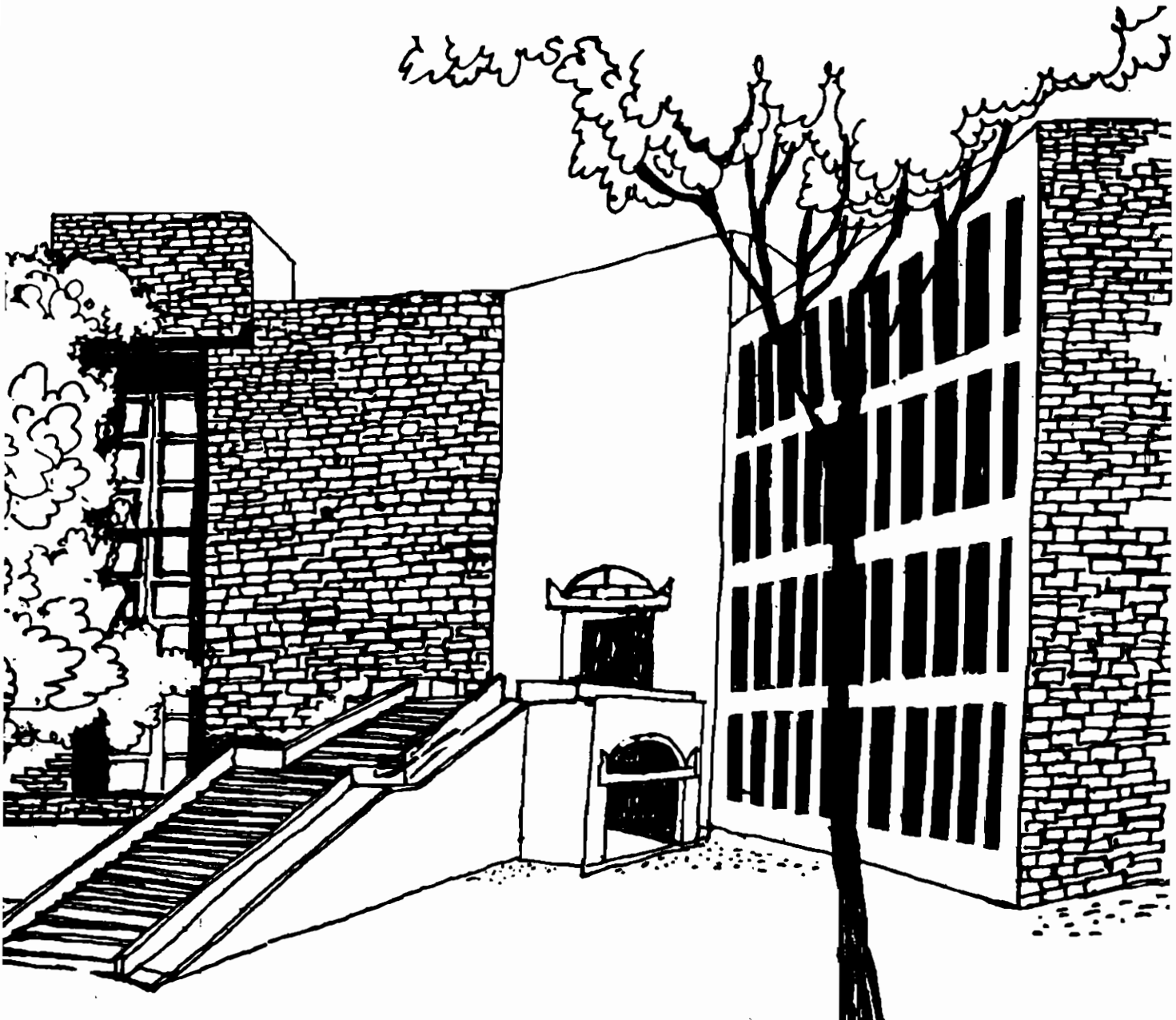




# Working Paper




**A PERSPECTIVE ON LAND USE PLANNING FOR  
EASTERN INDIAN**

**By**

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## **ABSTRACT**

*Of all the natural resources endowed upon mankind, soil cover on the mother earth has been one of the most important basic resources which plays a strategic role in determining the living standards of human beings. Given the multitude of possible uses of land and the fact that often there are possibilities of emergence of a new use outcompeting the existing users, and consequent conflicts, land use planning is to be considered an important exercise. The present paper is an attempt to provide a perspective on the multitude of uses land is put to in the Eastern states of India and tries to argue that plans should involve minimum reliance on centralised decision making bodies and their budgetary provisions on the one hand and nothing should be left to be decided by the unconstrained functioning of the existing market forces, on the other. Self-governing and self-sustaining decentralised user group institutions at local levels with appropriate higher tier organisations should perform the land use planning exercise and look into their implementation as part of their regular business*

**SECTION 1: INTRODUCTION** Of all the natural resources endowed upon mankind, soil cover on the mother earth has been one of the most important basic resources which plays a strategic role in determining the living standards of human beings. Soil, in fact, is the base for all sorts of productive activities. Any type of transformation be it quantitative, qualitative or spatial, requires soil in varying degrees. Historically, soil has been put to increasing number of varied uses. Given the fixed amount of land available on the mother earth and the simultaneous increase in population as well as both quantitative and qualitative changes in the goods and services demanded over time, the pressure on land has been increasing tremendously. In earlier days when economic activities were mainly concentrated around agricultural activities and the population of the world was not that high like what we have today, land was not considered to be scarce. Forests were felled to make land available for agriculture as well as for human settlement. In course of time man graduated into industrial production which necessitated further diversion of land from agriculture and/or forests to meet the requirement of industries as well as that for urbanisation. Simultaneously, the agricultural sector grabbed further forest land to make up for the loss caused by such diversion. Thus we have gradually shifted from slash and burn agriculture to multiple cropping on the one hand and on the other, land meant for agricultural production have been getting diverted to non-agricultural use at a very alarming rate. Under such circumstances it is necessary that a proper planning is undertaken in allocating the available land in an optimal manner among different possible uses to balance the requirements of all types of economic activities.

Conceptually, perspective land use planning involves altering the land area allocations over alternative uses through suitable technological and institutional devices such that

- (i) the supplies of the various commodities and service which follow from the stipulated land use pattern broadly conforms to the projected demand for such items,
- (ii) the uses are sustainable in the sense that the current uses by one group does not jeopardise the uses of another group or those of the future generation, and
- (iii) the bio-mass production - i.e. the streams of output which follow from the stipulated land use pattern (and even income and employment following from the streams of output) are maximized.

From an earth covered only with forests and rivers with patches of deserts here and there, even a few thousand years ago, we have arrived a level of 'development' where land is to be used for the following purposes:

- a) maintenance of forest cover upto a certain specific level for ensuring ecological stability;
- b) production of cereals and other food crops for ensuring food security;
- c) production of fodder for the live stock that ensures supply of other food stuffs necessary for human consumption;
- d) maintenance of water bodies for inland fisheries, irrigation and supply of water for drinking and even for protection of bio-diversity;
- e) cultivation of commercial crops for use as inputs by manufacturing enterprises;
- f) provision of shelter to the world's population both in rural and urban areas;
- g) extraction of minerals; and
- h) establishing industrial enterprises.

Given these multitude of possible uses of land and the fact that very often there are possibilities of emergence of a new use outcompeting the existing users, and consequent conflicts, land use planning *per se* is to be considered an important exercise facing the policy makers and planners of an economy. The present paper is an attempt at identifying the issues and suggesting possible remedial measures vis-a-vis the land use patterns in the three eastern states of India, namely, West Bengal, Bihar and Orissa. In order to provide the necessary logical clarity the paper is divided into five sections. The first one, as usual, is introductory in nature. The last section is set aside for suggestions and concluding remarks. This two sections are separated by three others in between. The second section gives a perspective of land use pattern in the region under study in comparison with that for the country as a whole. The characteristics of land use patterns under certain particular categories in eastern India have been taken up for thorough scrutiny in the third section. The fourth section identifies the emerging issues vis-a-vis the land use planning in the Eastern states.

