land is awfully meagre while the natural vegetation is thorny scrub. Demand for agricultural land is very high owing to the dense nature of the farm population. Therefore, cultivable wastes contribute very low proportion to the general agricultural landuse statistics. Both the soil and water potentials for productive agricultural landuse are moderate. The similar terrain bearing upon the cropuse as experienced in the RT is also the case with the FT in the MSUT. In both these situations, the FT grows pulses, ragi and groundnut other than paddy.

The FT in the NLLUT and LT is composed of hard granite-gneiss with quartzitic intrusions. The scattered low Archaean gneissic outcrops present a marginally dissected landscape in
parts of Kaniari, Ambapua, Nandigod, Paikajamuna panchayats of the NLLUT and Nutanramsanarayanpur of the Badamahuri panchayat (LT). The soil surfaces in both the situations consist of varying grades of low level lateritic and sandy soils. The vegetation of the FT in the NLLUT and LT consists of acacia and other thorny bushes. Palm and tamarind are some of the other species of natural vegetation here. The water resource is considerably poor while the soil potentiality is moderate. The present agricultural landuse operation in major parts of the NLLUT and LT villages of FT is based on monopaddy cropping. Within the FT in parts of the RT, MSUT, NLLUT and LT the groundwater resource is more or less confined to the suitable structural locations. Therefore, an underground water survey to this effect is quite essential in the FT of the Kavisuryanagar block because most of the irrigation tanks, LI points, tubewells and Dugwells go dry during the premonsoon periods. A scope of rabi cultivation in parts of Paikajamuna panchayat in the NLLUT will offer a still better promise in years to come if its water and soil potentials are kept under potential considerations. The rest of the panchayats of the FT extend no scope in this regard owing to the non-availability of irrigation during rabi months. To be more precise, within the FT, except Paikajamuna panchayat, all other villages suffer from surface and underground dryness even during the kharif months and it is a fact that their cultivated terrain development is associated primarily with irrigation besides the land owners' caste considerations.
(iv) The MFT constitutes 54.16% of the RT, 75% of the MSUT and 17.94% of the NLLUT. About 11.54% of the MFT in the RT, 33.71% of the MSUT and 20.88% of the NLLUT are irrigated. The cultivable wastes constitute 30.06%, 21.26% and 21.70% of the MFT in the RT, MSUT and NLLUT respectively.

The rugged surfaces, surface undulations, poor water resources, very unevenly distributed soil and vegetation potentials, soil erosion and monopoly of the dominant castes have resulted in a questionable cultivated terrain status. The conspicuous agricultural practice is limited to monocropping besides some vegetable growing in parts of Baunsia panchayat (NLLUT). A major part of the literate male population temporarily migrate to the nearby Aska town of the Bhanjanagar Subdivision for the job opportunities leaving an already fragmented productive land units as barren. The conspicuous barrenness of extensive productive space is a common sight in parts of Budhambo, Badamahuri, Athgarhpatna and Gudiali panchayats in the RT, MSUT and the NLLUT. Further owing to hard garnetiferous and leptinytic rock basement the ground water potential is brackish and poor in these panchayats. Under these circumstances the kharif paddy growing is the only promise in favour of the productive potential of the native cultivated terrain units. Extensive land levelling, extensive afforestation and foliation in the form of grass lands or cover cropping will definitely reduce the severe
effects of soil erosion. Since the available irrigation is less reliable, the rain water conservation will be a potential means in this regard. The NREP schemes which are in operation now are to be accelerated to tide over the rural unemployment particularly during the rainy months. The conspicuous aggregate human resource must have to be harnessed by stringent measures against the prejudiced communal monopoly in respect of landowners' discrimination towards the tenants in all terrain units of the MFT in the Kavisuryanagar block.

18.5. **GANJAM BLOCK**

The morphology of the Ganjam block exhibits a segmented monotony of its hilly, rugged, upland, nearly level and level lowlands. The landscape can rather safely be classified into the littoral and lacustrine plains (south-southeast), residual hills, rugged and rolling uplands, river valleys and the subdued rolling and level lands. On the basis of the cultivable land potentiality the block broadly represents saline tracts, arable tracts and the sub-hilly and hill tracts.

About 40% of the Ganjam block is rugged (Fig.12.1), 10% moderately sloping upland units, 3% NLLUT and 47% LI. About 48.77% (1991) of the total cultivated terrain is irrigated through rivers, canals, dugwells, tube wells, energized dugwells and other inland water bodies. Around 14.73% (1991) of the total productive space constitutes the cultivable wastes. The litho-
structural grain of the block has been observed to be fashioned by the Archaean granite-gneiss and garnetiferous sillimanite gneiss which resulted in sandy, lateritic, clay, sandy clay, sandy loam, and saline soils of littoral and lacustrine salt encrustations. About three kilometres inland from the Husnikulya estuary the water is still saline and of little agricultural value at the insistence of extensive marine ingress. Similarly, the ground water in both the situations in the vicinity of the Bay of Bengal and the Lake Chilka is conspicuously saline owing to the subterranean saline water incursion.