**SECTION 2 : THE EASTERN STATES VIS-A-VIS THE COUNTRY** In this section we provide certain stylised facts regarding the land use patterns prevailing in the three eastern states covered in

this study against the situation that obtains in the country as a whole. From the point of view of differences in uses we may distinguish land use under the following categories:

- Built up area, i.e., the land used up for construction of dwelling and business units, industrial sheds and roads;
- Agricultural area, i.e., land engaged in agricultural activities;
- Forest area;
- Wastelands;
- Waterbodies; and
- Mineral and industrial wastelands.

From the data available from NRSA we observe that :

1. In all the three states, the built up area as percentage of the total geographical area in the state, is higher than the Indian average (4.34%). Among the states, the highest proportion of land going to such use is recorded in Bihar (10.19%), followed by Orissa (6.90%) and West Bengal (5.28%) in a descending order;
2. West Bengal has set aside the highest proportion land for agricultural activities (73.05%), being followed by Bihar (64.90%) and Orissa (51.06%). Both West Bengal and Bihar are a notch above than the national average of 51.57%, with Orissa almost following the national level;
3. The greater allocation of land in agricultural use in West Bengal and Bihar seems to be at the expense of lesser proportional area being available for forests. Whereas West Bengal has a share of only 9.11% of its total geographical area under forests, that for Bihar stands at 15.34%. On the other hand Orissa is observed to be putting a larger share (29.51%) of its available land mass under forests, a proportion which is significantly higher than the national average of 20.51% (although well below the suggested norm of one-third of the landed area);
4. Compared to the situation that obtains at the national level (13.85%), the extent of wasteland is observed to be significantly less in the states under the present study. Whereas the least is observed in West Bengal (3.52%), the highest proportion is recorded in Orissa (8.75%);
5. West Bengal has the highest proportion of its area under water bodies, among the eastern states and incidentally, its share of water bodies (7.67%) is observed to be well above the national average (3.31%). The other two states record a more or less similar proportion of land under water bodies 2.46% and 2.33% for Orissa and Bihar respectively which is considerably less than the national figure;
6. In the context of the area converted into wastes because of mining and industrial activities, unfortunately, Bihar (0.21%) and West Bengal (0.10%) record a proportion that is quite higher than the national average (0.04%), with Orissa (0.05%) keeping track with the national situation.

So far we restricted our discussion in terms of broad categories of land uses. Under every category, we can differentiate among several sub-categories. Land under agriculture may be used for :

- Kharif Crop;
- Rabi Crop; and
- Agricultural Plantations.

Some land are also left fallow. The intensity of land use under agriculture is also indicated by the extent of double cropped area. We present below the main features regarding distribution of agricultural land under different such sub-categories. We observe that

- ♦ a higher allocation of land for *kharif* crops in all the states and the allocation is higher too in respect of *rabi* crops for West Bengal and Bihar. This explains the higher extent of double cropping in West Bengal (21.25%) and Bihar (23.50%) in comparison to that in the country as a whole (16.58%).
- ♦ a considerable area are lying fallow in West Bengal (5.67%), a feature not so prominent in the other two states (3.16% in Bihar and 0.05% in Orissa).
- ♦ in view of the concentration of tea gardens in the northern region of West Bengal, a considerable proportion of land is devoted to plantation (11.99%).

The forests in the eastern region of the country are mostly deciduous with patches of ever green forests spread over West Bengal and Bihar. So far as the distribution of forest resources is concerned :

- ◆ a significantly higher proportion of forest land is observed to be degraded in Bihar (7.88%), while Orissa (4.39%) and West Bengal (1.37%) show a comparatively better position, with the national average standing at 5.08%;
- ◆ West Bengal earns the dubious distinction of nurturing the highest share in forest blanks (0.59%) among the three states, although the share is more or less identical to the national average (0.57%);
- ◆ the states of West Bengal (0.21%) and Orissa (0.25%) are lagging behind the national scenario (0.35%) in terms of plantations, with Bihar (0.5%) showing a better performance;
- ◆ about 2.24% of the total geographical area of West Bengal falls under mangrove forests, with Orissa chipping in with about 0.14% of its land against the national average of 0.16%.

As we concentrate on the situation that obtains in these states in respect of wastelands it is observed that

- Bihar is the worst sufferer from waterlogging with 0.72% of its land coming under such category, whereas the national average is around 0.38%;
- West Bengal has a larger share of marshy/swampy land (0.56%); and
- Orissa features the highest proportional area under land with or without scrubs.

It is further observed that West Bengal enjoys a higher share of waterbodies (7.67%) compared to the national average (3.31%), although most of them are constituted of riverine or stream areas with a negligible proportion of land under lakes, reservoirs or canals. On the other hand, the presence of the Chilika lake in Orissa shows a considerable proportion of its land under the second category in comparison with the national average.

So far we looked into the percentage share of land under different uses in the total geographical areas of the states. However, the arguments made solely on the basis of such figures may be misleading unless we also look into the states' share in a particular use of land in respect of the total land put under such use in the country as a whole. In carrying out such an exercise, we observe that

- in spite of sharing a lesser proportion of the total geographical area of the country, both Bihar (5.43%) and Orissa (4.86%) have a considerably higher built up area (12.73% and 7.72% respectively). In case of West Bengal, even though it enjoys a share of 2.77% of India's total geographical area, it provides land for 3.37% of the built up area of the country;
- Bihar and West Bengal have, incidentally, set aside a larger proportion of land for agricultural practices as is evident from their larger share in the agricultural land of the country in comparison to their total land asset (6.83% and 3.92% respectively). Orissa more or less have been following the national average;
- However, in the context of forests the situation is observed to be just the reverse for Bihar and West Bengal (4.06% and 1.23% respectively) with Orissa maintaining a proportionately larger area under this category (6.99%);
- whereas the endowment of wastelands is much smaller in proportion to the total landed assets of these states, they are observed to be better endowed with waterbodies;
- the situation is highly alarming in the context of mining and industrial wastelands. Although Bihar accounts for only 5.43% of the total land mass of the country, it shares 30.71% of the total area lying under that category in the country. The situation of Orissa and West Bengal are no good either. The eastern Indian region as a whole accounts for 45.3% of the mining and industrial wastelands of the country in spite of controlling only 13.06% of the landed asset of the country.

If we are to look into the land use pattern in these states at a disaggregated level the following observation are in order in respect of land under agriculture:

- Bihar, interestingly, shows a higher intensity of double cropping as is evident from 7.69% of the double cropped area of the country being located in the state in spite of the fact that it accounts for 6.83% of the total area under agricultural use in India. The situation is more akin to the Indian average for West Bengal and looks grimmer in respect of Orissa;

- in the context of *kharij* crops we observe a proportionately larger share of land being put in Bihar (7.73%) and Orissa (6.49%), with West Bengal having a more or less proportionate share (3.74%);
- the situation is a bit different as we consider the *rabi* crops with Bihar allocating a more or less proportionate share and West Bengal and Orissa putting in a lesser proportion.
- As is obvious, West Bengal enjoys a disproportionately larger proportion of land under agricultural plantation in view of the tea estates in the northern part of the state.

In respect of area under forests the striking features that emerge are the disproportionately high level of forest blanks in West Bengal (2.90%) and degraded forests in Bihar (8.42%). However, the plantation figures provide some relief as they are observed to be on the higher side for all the states (7.74%, 3.47% and 1.64% for Bihar, Orissa and West Bengal respectively).

### SECTION 3 : DISAGGREGATED FEATURES OF IN EASTERN INDIA'S LAND USE PATTERN

As we talk of land, its most important use still is in terms of that for producing food grains as is necessary for the subsistence of human beings. This is far more so in respect of the eastern region of the country as has been revealed in the earlier section. As the per capita land available for such use is declining all over the world partly because of rapid increase in population and partly due to land being put to alternative uses, more and more intensive agricultural practices are becoming the order of the day. Table 4.1 provides an insight into the decline in per capita net sown area and per capita gross cropped area for the states under consideration over the years. Land use planning involves taking stock of the natural endowments - namely, soil, underground water and rainfall and then managing them properly for the purpose of maximising the productive potentials of available land resources. The practice of intensive use obviously puts pressure on the quality of soil as well as the ground water reserve. The extent of such use is reflected in the cropping pattern followed in the districts - an aspect that we are taking up in the following paragraphs.

**TABLE 4.1 DECREASE IN PER CAPITA NET SOWN AREA AND GROSS CROPPED AREA IN THE EASTERN STATES (in hectares)**

YEAR	WEST BENGAL		BIHAR		ORISSA	
	NSA	GSA	NSA	GSA	NSA	GSA
1950-51	0.180	0.203	0.230	0.281	0.385	0.408
1980-81	0.102	0.140	0.119	0.160	0.232	0.332
2000 A.D. (Projected)	0.066	0.100	0.079	0.104	0.160	0.273
% decline in 50 years	63.33	50.74	65.65	62.99	58.44	33.09

**Cropping Pattern and Management of Arable Land** An analysis of crop-yield, its instability (i.e., c.v.) and land area allocation (namely, percentages of GCA) for the four major crops of this region - namely, paddy, wheat, pulses and oilseeds has been done in Tables 4.2 through 4.5. For each crop, the districts have been classified into eight categories depending upon whether the yield rate is relatively high or low, whether the coefficient of variation of average yield is high or low and whether a proportionately high or low percentage of GCA has been allotted to this crop - each category highlighting the need for different policy measures. For example, the districts belonging to cell number 1B in any of these charts, even if they cannot augment productivity and reduce c.v. further, should attempt to allocate a larger land area under such crops. Districts belonging to cell 2A need to reduce high c.v of yield in crops and if successful, those in cell 2B should allocate a larger land area under those crops. Districts falling in cell 3A requires measures at augmenting the poor yield of crops and once such measures are successful, those belonging to cell 3B can allocate a large land area to such crops. The districts belonging to row 4 need measures for both augmenting yield and reducing c.v. If such measures are costly to enforce, each district should try to look for crops where it has high yields with low c.v. We shall take up this issue in a greater detail later.

Incidentally, the intensity of cropping pattern is highly dependent on the availability of water and intensity of its use. Water as usual is available from three sources: (1) rainfall, (2) ground water and (3) other irrigation sources. The distribution of normal and actual rainfall with seasonal break-up for the eastern states of the country reveals the following features:

- Not a single district of this region falls within the low rainfall category - whether one considers the average annual rainfall or the average *kharij* rainfall.

**TABLE 4.2 : CATEGORISATION OF DISTRICTS IN THE EASTERN STATES IN TERMS OF YIELD, INSTABILITY OF YIELD AND ALLOCATION OF GCA ON PADDY**

**Districts with % of GCA Allotted**

	A.High	B. Low
1.High yield, low C.V.	Bihar:Nalanda,Nawada Orissa: - Bengal:Bankura,Birbhum,Burdwan, Malda, Midnapur, Murshidabad, 24 Parganas	Bihar: Bhojpur, Patna, Rohtas, Saran, Siwan Orissa: - Bengal: -
2.High yield, high C.V.	Bihar:Darbhanga, W.Champaran Orissa: - Bengal:Howrah, Hoogly, Puralia	Bihar: - Orissa: - Bengal: Nadia
3.Low yield, low C.V.	Bihar:E.Champaran, Purnia, S.Parganas Orissa:Balasore, Keonjhar, Mayurbhanj, Puri, Sambalpur Bengal: Cooch Bihar, W.Dinajpur	Bihar:Katihar, Munger, Saharsa Orissa: Cuttack, Koraput Bengal: Darjeeling
4.Low yield, high C.V.	Bihar:Aurangabad, Dhanbad, Gaya, Giridih, Hazaribagh, Madhubani, Ranchi, Sitamarhi Orissa: - Bengal: -	Bihar: Begusarai, Bhagalpur, Gopalganj, Muzaffarpur, Samastipur, Vaisali Orissa: Balangir, Dhenkanal, Ganjam, Kalahandi, Phulbani Bengal: -

Note: Yield  $\geq$  13.75 qt/ha (mid-value of range) is high, low otherwise; C.V.  $\geq$  20 is high, low otherwise; land allocation  $\geq$  50 per cent of GCA is high, low otherwise.

**TABLE 4.3: CATEGORISATION OF DISTRICTS IN THE EASTERN STATES IN TERMS OF YIELD, INSTABILITY OF YIELD AND ALLOCATION OF GCA ON WHEAT**

**Districts with % of GCA Allotted**

	A.High	B. Low
1.High yield, low C.V.	Bihar: - Orissa: - Bengal:Murshidabad, Nadia	Bihar: - Orissa:Balasore, Cuttack, Mayurbhanj, Bengal: Birbhum, Howrah, Hooghly, Cooch Bihar, Medinipur
2.High yield, high C.V.	Bihar:Gopalganj, Nalanda, Patna, Samastipur, Saran, Siwan Orissa: - Bengal: -	Bihar: S.Parganas, Orissa: Dhenkanal, Keonjhar, Bengal: Bankura, Burdwan, Malda, Purulia, W.Dinajpur
3.Low yield, low C.V.	Bihar: - Orissa: - Bengal: -	Bihar: - Orissa:Balangir, Sambalpur Bengal: Jalpaiguri
4.Low yield, high C.V.	Bihar:Aurangabad, Begusari, Bhagalpur, Bhojpur, Darbhanga, Gaya, Katihar, Madhubani, Munger, Muzaffarpur, Nawada, Palamau, W.Champaran, E.Champaran, Purnia, Rohtas, Saharsa, Sitamarhi, Vaisali	Bihar:Dhanbad, Giridih, Hazaribagh, Ranchi Orissa: Ganjam, Kalahandi, Koraput, Phulbani, Puri, Sundergarh Bengal: Darjeeling

Note: Yield  $\geq$  18.5 qt/ha (mid-value of range) is high, low otherwise; C.V.  $\geq$  20 is high, low otherwise; land allocation  $\geq$  10 per cent of GCA is high, low otherwise.



**TABLE 4.4: CATEGORISATION OF DISTRICTS IN THE EASTERN STATES IN TERMS OF YIELD, INSTABILITY OF YIELD AND ALLOCATION OF GCA ON PULSES.**

Districts with % of GCA Allotted

	A.High	B. Low
1.High yield, low C.V.	Bihar: - Orissa: - Bengal: -	Bihar: - Orissa: - Bengal: -
2.High yield, high C.V.	Bihar: Aurangabad,Muzaffarpur,Palamau, Patna, Vaisali Orissa: Keonjhar,Koraput Bengal: -	Bihar: Begusarai,Bhagalpur,Madhubani, Nalanda,Nawada,W.Champaran, Samastipur, Saran, Sitamarhi, Siwan Orissa: - Bengal: -
3.Low yield, low C.V.	Bihar: - Orissa: Balasore,Dhenkanal Bengal: -	Bihar: Rohtas Orissa: - Bengal: -
4.Low yield, high C.V.	Bihar: Saharsa,Singbhum Orissa: Balangir,Cuttack, Ganjam, Kalahandi, Mayurbhanj,Phulbani, Puri, Sambalpur, Sundergarh Bengal: -	Bihar:Bhojpur,Darbhanga,Dhanbad,Gaya, Giridih,Gopalganj,Hazaribag,Katihar, Munger,E.champaran,Purnia,Ranchi, S. 24 Pargans Orissa: - Bengal: -

Note: Yield  $\geq$  6.8 qt/ha (mid-value of range) is high, low otherwise; C.V.  $\geq$  20 is high, low otherwise; land allocation  $\geq$  10 per cent of GCA is high, low otherwise. Bengal has hardly any area under pulses.