So far as the productive potential of the agricultural landscape in the Ganjam block is concerned, the natural setback, apart from the saline tracts, is not one but many. The rugged landsurface projections, rolling surfaces, lateritic pavements, hard and rough surfaces of the uplands, annual floods, soil erosion, surface run-off, small size of the landholding and sex discrimination have impeded prospects in respect of agricultural landuse operation. The growing appraisal of several development programmes of the government with regard to the protection of land, land cover, tenancy rights, caste-integrity and the deployment of employment opportunities in agro-based sectors, etc., go unacknowledged. Therefore, the present study would basically pinpoint such constraints of the potential cultivated terrain utilisation in each facet of the terrain in the Ganjam block.
About 37.88% of the RT in the Ganjam block is irrigated and 13.34% of the productive space has been laying as the cultivable wastes. As far as the cultivable terrain potentiality rating stands, the block of Ganjam shows no potential account of the GT. The MGT accounts for 5% of the RT of which only 46.98% is irrigated in the favourable tracts of Aliabad village of the Karapada panchayat which grows extensive betel vines and vegetable upon its sandy loam soils. The canals of Jaymangala (Ghodahad River Irrigation System) and Rushikulya irrigation diversion canals virtually serve as life blood of the potential space in the Aliabad because the ground water-table in this village is deep and brackish. Annual Rushikalya floods are very common (1990) in the low-lying rugged lands of Aliabad and along the river-side uplands of Niladripur. Soil erosion, soil profile truncation, surface run-off and land barrenness are some of the other minor land-use constraints of the Niladripur village of the MGT in the RT. The high land-revenue rating of the land in both these villages is accountable by their mild relief, gentle slope and rich soil potential and moderate water resource. The conspicuous cropping of the RT under the MGT consists of paddy, betel-leaf and vegetable growing in the Aliabad village in both kharif and rabi while the kharif paddy and vegetable growing dominate the cropping pattern in the Niladripur village.
(i) While planning the cultivated terrain use of the MGT in the RT it may be taken note of a poor response of the traditional crop varieties to chemical fertilizer application in these parts. With the introduction of some of high yielding rice varieties in response to fertilizer (Chemical and biological) can be adopted with the provision of profuse water supply through the water conservation tanks. Land levelling and increasing of canal irrigation efficiency are quite essential in these parts. The tillage of miniature gullies would help restoring soil and water loss and thereby increase the amplitude of area under cropuse. The other social constraints in this regard need general considerations.

(ii) The FT in the RT constitutes 7.50% of which about 15.69% is irrigated. This well-dissected landscape is characterized by moderately rich soil and water potentials of which a considerable proportion is saline owing to the regional nearness to the lake Chilka canal. Under this specific geographical and environmental situations with adequate availability of all inputs, the conspicuous water stress in terms of salinity over the whole of the RT in the FT lowers the productivity levels of rich lands in Raghunathpur and Belopada villages of the Humma panchayat. At present the tank irrigation is the only stable source of agricultural production in these parts of the Ganjam block. Most of the wells remain
dry especially during the later part of rabi owing to the obvious natural limitations of their granulitic lithology and hard gneissic basement. Therefore, agriculture is composed of some kharif paddy and summer chilli around the village tanks. Like the northern blocks of Khallikote, Kodola and Polosara, the conspicuous barrenness may be attributed to initial overuse of chemical fertilizers during the kharif and overgrazing during rabi. As we observe, the surface under production will have to be brought under intensively careful tillage and water management. About 50% of Belopada and 75% of Raghunathpur will need extensive afforestation of cashew and coconut plants which will be more remunerative than paddy growing in these parts. When the entire Chhatrapur Subdivision possesses a very good road net work, these parts of the FT in the RT display only fair weather roads. These need attention (Fig.18.6).