**TABLE 4.5: CATEGORISATION OF DISTRICTS IN THE EASTERN STATES IN TERMS OF YIELD, INSTABILITY OF YIELD AND ALLOCATION OF GCA ON OILSEEDS**

Districts with % of GCA Allotted

	A.High	B. Low
1.High yield, low C.V.	Bihar: - Orissa: - Bengal: -	Bihar: Vaisali Orissa: - Bengal: -
2.High yield, high C.V.	Bihar: - Orissa: Dhenkanal,Sambalpur Bengal: -	Bihar: Begusarai,Patna,Samastipur Orissa:Balasore,Cuttack Bengal:Bankura, Nadia
3.Low yield, low C.V.	Bihar: - Orissa: - Bengal: -	Bihar: - Orissa: - Bengal: -
4.Low yield, high C.V.	Bihar:Palamou,Singbhum Orissa:Balangir, Ganjam,Kalahandi, Keonjhar, Koraput, Phulbani Bengal: W.Dinajpur	Bihar: Aurangabad, Bhagalpur,Bhojpur, Darbhanga,Dhanbad, Gaya,Giridih, Hazaribag,Katihar, Madhubani,Munger, Muzaffarpur,Nalanda, Nawada, W. Champaran, E. Champaran,Purnia,Ranchi,Rohtas, Saharsa,S.Parganas,Saran,Sitamarhi, Siwan Orissa: Mayurbhanj,Puri, Sundergarh Bengal: Birbhum Burdwan, Darjeeling, Hooghly, Jalpaiguri,Cooch Bihar, Malda, Midnapur, Murshidabad, Purulia

Note: Yield  $\geq$  8.5 qt/ha is high, low otherwise; C.V.  $\geq$  20 is high, else low; land area allocation  $\geq$  10 per cent of GCA is high, low otherwise.

- Since the proportion of rainfall received during the monsoon months (July-September) constitutes about 75 to 80 per cent of the total annual rainfall of these states, irrigation becomes extremely important
- Over the last 20-30 years, the average actual rainfall seems to have fallen short of the normal annual rainfall for all the three states. This is also true season wise, at least in the cases of West Bengal and Orissa.
- Instability of rainfall (inspite of high/medium average rainfall) is a serious problem for those districts for which the coefficient of variation of average annual rainfall is at least 20 per cent.
- But interestingly and quite contrary to expectations, the years in which rainfall received was less than 25 percent of the normal level, the states have been able to produce more kharif paddy. But the years in which flood visited the region (e.g., in 1978-79 and 1981-82), there was fall in the production of kharif paddy. Thus, flood damages kharif production more than drought in this part of the country.

Based on the districtwise data on percent gross cropped area irrigated, ground water availability togetherwith level of ground water utilization and source wise irrigation status, Table 4.6 identifies the following districts in the states where the position of irrigation is very grim (net irrigated area less than 25% of the net cropped area). The stylised facts with respect to development of irrigation and watershed in this region are as follows:

- I. In the eastern states, mostly the alluvial plains having a flat topography and growing mainly rice during all the three seasons, are under irrigation by the major river valley projects which has caused alarmingly high water-logged conditions in the absence of proper drainage arrangements.
- II. About 20-30 percent of available ground water potential has been utilized in Bihar and West Bengal whereas in Orissa only 4.74 percent has been utilized against 70-80 percent in Haryana and Punjab (Ministry of Irrigation, 1982).
- III. Two types of factors have been identified for the failure of Deep Tube Wells and River Lift Irrigation: (i) The internal factors which include mechanical inefficiency, lead to gradual decline in water discharge rate over time, and the lack of timely maintenance and repair which reduces the life span of the machine. (ii) The external factors include (a) erratic supply of electricity, (b) theft of transformer and machine parts, and (c) political influence on the operator to irregularise the distribution of water.
- IV. Given the imbalance between demand and supply of irrigation water, there exists a scope for making enormous profit by water sellers through selling excess water to the small and marginal farmers and even to share croppers.
- V. The incidence of use of diesel pumpset is large enough inspite of relatively higher efficiency and lower private cost of operation in case of electric pumpset. It is observed that erratic power supply is responsible for the unpopularity of electric pumpset.
- VI. Under the existing property relations, unrestricted use of submersible pumpset has not only restricted the efficiency of STWs but also has threatened the prospect of the agrarian economy through depletion and continuous going down of ground water potentials.
- VII. The impact of irrigation in the eastern states is comparatively lower since kharif paddy is the major crop of these states where there is no absolute necessity of irrigation, given the high rainfall, except in the years of drought. Moreover, the consumption of fertilizers and HYV seeds is quite low in the eastern states which further bring down the impact of irrigation on crop yield.
- VIII. In the eastern states different types of land treatment work on watershed basis are being implemented under different programmes like:
  - National Watershed Development Project for Rainfed Areas (NWDPR).
  - Watershed Management Programme in the priority watersheds of the interstate River Valley Projects.
  - Watershed Management under Drought Prone Area Programme (DPAP).
 All these programmes are being undertaken at government initiative and expenses.

**TABLE 4.6 : DISTRICTS HAVING CRITICALLY LOW LEVELS OF IRRIGATION**

	District	%GCA irrig.	Level GW Util.	Major sources of irrigation
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**West Bengal**

1.	Jalpaiguri	11.93	1.10	Canals
2.	Cooch Bihar	8.64	4.30	Underground
3.	West Dinajpur	23.13	23.70	Underground

**Bihar**

1.	Deoghar	8.61	7.90	Minor surface
2.	Dhanbad	2.50	1.50	Minor surface
3.	Giridih	10.47	1.20	Under ground
4.	Godda	9.90	5.30	Minor surface
5.	Gumla	2.81	2.00	Other sources
6.	Hazaribag	12.57	1.50	Under ground
7.	Lohardaga	9.72	7.30	Under ground & other sources
8.	Bokaro	6.12	18.25	Under ground
9.	Purnia	18.30	10.10	Canal & Under gound
10.	Ranchi	8.25	2.00	Canal
11.	Sabebganj	5.17	11.60	Other sources
12.	Santhal Parganas	5.69	1.60	Under ground
13.	Singhbhum	4.60	0.96	Canal
14.	Kishanganj	18.97	8.90	Under ground

Source : ARPU, Ahmedabad

**Forests in the Eastern States:** There are certain special features of the eastern states which make the issue of forestry management in these states both qualitatively and quantitatively distinct:

- Implications of the broad socio-economic features - namely, high population pressure on land and the high incidence of scheduled caste and scheduled tribe population,
- Strong demand from industries (e.g. paper-making) and the communication sector,
- High order of deforestation due to socio-economic reasons as well as implementation of developmental projects,
- Poor yield rate of forests, and
- Growing importance of participatory mode of forest management with increasing importance being attached to development of minor forest products which are available in considerable amount.

**Waste Lands:** Management of waste lands, which implies reclamation of such lands and putting them back to productive and efficient use on a sustainable basis - all at a reasonable cost - is beset with three general and interrelated problems: first, definitional, second, informational and third, diagnostic. Based on a conservative estimate capturing only barren land, cultivable waste and fallows other than current fallows - most of which are lying vacant, Table 4.7 lists the districts within these three states, where the area under the category of barren, other fallow and cultivable waste land has increased consistently between 1986 and 1994.