(iii) The MFT constitutes an all time high of 67.50% of the RT of which only 23.51% is irrigated leaving aside the cultivable wastes at 19.92%. Deeply dissected undulating lands, rough lateritic surfaces, scattered rocky-knobs and poor ground water conditions have limited the agriculture of the region to rainfed paddy growing only. Moderately rich soil potential and moderate water resource characteristics are locationally specific in few villages like Borigam (Humma panchayat) and Laupati, Santoshpur and Kartikdihi villages
(Santoshpur panchayat) of the RT. The rest of the villages in the RT of Poirasi, Sanaramchandrapur, Ramagad and Khanda-deuli panchayats present no remunerative and economic pursuits with regard to agriculture. Therefore, these MFT units in these parts will have to be put under extensive cashew plantation in addition to their traditional kharif paddy growing. As the underground water resource is poor and surface flow irrigation points are away, the number of tank irrigation points will have to be increased with special stress upon the rain water conservation. This kind of approach of agricultural landuse planning needs an extension into the TMC of the RT where both the soil and water potentials are moderate to low comprising the Badachakada village (Poirasi GP), Nalabenta, Madhurchuan (Sanramchandrapur GP). About 39.48% of the TMC in the RT is irrigated having no virtual cultivable wastes (0.26%), as the agriculture, irrespective of the productive potential, is the single source of sustenance in these parts. The development indicators in terms of agricultural landuse are, however, observed in the village Badachakada of Poirasi panchayat. It enjoys the bulk of the river irrigation of both Rushikulya and Kharkhari rivers. Therefore, this village needs special attention with regard to the adoption of HYV paddy and pulses in both kharif and rabi, application of organic manure to its sandy clay and clay soil surfaces. Another village, i.e., Madhurchuan (Sanramchandrapur GP)
on the southern tip of the Chilka Lake needs extensive desalination of its ground-water at minimum cost. Some salt resistant maize and vegetable at present will have to be adopted along with extensive pasture land development on upper and lower parts of this village on lake Chilka.

(iv) The GT and NGT are virtually unknown in the MSUT of the Ganjam block owing to the constraints of soil, slope, relief, litho-structure and water resource. About 17.14% of the MSUT is irrigated through tanks and dugwells.

The agriculture is purely rainfed in the FT and MFT in the MSUT of which 22.62% and 12.97% are irrigated respectively. The soil surfaces in parts of FT (MSUT) in portions of Khanda-deuli panchayat consist of red ferrugenous, lateritic and brown sandy soils while they consist of clay, sandy and sandy clay soils (MFT) in parts of Sanramchandrapur panchayat villages of Jharadi-Govindpur, Bhaigadiho, Diandein (Chilka upland) and Satrusolo. Water-logging, severe soil profile truncation, soil erosion and severe surface run-off, brackish underground water, overgrazing and unscientific tillage in both FT and MFT in the MSUT need appropriate measures. These would include rain water conservation, selective HYV cropping, organic manuring, soil conservation and rational and careful tillage, etc., particularly during the pre-kharif land preparation. Extensive cashew plantation in the FT and large-scale pasture development in the MFT would undeniably increase the
productive potential of the MSUT. The identical solution will also help in reviving the agricultural potentiality (kharif) in the highly dissected low soil and water potential tracts in the MFT of the NLLUT in parts of Subulia, Sanramchandrapur and Kantapali villages of the Sanaramchandrapur panchayat of the Ganjam block. The village Subulia on the Chilka Lake, 39.48% of which is irrigated by the tanks and dugwells, needs a special mention. Unlike other villages on Chilka border land, the village Subulia (NLLUT) possesses rich and sweet ground water-table inspite of its lacustrine location. The underlying litho-structural, geo-hydrological and pedological enigma in this respect needs research in future with a view to identify the village Subulia's potential underground water contour in view of harnessing its rich agricultural resource.

(v) A large part of the level terrain (47%) in the Ganjam block consists of marine planation surface and emergent coastal borderland. Therefore, the landscape of the LT in the Ganjam block may broadly be divided into the littoral and non-littoral plains notwithstanding their characteristics of GT(V), MGT(W) and MFT(Y). The descriptions would, however, consider both the littoral and non-littoral units of one capability class together as a single unit, i.e., LT.

The GT constitutes 10.64% of the LT of which about 85.45% is irrigated. The soil and water potentials are rich and
variable under different suitability quotients in terms of littoral and non-littoral cropping pattern. The village Pallibandha (Pallibandha panchayat) will have to be taken in to consideration in view of its extensive cashew and casuarina plantation as its saline littoral sandy and clayey soils exhibit no response to an economic agricultural landuse. During the recent times the bulk of the native farm population is under the disposal of Indian Rare Earth Management where they have been employed and engaged in rare mineral extraction of the beach sands (Table 7.1). This is most welcoming trend. Therefore, in the context of marine ecological interests, the landscape of the village Pallibandha will have to be extensively and selectively folliated so as to offer more employment opportunities in the non-industrial sector as well. The coastal and estuarine waters near this village on sea has to be kept free of chemical pullutants released by the nearby Jayshree Chemical Works in detriment to the sustainable fishing resource. The chemical plant will have to be mobilized, however, to adopt anti-pollution technology in the plant to check chlorine release in to the water and on to the farm lands both in the form of liquid and gas.