**TABLE 4.7 : DISTRICTS SHOWING UNFAVOURABLE MOVEMENTS OF AREA UNDER WASTE LANDS**

States	Area increasing between 1986 and 1994
West Bengal Bihar Orissa	Cooch Behar (between 1972-86) Purba Champaran, Darbhanga, Sitamarhi, Madhubani, Vaisali, Siwan, Aurangabad, Gumla, Lohardaga, Ranchi Baleswar, Bolangir, Dhenkanal, Mayurbhanj, Phulbani, Keonjhar

Source: Based on data collected from ARPU, Ahmedabad.

The scope for waste land development through a ranking of the districts in terms of the extent of waste land available (i.e., the extent of waste lands being measured by the estimate given above as proportion of total geographic area) is displayed in Table 4.8.

**TABLE 4.8: EXTENT OF WASTELANDS AVAILABLE IN THE EASTERN STATES**

Wastelands as proportion of total geographical area	West Bengal	Bihar	Orissa
Less than 5 percent	Burdwan, Birbhum, Midnapur, Howrah, Hoogly, 24 Parganas, Nadia, Murshibadad, W. Dinajpur, Darjeeling, Jalpaiguri, Malda	Nalanda, Buxar.	Kalahandi, Ganjam
5 to less than 10 percent	Bankura, Purulia	Bhojpur, Jahanabad, Samastipur, Patna, Rohtas, Muzaffarpur, Madhepura, Darbhanga, Siwan, Aurangabad, Nawada, Bhabhua, Sitamarhi, Paschim Champaran, Madhubani, Gopalganj, Purnia, Araria, Purba Champaran,	Mayurbhanj, Dhenkanal.
10 to less than 20 percent		Saran, Bhagalpur, Supoul, Chatra, Khagaria, Begusarai, Vaisali, Munger, Saharsha, Kishanganj, Katihar, Palamau, Gaya	Puri, Balasore, Cuttack
20 to less than 30 percent		Godda, Deoghar, Gumla, Bokaro, Giridih, Banka, Jamui, Singbhum, Ranchi, Sahebganj, Hajaribagh, Lohardaga	Sambalpur, Sundargarh, Phulbani, Keonjhar, Balangir
More than 30 percent	Cooch Bihar	Santhal Parganas, Dhanbad	Koraput

Source: Based on data collected from ARPU, Ahmedabad. Note : Data for West Bengal refer to the year 1986, for the rest of the states the information pertain to 1994.

**SECTION 4: THE EMERGING ISSUES AND SUGGESTIVE POLICY FRAMEWORK:** As we have already mentioned in the earlier section, land today is being put to a number of uses many of which often compete with one another. Under such circumstances we are required to evolve some mechanism that will ensure the simultaneous achievement of the goals mentioned in the previous section and minimize the possibilities of conflicts that may emerge as a result of the different possible uses of land already listed. Can market play the necessary role? Unfortunately, we argue in the negative. An example may help realise the problem. There existed a lot of wetlands aoround the city of Calcutta even a couple of decades ago. Although shrinking in the face of severe pressure of demand for land for growth of real estates, they are yet to have vanished altogether today. Can market forces help maintenance of the wetlands as are necessary for the supply of the necessary oxygen to the millions of dwellers in the city? Land provides lot many such services to mankind and for a good number of them markets simply do not exist. We are yet to evolve a 'market-clearing mechanism' in respect of environmental degradation. Certain qualitative concepts like 'food security' and 'bio-diversity' are still not possible to be analysed in a market framework as certain basic requirements of market analysis cannot be fulfilled in respect of them.

Collin (1993) provides an excellent structure for understanding the dynamics of goal attainment. He argues that the achievement of a certain goal necessitates constraining of actions. 'Defining control as the constraining of action in order to achieve a goal', he classifies 'different modes of control depending upon when the constraint is imposed'. When a person, or an organisation with rules and plans specifies the appropriate action and directs the actor what to do, we talk of 'action control'. Control based on the consequences of action, on the other hand is termed as 'output control'. Control prior to action is characterised as premise control. Table 4.1 provides the different possibilities depending on the possibilities of measuring goal attainment and the degree of knowledge of the action necessary to achieve the goals.

**TABLE 4.1: CONTROL TYPES DEPENDING UPON KNOWLEDGE OF ACTION AND MEASURABILITY**

Knowledge about the action	Goal Attainment	
	Measurable	Not Measurable
High	Action control or output control	Action control
Low	Output Control	Premise Control

Source : Collin (1993), p.74

If the goal to be attained is measurable and one has prior knowledge about the possible actions to be taken, the control may be either in terms of action or output. If the goal is not measurable but there is high knowledge about the actions, Collin suggests an action control, i.e. setting up of a hierarchical institution for the purpose. A market form of control in the form of output control is prescribed when the goal is measurable with even a low level of knowledge about the possible actions. In case there arise problems regarding both measurability and knowledge of actions, Collin suggests premise control and argues that 'some clan like institution is needed to deal with these conditions...' (p 74). Such institutions call for collective action.

In the context of the controls necessary to ensure optimum land use in India, we observe that the goals are neither measurable ( we are yet to know the dynamics of the land diversion system in a precise manner) nor has it been possible to identify the correct courses of action (the recurrent concerns being shown in the context of rapid deforestation in the country is a pointer towards that ). We cannot set up a control regime dominated by market forces given the facts that

- there exists no clearly defined property rights in respect of considerable proportion of land mass in the country which are under state ownership (around 40% of the total geographical area consisting of forests, wasteland waterbodies and mining/industrial wastes). Although on paper these land belong to the state, the access to such land cannot be restricted fully and very often they get converted into 'open access' properties, with no one showing the necessary interest in optimally utilising them ;

- even though some semblance of clear property rights are observed in the context of land used for agricultural purposes, there are certain grey areas, like tenancy systems, where the property rights are neither clearly defined, nor vested permanently on the user;
- certain uses of land generate negative externalities, for example, we may consider the impact of conversion of some forest land into agricultural /industrial land. Such conversion will definitely yield a higher agricultural/industrial production and may provide employment to a number of individuals. But such an action may simultaneously reduce the bio-diversity, leading to the possible extinction of a number of flora and fauna. Incidentally, we are yet to have a complete knowledge about the importance of all the flora and fauna available in nature today and their relationship with the human life. Such possible extinction may have some impacts on the future generation about which we are not very sure. Further, felling of trees for agricultural/industrial purposes may add to the problems of global warming. These may increase the hardships of people who were not at all involved in taking the decision about such conversion and also not parties to the sharing of the returns generating out of such agricultural/industrial activities.

These factors will lead to a 'market failure' problem and the goals cannot be achieved if we are to depend entirely on 'output control' through the market mechanism.

Thus we argue that planning is absolutely necessary to evolve the necessary land mix that maximises the benefits of the society. However, is complete state control then the way out? 'Action control' that the state is supposed to ensure will probably not help as complete knowledge about the appropriate action to be taken may not always be available with the state. Given the present day top-down structure of decision making, those at the higher levels of hierarchy passing on the directions may not be aware of the possible impacts the people who will actually be facing the consequences of such decisions. This probably may be the reason for the apparent failure of almost all 'plans' with pious wishes at the implementational level.

In case of a likelihood of failure of both market control or state control in the simultaneous achievement of several goals, one has to take resort to control prior to action, i.e., input control and control through socialisation. This is the essence of premise control. Control in such a form involves formation of a proper 'network' of decision makers at different tiers involving the stake-holders of all possible denominations. Consequently, in the context of land use planning, an approach of 'collective action' and 'participatory management' to ensure necessary control will be more effective while framing the necessary policy prescriptions. We shall be using the conceptual framework elaborated above in arriving at the necessary policy prescriptions.

**URBAN PLANNING** As we have already observed, a disproportionately higher amount of land has been usurped by built up area in the region under the present study. The implications of such urbanisation for policy-makers are broadly three-fold. The first and the positive aspect of urbanisation is that it can play the role of a growth centre and can induce growth through backward and forward linkages with the rural hinterlands. In the context of the eastern states, however, this concept does not seem to have played any significant role. One strong negative effect of the rapid urbanisation process is encroachment of agricultural and forest land and misuse of fringe areas in brick kiln, sand digging, small factories and residential construction in an unplanned manner.

The second negative effect of urbanisation is the rapid rural-urban migration it generates, resulting in two-fold congestion - congestion of people in houses and of houses on land, and causing both environmental and mental pollution. The four major problems which arise out of the excessive pressure of population on urban conglomerates are: (a) exposure of the urban population to increasing risks of disaster, (b) pollution of air, water and noise, (c) scarcity of basic amenities like supply of water, sanitation etc, (c) decline in the economic standard of living of urban population, in general and of the urban poor, in particular.

The whole problem of urban land use finally boils down to evolution of organisations and institutional mechanisms which can generate urban land use patterns such that the growth and development through rural-urban linkages are maximized, while at the same time encroachment of productive

agricultural land and the multifarious environmental problems associated with rural-urban irrigation are kept at the minimum.

Broadly speaking, there have been three types of responses to the urban land use problem in the eastern states: first, preparation of master plans; second, evolution of rules and regulations to control land use and the problems associated with undesirable uses; and third, evolution of special development authorities, besides the regular corporations, municipalities and notified area authorities, to implement plans, rules and regulations and also to provide further guidance in this regard.

The absence of explicit mechanisms and institutional devices by which failure to achieve targets in terms of desired land area allocations can be prevented is observed to be the main obstacle vis-a-vis urban land use planning. It appears that exclusive reliance has been placed on statutory rules and regulations for avoiding sub-optimal allocation without regard to the high transaction costs that may be involved in enforcing such statutory provisions. Moreover, not enough attention seems to have been paid either to augment the productivity of organised open space, agricultural and allied activities and water bodies and/or wet land around urban fringes, nor to create a public awareness about their environmental utilities and benefits.

In order to promote optimal urban land use and also to strengthen rural-urban ties, all the state governments have been pursuing the growth center concept through promotion of special area development authorities, but often to the utter neglect of the financial viability of such organisations and at the cost of unnecessary messing up of activities between those of the pre-existing organisations and those of the new ones.

The growth of urban population in the three eastern states of W. Bengal, Bihar and Orissa shows that the growth has been particularly phenomenal in recent times in the two states of Bihar and Orissa, which not only started from a lower urban base but also continued to remain so as compared to W. Bengal. However, there has been a slackening in the growth rate of urban population in the last decade in all three states and especially in Bihar and Orissa. Urban land as a percentage of the land put to non-agricultural uses, though still lower in Bengal and Bihar as compared to the all-India situation, has increased steadily during 1971-91 in this region, the current percentage figures being 20.5, 18.6, 36.2 and 27.4 for W. Bengal, Bihar, Orissa and the country as a whole, respectively.

In the light of the trend on urban land use and the experiences of Sweden's eco-municipalities, the following policy prescriptions are suggested improve urban land use :

- (1) a systematic and comprehensive survey of urban land for all cities and towns which should synchronise with decennial population census. Use of satellite pictures, as recent studies reveal, may provide useful data in this regard.
- (2) Another important area where planned actions are called for is land under mixed use. The concept of 'Building Centers' with emphasis on mixed land use, are being applied by these state governments to provide cheap housing to low and middle income groups in urban fringes. Ideally, the state governments should play the role of facilitators - encouraging and inducing private and cooperative initiatives often in collaboration with industries to undertake these tasks and manage them, rather than themselves going in for such ventures.
- (3) In case of places like C.M.D. area which has nearly stopped growing, development of core areas which have deteriorated in recent times and lack the facilities of open space and do not have adequate roads or street for speedy movement of traffic, renewal or redevelopment seems to be the only strategy. It may even be useful to "undo" to some extent big metropolies like the CMD area, by shifting the major activities (even the state capital in case of Calcutta) to far-off places. In order to facilitate this process, subsidies on urban life should be removed and the urban-dwellers ought to be made to pay fully for the services they receive. The government should facilitate the role and growth of secondary cities more and more in the coming years.
- (4) There is considerable scope for achieving a balanced distribution of urban population within towns through development of certain wards and areas within wards.

- (5) One major step in avoiding/minimizing environmental hazards, especially in large urban conglomerates is to recognize the communities' "right to know" and facilitate smoother information flows.
- (6) Decentralised and perfectly comprehensible small projects, having "graceful failures", are suggested as a viable strategy to combat growing urban vulnerability to disaster.
- (7) Based on the experiences of the past, the current trend is to move towards participatory approach to management from application of intimidatory laws and regulations.
- (8) The various regulatory instruments available in this country for handling urban land use deserve a fresh and critical look not only in view of the potentials of the participatory approach at the local level, highlighted above but also in view of the fact that, as in the U.S., a number of regulatory instruments can allow urban strategies to move further into market mechanisms.
- (9) There is a need for business to keep local government informed, and also a need for local governments to work with industry in promoting safe, beautiful and risk-free urban life.
- (10) Poor assessment of land and landed property very often leads to poor tax collection and the resulting violation of equity. The current tax base is either capital value or annual value. What is suggested is that a tax based on some physical properties of land should be followed.

**Land Reforms and Management of Arable land:** Till today, the equity objective of land reforms seems to have played a much bigger role than the objective of growth in shaping the nature and details of land reforms in these states. The major issues are as follows:

- (i) With respect to the behavior the size redistribution of operational land holdings all the three states are tending towards more equal pattern of land distribution of operational holdings.
- (ii) All the three eastern states have achieved very little success in land consolidation, as the number of parcels per holding is quite high in these states (5.38, 6.27 and 5.02 for West Bengal, Bihar and Orissa, respectively).
- (iii) On the issue of distribution of surplus and vested land in the eastern states, the position is as follows. Contrary to the fact that pressure of population on land is high and hence the pressure for distribution of surplus and vested land would also be high, the performance of these states is not specially encouraging.
- (iv) As regards tenancy arrangements, share-cropping is the dominant form of tenancy contract in all the three states, although in Bihar, leased-in land under infrastructural contract constitutes a significant proportion of total leased in land. While legislation for protecting the rights of tenants and regulating land rent are also there in Bihar and Orissa, West Bengal has by far made the most elaborate arrangements for enforcing tenancy legislations — namely, to record the names of sharecroppers, so that they cannot be unlawfully evicted and also to ensure that the lawful share of the produce goes to them.

The following districts have been identified where there is enormous scope for bringing more land under cultivation (as the per cent of net sown area to cultivable area is less than 80)

Bihar : Aurangabad, Bhagalpur, Deoghar, Dhanbad, Gaya, Giridih, Godda, Gumla, Hazaribag, Katihar, Khagaria, Lohardaga, Munger, Palamu, Ranchi, Saharsa, Sahibganj and Singhbhum.

Orissa : Phulbani, Keonjhar and Koraput.

West Bengal : Purulia.

In rest of the districts of these states, improvement in agricultural production has, therefore, to be brought about through a more intensive use of cultivated land as the scope for bringing more land under cultivation has been practically exhausted.

However, the various types of land which can be brought under cultivation are generally cultivable waste and fallow lands, barren and uncultivable lands and vested lands which are badly degraded and denuded of any vegetative cover and their productivity is almost negligible or far below the potential. here is need for a shift in favor of tree plantations from that of regular agricultural crops.



Another way of improving the productivity of land and thus income of the farmers is to achieve inter-crop transfer of area which requires strong infrastructural support in the form of marketing, processing and input supply in favour of those crops for which the land is most suited. In this context, cooperatives, if formed on principles of sound planning and managed by local leadership as in cases of Gujarat and Maharashtra, are most suitable organisations to provide the necessary forward and backward linkages required to induce the farmers to shift their cropping pattern in favour of the most profitable crops of that area.