The most potential tracts of the GT in the LT of Ganjam block constitutes the fertile canal irrigated sandy loam surfaces of the Karapada village (Karapada panchayat), and the villages of Rajapur, Kanchara and Nurmohamadpali of
the Rajapur panchayat. These are extensive betel leaf, paddy and vegetable growing tracts of the Ganjam block. Owing, however, to the poor and brackish underground water (granite-gneiss basement) the available irrigation through the canals mostly concentrates upon the betel leaf and chilli growing tracts during the kharif and rabi seasons. With the introduction of skillfully managed tank irrigation the cropping pattern will be more diverse in both kharif and rabi seasons. Flood control measures are very much essential near the Rushikulya and Jaymangala canal heads to protect the betel vine tracts in these parts which account for more than 70% of the regional agricultural income.

(vi) The MGT in the LT of the Ganjam block constitutes a large proportion of 63.83% of which about 34.98% is irrigated, and cultivable wastes account for nearly 16.52%. The MGT constitutes a large area of the littoral and lacustrine plains. The littoral margins include the villages of Gokhorkuda, Mayurpada and Kantiagad villages of the Pallibandha panchayat while the lacustrine plains include the villages of Humma and Kliajhor of the Humma panchayat and Bhramarkudi village of Ramagad panchayat. The soil potentiality in these villages is moderate with low natural water resource. The conspicuous salinity of the clay and sandy-clay soils has restricted the agriculture of this locality to mono-paddy cropping during the kharif months only. It has been observed during the field
work that even paddy growing is unremunerative in these parts. A large part of the farm community irrespective of sex, and caste, is engaged in the most economic and remunerative salt extraction operations (Plate 3.3). This is by and large the most viable alternative to agricultural landuse. The introduction of Chilka saline water canal for salt extraction has further deteriorated the cultivable potentiality of the adjacent cultivated terrains. Therefore, it has been felt that all the agricultural plots on either side of the Chilka canal will have to be converted to either salt pans or the limited land available for agriculture will be put to desalination of soil and adoption of salt resistant paddy. The rice free lands will be extensively devoted to grass lands for animal rearing in these parts.

(vii) The MGT in the non-littoral level lands constitute extensive cultivated terrains depicting very mild dissection, moderate soil potential and rich ground water resource. The water table is shallow. Parts of Malado and Kainchpur panchayats are irrigated by Rushikulya segment canals especially during the kharif. The cropping pattern in the irrigated tracts of the villages of Lunghuri, Barada and Kusapali (Malado GP), and Kainchpur, Kalyanpur and Jaganathpur villages of Kainchpur panchayat and Damodarpur of the Ganjam panchayat consists of kharif paddy and rabi chilli growing. The rest of the villages
of Poirasi and Santoshpur panchayats grow kharif paddy only. As the ground water resource is very rich in all panchayats in the MGT of the non-littoral LT, the number of bore wells (LI points) will have to be increased in order to reclaim the rabi and kharif cultivable wastes. The practice of crop diversification will rather depend upon the protection of soil loss by way of arresting extensive sheet erosion especially in parts of Poirasi and Santoshpur panchayats. Extensive afforestation in the lateritic lithofacies of these two panchayats will restrict nutrient loss through leaching. On implementation of these plans through different government schemes such as kharif and rabi programmes, one will be sure of a marginal shift from the paddy growing to the growing of pulses, oil-seeds (groundnut and til) and a variety of vegetables in all panchayats of the MGT in the non-littoral LT of the Ganjam block.

18.7. PURUSOTTAMPUR BLOCK

It has been often mentioned in the present work that Purusottampur is one of the two leading blocks (the other being Hinjili block) of the Chhatrapur Subdivision in relation to the agricultural landuse operation as well as production. The agriculture is though diversified there is no much concentration of any particular crop through time on space except paddy. The cultivated space accounts for 63.13% in this block. The cultivable wastes account for 5.87% (1991) of the total
FIG. 18.7
cultivable space. Irrigation facilities have increased considerably, but water does not reach many panchayats. Many villages of the RT, MSUT and NLLUT suffer from the rain water loss as the water is running away from their potential cultivated terrains. Therefore, it may be noted that the inequalities in the terrain-make are as significant as the social response. Both have resulted in the stagnation of agricultural growth over most of this block.