Extending the facilities of regulated markets and all weather roads can also go a long way in strengthening the forces of the competitive market system and inducing a more optimal allocation of arable land area across crops.

Agricultural production cannot be optimised unless due care is taken in the provision of necessary irrigational facilities. The following suggestions are in order in the context of management of irrigation and watersheds.

1. Land levelling should not be encouraged in the irrigated alluvial zone of eastern states. Instead, pumping sets for lifting water from nearby canals should be encouraged.
2. The problem of waterlogging can somewhat be avoided if conjunctive use of tank water is encouraged to grow seedlings for transplanting paddy without charging the whole irrigation system during the nursery stage. Renovation of old tanks lying in the command area and digging up more to store water is desirable to avoid waterlogging.
3. Integrated watershed development (IWD) requires coordination and integration among three groups:  
Departments of Agriculture, Revenue, Irrigation, Forestry and Animal Husbandry,  
Scientists and planners, and  
Farmers & voluntary agencies.
4. The state governments should undertake legislation of water rights in tanks, jheels and lakes and their maintenance should be vested with Panchayats (RBI, 1984). However, some precautions are necessary here. The Panchayats may be dominated by those people who do not demand water for irrigation from these sources leading to their inefficient management. Therefore, management of tanks, jheels and lakes and even irrigation equipments (e.g. mini deep tubewells currently being installed under World Bank support in West Bengal) should be entrusted to the group of farmers who are mainly dependent on these sources for irrigation water.
5. There is need to change the design of the cross drainage works in alluvial plains to an alternative one of feeding small drainage channels to the canals and distributories themselves. The conventional system should be replaced by sluice gates both in the up-stream and down-stream side of the drainage channel while crossing the canal.
6. Given the very low exploitation of ground water resources in the eastern states, the main thrust of irrigation development strategy has to be tapping the large ground water resources of these states
7. Regarding the management of pumpset, the successful experience of Pani Panchayat operation in Gujarat can be operationalised in eastern states too. Recovery of institutional finance for minor irrigation would also improve under cooperative loan scheme rather than when loans are given to individual farmers.
8. The following measures can be implemented to prevent possible over exploitation of ground water resources (i) the abandonment of the government policy of low-cost highly subsidised irrigation from government owned irrigation works; (ii) linking water rates to volume of water actually used by the farmers, (iii) giving up the flat power tariff for electric pumpsets, and (iv) undertaking massive extension work to educate the farmers both about efficient irrigation and the harmful effects of over-irrigation.
9. It is clear from the analysis that all the watershed development programmes in the eastern states are totally dependent on government support. Watersheds managed either by local peoples or by some NGOs are virtually absent in this part of the country. In order to avoid scattered work on watershed management that are being done at the state level under various programmes, a state level authority -say, watershed area development authority (WADA) may be created in the same lines as command area development authority (CADA). This authority would be vested with power to co-ordinate different items of work on watershed basis (for which master plans are being

prepared by the districts) and utilise funds of Agriculture, Pisciculture, Animal Husbandry, and Soil Conservation Departments to work as per watershed plans prepared for the district.

**Forests:** For developing an appropriate management perspective, discrepancies in forestry data across sources should be convincingly reconciled as the very first step. It is recommended that maps based on remote-sensing data be used for location of area for plantation, and inside the forests, for location of forest blanks and degraded forests.

It is not wise to fully depend upon only exotic species and monoculture programme. At the same time, however, the experience gained on exotic species and its success should not be lost sight of. Some successful exotics, which have proved the test of time, especially in these eastern states, like Eucalyptus (hybrid), *Accacia Auriculoformis* and *Casuarina Equisetifolia* (for sandy coastal belts) should not be discarded on the basis of mere prejudices and presumptions.

Trees that yield well on desert conditions are likely to yield well on saline soils also. It is, therefore, wise to try promising varieties of mangrove vegetation in the desert, and desert suitable species in the coastal as well as in other saline areas, where there is physiological aridity. *Prosopis juliflora*, a plant of the desert has already established itself in coastal saline areas. *Prosopis cineraria* needs experiment.

Considerable forest area has been lost in the reservoirs of irrigation projects. As a compensatory measure, an equivalent area in the command may be earmarked to be put under "ideal production site" for practising intensive forestry including commercial production of wildlife such as deer, rabbits etc.

Regarding management of the social forestry programme, the following observations / recommendations are in order:

- training and orientation for the staff.
- Involving local bodies like panchayats and cooperatives and even granting 'tree pattas' to individuals seems to be the crying need of the hour.
- This programme ought to be put on media (Newspapers,TVs, radios) and the pros and cons of the project as well as the economics of the farm forestry as worked out by NABARD ought to be propagated. include big industrial houses, paper mills etc. under the purview of farm forestry to facilitate growth of forests on long term leased out forest land.
- long-term leasing rights ought to be generated in favour of private individuals in case of non-strategic and non-priority lands, whereas for strategic and priority lands, government should alter property rights in favour of the community and their organisations, which ought to be run in a spirit of partnership with the government.

**Mine Land :** While the three eastern states are fortunate in having a rich endowment of mineral resources , as we have already mentioned, they also have the misfortune of inheriting a number of complicated problems due to these mining activities. In view of the gravity of the problem, the state governments have made it mandatory on the part of the potential leasee to prepare land use plans encompassing pre-operational, operational and post-operational phases of a mine, along with the project report for exploitation of any particular mineral deposit in a given area, which would be approved and also monitored suitable authorities.

The current approach, which seems to be full of wishful thinking and are devoid of strong economic reasoning, have laid too much of reliance on the benevolent disposition of the leaseholders of mining land and the effectiveness of government regulatory mechanism, to the utter neglect of the recent advancements in the participatory modes of management and the sustainability properties of the existing system of arrangement.

In the present context, given the whole spectrum of technologies available from the technologists, the question is: How should one go about resolving the following issues :

1. Should one emphasise only reclamation of mined lands, as done in the past, or look at the environmental problems arising from the very beginning of mining operations?

2. How far can one depend upon afforestation as a solution to the multiple environmental problems arising out of mining operations?
3. If afforestation is a solution, what are the optimal combinations of species which ought to be encouraged in a given situation ?
4. What are the best ways of handling old and defunct mines which are still generating environmental problems because of their inappropriate handling in the past by their leaseholders?
5. Given the long-run and invisible nature of the environmental problems, how should contracts on mining rights be devised?
6. Whether, how, how far and to what extent the involvement through a participatory approach of local residents and employees, who seem to be having the largest stake in environmental control, would improve upon environmental enforcement?
7. What would be the future role of the area as well as the local residents/employees when the mining activities will be over? How should one incorporate the life of a mining area in land use planning ?
8. Who will incur the expenses on R & D for environmental control and how should these costs be distributed over time and space? Should there be a federation of mining companies which should undertake these R & D activities and disseminate the findings?
9. What should be the future role in this context of National Afforestation and Eco-Development Board vis-a-vis other government departments /agencies ? How should the functions of various government R & D agencies /institutions relating to mining activities be integrated and coordinated?

Obviously, a 'network' of the stakeholders involving the organisations of residents of nearby settlements, the leaseholders, the relevant government departments introducing a premise control seems to be able to provide answers to all the questions raised above. Neither the market system nor the 'state' mechanism alone has the capability of solving all these problems simultaneously.

Based on the existing pattern of land use across districts, Table 4.9 identifies the districts which need special care i.e., interventions of one kind or another, to improve (or halt deterioration in) existing land use.