The Purusottampur block registers definite proportions of rugged, upland, nearly level and level terrains (Fig.12.1). About 20.58% of the panchayat area of the Purusottampur is rugged, 6.25% moderately sloping upland, 8.04% NLLUT and a large percentage of 65.18 (65.18%) is LT. The GT(V) is unknown in the RT, MSUT and NLLUT (Fig.13.1) owing more or less to relief, slope and litho-structural constraints. About 36.97% of the RT, 30.66% of MSUT, 31.08% of the NLLUT and 46.62% of the LT are irrigated through river, canals, dugwells, tanks, tube wells and energized L.I.points. Though the agriculture is diversified to some extent, the cropuse is more or less dominated by paddy growing in all terrain units of the Purusottampur block.

(i) The GT constitutes about 68.49% of the LT of which about 56.02% is irrigated while the cultivable wastes under the GT is 6.21%. The broad physical homogeneity and the
uniform cultural outlook of the people have shown an integration of inner robustness as well as frailty for which the production is nearly stagnant even in the much potential tracts of Pandia, Bhimpur, Purusottampur, Handighar and Kamanalina-khyapur panchayats. A large scale temporary migration in parts of Pratapur, Handighar, Jamuni, Gangadeuni, Ranajhali and Sunadhara panchayats have led to a permanent increase in the number of fallow land-units. Further, the attitude of landowners and their general attitude towards lower castes adversely affected the potential productivity of the cultivated terrain of the GT in all these panchayats where the soil potential and water resource are rich. Inspite of the several concerted efforts from several quarters (private and government undertakings), the progress is more or less slow. Therefore, the agricultural resources in these panchayats will have to be estimated for agricultural development needs. It may be noted that an improved agricultural economy in the GT of the LT in the Purusottampur block will be a potential base for allied tertiary activities (Fig.18.7).

(ii) The MGT(W) constitutes 52.17% of the RT, 28.57% of the MSUT, 55.56% of the NLLUT and 21.92% of the LT in the Purusottampur block. The soil and water potentials are moderately rich all over the MGT in all terrains. About 34.44% of the MGT in the RT, 41.35% in the MSUT, 35.58% in the NLLUT and 35.77% in the LT are irrigated. The river and canals
form the bulk of irrigation in the RT, LT and parts of NLLUT. Such irrigation provisions are lacking and also impossible in the MSUT owing to the relief, surface elevation and slope constraints. The tanks, ordinary dug wells, energized dug wells and tube wells are the common means of irrigation in the MGT villages of all terrain units. Under uniform structural-lithology and fertile soil surfaces the MGT in all terrain units exhibit an apparently homogeneous potential agricultural base. But it exhibits significant variation in the phenomena that are associated with the socio-cultural attitude in extending support to an expected productive growth in the agricultural sector. The elasticity in the cropping pattern and cropuse have been contracted to paddy-pulses and ragi only in parts of Jaganathpur panchayat in the RT, Kaithada of Bhutasarsing panchayat in the MSUT, Bhatakumarda panchayat in the NLLUT and Badakharida and Baghala panchayats of the LT owing to the dominance of their negative social attitudes towards the division of labour and the participation of lower castes in the agricultural operation. The land fragmentation on traditional counts has reduced the farmer and farm ratio to less than a hectare. It is, therefore, significant to note that the other corporate sectors of the Agricultural Department (Government of Orissa), while exercising their control upon the land degradation, nutrition deficiency, traditional low yielding varieties of seedling, misuse of rain and irrigation water in these parts, should also take into account the land
consolidation measures seriously in the proper social perspective at the wake of growing land fragmentation. It is quite amazing that after 1968 no fragmented land unit has been brought under consolidation as mentioned in the settlement records. Further, the existing land legislation measures will have to be executed in the MGT of all terrain units against the heretofore unpunished feudal landlordism and the general attitude of the landlords towards lower castes, and female education, etc. It is expected that land allotment to the landless under RLEP (Rural Landless and Economically Poor) scheme which is already in operation in the Purusottampur block will restore the potential concentration of different crops that are grown both in the kharif and rabi seasons. The attention towards extensive foliation of the current fallow under the social forestry schemes and agro-based home industries in these terrain units under MGT would further raise the degree of employment opportunities for the seasonal unemployed farmers.

(iii) The FT(X) constitutes 30.44% of the RT, a large portion of the MSUT (71.43%), and 9.59% of the LT. The FT is conspicuously absent in the NLLUT. High dissection and low surface undulations in the FT are common to RT, MSUT and LT. The soil potential and water resource conditions are moderate in the FT in all these terrain units. About 40.36% of the FT in the RT, 28.01% in the MSUT and 47.75% in the LT are
irrigated through river, canal, tank, dug-wells and L.I. points. The river and canals are, however, unknown in the Badakharida panchayat of the MSUT and parts of Bhutasarsing, and Jaganathpur panchayats in the RT. The cultivable wastes account for 0.76%, 9.32% and 5.88% of the total cultivable space under the FT in the RT, MSUT and the LT respectively. The conspicuous soil sequence ranges from the low level lateritic to sandy clay and loam. The sequence of cropping in these parts consists largely of paddy, ragi and vegetables in the kharif season while extensive chilli growing during rabi. The rabi chilli growing is confined to the irrigated tracts in parts of Tankachai and Jhadabai panchayats of the LT. Under the tank irrigation the Badakharida panchayat villages of the FT in the MSUT grow some vegetables as their second crop after paddy, otherwise the agriculture is exclusively rainfed in this panchayat. Owing to the hard ferruginous lateritic surfaces upon the garnetiferous gneiss basement the tillage operation is very difficult in parts of Pitanapali (Arakhpur panchayat), Gopapur (Jhadabai panchayat), Kolosingi (Bhimpur panchayat) and Dasiamaripali (Bhutasarsing panchayat) villages of the FT in the RT and Samantaratnapali, Bananai, Jenabagad and Bauribagad villages of the Badakharida panchayat in the MSUT. Under these difficult circumstances the tillage operation became very much unscientific and ultimately resulted in severe soil erosion, nutrient loss and excessive run off, etc., in these villages.
These constraints have been further accelerated owing to extensive defoliation through overgrazing and deforestation of the communal forests. It is, therefore, necessary to undertake the soil and rain water conservation measures seriously in the villages of the RT and MSUT under the existing schemes of the government of Orissa to restore the productive potential of their cultivated terrains for atleast marginal crop diversification during the kharif and atleast one cropping during the rabi, i.e. chilli. The social constraints in the FT in all terrain units will demand general consideration for all practical purposes. Finally the conspicuous bank erosion in parts of the Tankachai panchayat has increased the dangers of flood hazards of the river Rushikulya during the rainy season. This is also true of Jhadabai and Kolosantrapur villages of the Jhadabai panchayat. The deep dissection and surface roughness in the Gundribadi, Ambilopali, Jhadabandha villages of the Jhadabai panchayat have resulted in severe surface run-off and nutrient loss of the soils. At present the various land reclamation works are seemingly satisfactory with regard to their operational efficiency in these villages of the FT in the LT. But an additional attention will have to be given on to the extensive social afforestation on the river side uplands and other strategic parts to check severe surface run-off. This would raise the productive potential of the agricultural land units in these two panchayats of the FT and LT.
(iv) The MFT constitutes about 17.39% in the RT and 44.44% of the NLLUT. About 37.45% of the MFT in the RT and 7.10% of the MFT in the NLLUT are irrigated registering 0.35% and 10.80% as cultivable wastes respectively in both the terrain situations of the MFT. The MFT villages of RT and NLLUT have been characteristically exhibiting deep dissection, surface roughness and frequent surface undulations. The soil and water potentials are medium and low respectively. The underground water table is very deep but not brackish. The garnetiferrous gneissic basement with its ameliorating red ferruginous soil surface has resulted in flourishing kharif cultivation in parts of Babarapali and Arakhpur (Arakhpur panchayat), Balarampur (Badakharida panchayat), and Narsingpur (Jaganathpur panchayat) villages in the RT and Raghunathpali, Boxipali, Bhimpali and Balakrishnapur (Bhutasarsing panchayat) villages in the NLLUT. A large part of the productive space has been left as fallow lands particularly at the base of the residual hills in these parts of the Purusottampur block. The down hill bases have been used for agricultural use by the manual preparation of agricultural plots out of barren undulating lands in the Boxipali, Bhimpali and Raghunathpali villages of the Bhutasarsing panchayat in the NLLUT. These plots are exclusively rainfed. These residual hill sides have been severely affected by gullies owing to extensive deforestation and granite quarrying. The consequent soil loss at the present rate has
converted these hills into total barrenness. Therefore, several afforestation operations will have to be accelerated along with soil conservation and rain water conservation operations in these parts. The granite quarrying along with simultaneous afforestation would be good employment generating operations for the seasonal unemployed farmers of the MFT villages in both the RT and NLLUT. The conspicuous social forestry in these parts of the Purusottampur block will be equally remunerative as its agricultural land utilisation.

18.8. HINJILI BLOCK

The Hinjili block provides nearly all the food requirements of the Chhatrapur Subdivision. The regional economy of the Hinjili block itself is largely associated with agriculture. About 72.54% (1991) of the cultivated space is irrigated while the cultivable wastes account for 8.88% (1991) in this block. The soil and water potentials are very rich owing to the flatness of the terrain. Here the ground water resource is rich. There are a few instances of residual khondalitic hills in the vicinity of the Hinjili town and the village area of Bhabandh (Bhabandh panchayat) in the southeast of the Hinjili block which limit agricultural landuse to some extent.

The dominant feature of agriculture in the Hinjili block is the preponderance of food crops upon the significant local
HINJILI BLOCK

BOUNDARY

SUBDIVISION

BLOCK

PANCHAYAT

VILLAGE

kilometres

FIG. 18.8
concentration of commercial crops such as betel leaves and sugarcane growing. Kharif paddy dominates the sequence of food crops in the Hinjili block. Even though the paddy registers dominance, pulses, oil-seeds, ragi, vegetable, betel vines and sugarcane also stand out as economic promise to this extensively fertile riverine plain terrain of the Hinjili block.

Keeping in view the high land potential for a prosperous agriculture in the Hinjili block, the social factors need a special mention. The traditional agrarian structure of the cultivated terrain in this block hindered the agricultural production. Those who have large land holdings, appoint tenants or Bhagchasi, mostly from the poor income group. Thus they live on rented income and invest the savings in other business instead of agricultural improvement. The agricultural sector of the Hinjili block engages more than 70% of the total population and a majority of them are landless. The Orissa Tenancy Act, 1955 (Ch.14) made the tiller, master of the land in these parts but the constraints of economic impoverishment led these theoretical tiller masters to mortgage the land with the Kumuti money lenders and the process of income submission continues. The conspicuous land fragmentation again hindered the maximisation of agricultural production in this block. The small fragmented holdings of this block have been left at the mercy
of the share-croppers or left as fallow in case of the non-availability of the tenants from the higher castes. Owing to all socio-economic infringements, the conspicuous area under rabi cropping (Table 16.1) is much below what is expected of a potentially rich cultivated terrain as of the Hinjili block. It is, therefore, quite essential to review the man-land situation and plan the cultivated terrain use in accordance with the potentiality rating of each terrain unit in the Hinjili block in the legislative, executive and economic perspectives.

(i) The RT in the Hinjili block constitutes only 8.62% of its total panchayat area, while about 17.24% and 74.14% are NLLUT and LT respectively. Almost the whole of both RT and NLLUT are irrigated by the canals, tanks and wells while about 68.17% of the LT is irrigated through the rivers of Ghodahad Rushikulya, Jaimangala and Rushikulya canals, tanks, dug-wells, L.I. points and tube wells. The cultivable wastes account for 11.87% in the RT, 3.22% in the NLLUT and 3% in the LT.

(ii) The GT(V) accounts for 40% of the RT of which about 82.08% is irrigated in partly dissected low undulating low-lands of the villages of Venkatraipali and Makarjhol panchayats. The soil potentiality of the sandy clay soils in these parts is very rich while the surface water resource is comparatively poor. The agriculture is characterized by the kharif paddy growing followed by ragi, and vegetables. The rabi cropuse is
limited to extensive chilli growing only. Besides the social problems relating to small sizes of the land holding, the region is quite responsive to fertilizer use and green manuring. The huge M.I.P. tanks and canal sides in the rugged parts of the Makarjhol panchayat need border plantation to check the soil loss into these tanks and canals. The introduction of all kinds of HYV seeds of paddy, pulses, maize and some vegetables by the Department of Agriculture, Government of Orissa holds a key to an around agricultural development in these villages.

(iii) The GT(V) constitutes about 10% of the NLLUT of which about 89.11% is irrigated through the Rushikulya canals, panchayat tanks, MIP reservoirs, wells and tube wells. The surface and groundwater resources are rich having rich soil potential. The texture of soil ranges from sandy clay to clay loam and loamy clay. The low imperceptible ruggedness and low surface undulations do not stand on the way to progress. It is rather the lack of social awareness which has limited the agriculture in parts of Konchuru, Badakhandi, Gandala and Durubandha NLLUT to kharif paddy growing only. It is, therefore, apt to extent legislative measures into the GT in the NLLUT so that the barren fallow and rice fallow lands of these panchayats will adopt regular agricultural operations or execute extensive top dressing in view of generating more employment in the pastoral sector in addition to agricultural (Fig.18.8).
(iv) The GT in the LT constitutes about 90.70% of which 75.80% is irrigated through the rivers and canals of the Rushikulya and Ghodahad river irrigation projects. The soil and water potential are uniformly rich while the fertility status shows a conspicuous regional variation. The riverside upland panchayats of Sikiri, Nandika and Ralaba are very much flood and erosion prone areas. The other means of soil erosion include unscientific tillage and extensive defoliation. The aforesaid problems have already been identified by the Directorate of Soil Conservation, Government of Orissa in some of these villages. Therefore, a growth in the productive potential of the cultivated terrain in the GT villages of the LT in the Hinjili block would demand rather for a growing social concern in view of their rich agricultural bases in the LT in terms of crop concentration, diversification and efficiency.

About 0.90% of the cropped area of the GT in the LT is devoted to food crops in Chanduli, Sahapur, Sasanambagan, Putiapadar, Saru, Badakhandi and Konchuru panchayats. As compared to this, about more than 60% of the cultivated terrain is devoted to commercial cash crops in Sikiri, Nandika, Kharida, Putiapadar, Ralaba and Gandala panchayats. These panchayats produce about half of the Subdivision's betel leaves, maximum paddy, pulses, oil-seeds, vegetables, etc. There is least diffusion of these crops except the sugarcane and betel leaves
which are confined to the perennially irrigated light and friable sandy loam soils in parts of Sikiri, Ralaba and Nandika villages. On social grounds the conspicuous *rabi* cropuse in the GT villages is far from the level of expectations barring Sikiri, Nandika, Sahapur, Hinjili, Kharida, Gandala and Belagam panchayats. The chilli growing forms the bulk of the *rabi* cropuse. It is in view of rich soil and water potential, the agricultural landuse will be more efficiently mobilized through the serious implementation of the existing land legislation codes of the land owner's conduct.

(v) The MGT(W) constitutes about 20% of the rugged terrain of which 36.59% is irrigated. The cultivable wastes account for 21.95%. The soil potential is rich while the water resource is poor. The surface undulations, rough surfaces and low groundwater potential, excessive soil erosion and run off over the lateritic outer surfaces of the village Singipur in the Makarjhol panchayat have limited the regional agriculture to *kharif* paddy growing only. The *rabi* landuse is unaccountable and low. The soil and water conservation which are already in operation in this part will have to be mixed with land levelling and cover plantation of the canal side uplands.

(vi) The MGT constitutes 4.65% of the LT of which about 71.40% is irrigated by the tanks. The ground water potential is poor while the natural surface water resource is moderate.
The soil potential is rich. The MGT villages in the LT consists of Burupada and Podingi in the Burupada panchayat in the northwest of the Hijnili block. The conspicuous water deficit in these villages may be met through the extension of a segment canal of the Rushikulya or Ghodahad river after due negotiation with the region's surface elevation, structure, lithology and dissection. A marginal shift from the predominantly monopaddy cropping to some other selective food cropping such as chilli and other vegetables may be considered then. The rabi fallow lands can also be activated on the provision of irrigation.

(vii) About 40% of the RT is FT of which about 64.55% is irrigated through canals, tanks, wells and MIP reservoirs. The region, comprising sapuapali and Sasanambagan villages of the Sasanambagan panchayat, exhibits medium gradient ruggedness, moderate dissection and moderately low relative relief upon the granite-gneiss litho-structural basement surfaces. The conspicuous soil variants range from clay to sandy clay. The soil potential is rich while the natural water resource is poor. The conspicuous undulations, surface roughness in small patches and low water resource have limited the regional agriculture to a status of monocropping. The measures of land levelling in addition to an already operating soil and water management would enhance the productivity levels of the present monocropping and would ensure a marginal shift from the
paddy concentration to crop diversification on priority basis during the kharif. The rabi cropuse would also be possible in the form of vegetable growing.

(viii) The FT constitutes about 4.65% of the LT of which about 51.05% is irrigated through the Rushikulya canal, other tanks and dug-wells especially during the kharif season. The hard pyroxenated quartzitic and granulitic structural basements in this part have resulted in mild surface undulations. The soil and water potentials are moderate to low. The villages of Bhabandh and Suryanarayanpur of the FT in the LT record deep water table. The summer dryness of wells, tanks and other water bodies is a common phenomenon in these parts. Crop failures are common during the years (1987-88) of monsoon fluctuations. As the dry conditions are common during both pre-kharif and rabi seasons the agriculture of these villages is limited to mono-paddy cropping. Large part of the cultivated terrain in these parts remain fallow and, therefore, fall an easy prey to overgrazing and consequent soil erosion. As there is very little scope of elevating the irrigation efficiency of the silted and only segment of the Rushikulya canal, a concentration upon rain-fed farm ponds is essential. The present soil and water management schemes will also help in increasing the productive potential of the rainfed agriculture in the Bhabandh panchayat of the Hinjili plains in the Hinjili block of the Chhatrapur Subdivision.
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