**TABLE 4.9: DISTRICTS REQUIRING SPECIAL ATTENTION IN TERMS OF LAND USE**

Categories	Districts	Relevant Issues
1. Disproportionately low % of NSA (< 30)	Bihar: - Orissa: Koraput, Phulbani	1(a) Whether and how cropping intensity can be augmented
2. Proportionately high % of Wastelands (>5)	Bengal: - Bihar: Aurngabad, Begusarai, Bhagalpur, Bhojpur, Darbhanga, Dhanbad, Gaya, Giridih, Gopalganj, Hazaribag, Katihar, Madhubani, Munger, Muzzafarpur, Nalanda, Nawada, Palamau, E. Champaran, Patna, W. Champaran, Purnia, Ranchi, Rohtas, Saharsa, Samastipur, Santhal Parganas, Saran, Singhbhum, Sitamarhi, Siwan Orissa: Balasore, Balangir, Cuttack, Keonjhar, Koraput, Puri, Phulbani, Sambalpur, Sundergarh Bengal: Birbhum, Bankura, Howrah, Purulia, Cooch Behar	2(a) Whether this is induced by land legislations or other government policy or a real phenomenon. 2(b) Scientific and economic devices to bring down the area under this category 2(c) Identification of locations and reasons 2 (d) Tehnological and institutional devices to bring down area under this category.
3. Proportionately low % of pasture and misc. trees (< 5)	Bihar: Aurngabad, Begusarai, Bhagalpur, Bhojpur, Dhanbad, Gaya, Giridih, Gopalganj, Hazaribag, Katihar, Madhubani, Munger, Muzaffarpur, Nalanda, Nawada, Palamau, W. Champaran, Patna, Purnia, Ranchi, Rohtas, Saharsa, Samastipur, Santhal Parganas, Saran, Singhbhum, Sitamarhi, Siwan, Vaishali Orissa: Kalahandi, Mayurbhanj. Bengal: All districts	3(a) Whether consistent with the role of the animal husbandry sector. 3(b) Measures to improve management of CPR type pastures. 3(c) Measures to improve cultivation of tree crops.

4. Proportionately low % of Forests ( < 10)	Bihar: Aurangabad, Begusarai, Bhagalpur, Bhojpur, Darbhanga, Dhanbad, Giridih, Gopalganj, Hazaribag, Katihar, Madhubani, Muzaffarpur, Nalanda, Palamau, Patna, E. Champaran, Purnia, Ranchi, Saharsa, Samastipur, Santhal Parganas, Saran, Singhbhum, Sitamarhi, Siwan, Vaishali. Orissa: Balasore. Bengal: Burdwan, Birbhum, Hoogly, Howrah, Nadia, Murshidabad, W. Dinajpur, Darjeeling	4(a) Measures to improve management of existing forests. 4(b) Extension of social forestry outside of regular forests.
5. Proportionately high % of Non-Agricultural Area (> 5)	Bihar: Aurangabad, Begusarai, Bhagalpur, Bhojpur, Darbhanga, Dhanbad, Gaya, Giridih, Gopalganj, Hazaribag, Madhubani, Munger, Muzaffarpur, Nalanda, W. Champaran, Patna, Purnia, Ranchi, Rohitas, Saharsa, Samastipur, Santhal Parganas, Saran, Singhbhum, Sitamarhi, Siwan, Vaisali. Orissa: Balasore, Cuttack, Koraput, Puri. Bengal: All districts except Cooch Bihar.	5(a) Measures to check urbanisation. 5(b) Measures to improve management of existing non-agricultural land use.
6. Proportionately low % of Non-Agricultural Area (< 3)	Bihar: Nil Orissa: Kalahandi, Phulbari Bengal: Cooch Bihar	6(a) Measures to induce non-agricultural land use for benefit of both agricultural and non-agricultural sectors.

Table 4.10 lists some of the technological solutions as well as institutional requirements for recovering saline land, waterlogged areas and acid soils of the eastern states:

**TABLE 4.10 : CORRECTIVE TECHNOLOGICAL SOLUTIONS FOR CERTAIN TYPES OF WASTE LANDS (NAMELY SALINE, ACIDIC AND WATERLOGGED LANDS)**

<u>Technical Correctives</u>		<u>Institutional Requirements</u>
1.	For acid and saline soils:	For both 1 & 2:
1.1	Paper mill sludges to be used as liming material to neutralise acid soils, applicable to non-calcareous saline coastal areas of Orissa and W. Bengal	(i) Since for most of these solutions, the benefits are divisible across individual beneficiaries and the costs do not outstrip the private benefits, government ought to strengthen the market system by
1.2	Fly ash from cement factories and thermal power plants available in colloidal forms to be used for liming soils	(a) Arranging extension and dissemination of knowledge through various and semi-government local bodies;
1.3	Dolomite, lime stone waste and coal cinder of railways after pulverising to be used for treatment of acid soils. coal cinder will also add potash to the soil.	(b) Arranging proper monitoring through participation of local people so that the statutory provisions for thermal power stations and cement factories to have electrostatic precipitators for arresting 'fly ash' are enforced.
1.4	Rock phosphate, besides treating acid soils, in particular, will add phosphate to the soil.	(c) (i) Since industrial wastes and effluents are so useful in amending and treating problems of lands and soils, a committee ought to be formed at the initiative of the State Land Use Boards including representatives from State Pollution Control Boards, Agricultural and Soil Chemists of the State and other relevant persons, to work out the details for adaptive research cum pilot projects following this approach.
1.5	Pyrites and gypsum for treating saline and alkaline soils.	(ii) When there are economies of scale and scope in arrangement
1.6	Liquid effluents from paper mills after minor treatment can be used to irrigate acid soils under plantation forests	(i), a collective body at local level may generate better results than that obtained through arrangement (i), given the market system in the purchase and sale of the necessary ingredients.
2.	For waterlogged areas	(iii) When costs and/or benefits are indivisible, a free rider's problem is certain to arise and development of a collective body to share the costs and benefits is a must.
2.1	Rice bran and Saw dust can be applied to improve soil tilth and organic matter of the heavy soil in mildly / moderately waterlogged areas.	
2.2	Vermiculite (hydrrous silicate minerals with tiny flakes of mica) may be used to aid better soil erosion against waterlogged heavy soils.	
2.3	Low grade lignites and graphites having low commercial value or their wastes near beneficiation plants can be diverted to agricultural fields to improve both soil tilth and organic matter content of soils.	

Regarding handling of the relevant data and administration of the land use planning exercise, the following suggestions emanate from the understanding of the information given in the earlier sections.

- (i) The land use planning exercise by the National Land Use and Conservation Board and the State Land Use Boards, on the one hand, and the agro-climatic regional planning exercise by the Planning Commission, on the other, ought to have a point of convergence.
- (ii) Given the data availability position, land use planning exercise ought to be performed at a more disaggregated taluka level. It is high time that the State Land Use Boards (SLUB)

be instructed to maintain on a continuing basis updated information at taluka level on all aspects of land use planning.

- (iii) Now that the Panchayat system has been functioning at the grass-root level with the 73rd amendment to the constitution, land use planning exercise ought to be performed even at level of the lowest administrative unit - namely, villages. However, in order to get the maximum mileage out of this exercise, geographic jurisdictions of villages, of that blocks and even districts may have to be reorganised and redefined so that they can correspond to the definitions of micro and macro-watersheds.
- (iv) Ideally, SLUBs ought to be a crucial part of the Planning and Development Department, having liason with the planning and development activities of each and every Department. Moreover, they must be given an appropriate status in terms of decision-making and law-making powers so that they can effectively coordinate their task with the relevant governmental and non-governmental bodies.

In the context of land reforms and land use planning we strongly feel that one needs to take a fresh and proper perspective on the issue. Given production technology at any given point in time, any attempt at overcoming unevenness in the existing distribution of land and other complementary resources across households and/or over space to facilitate production and exchange, generates a series of alternatives to the society - redistribution of land and related assets across households and space, elimination of intermediary rights in land to pave the way for self-cultivation and use of a variety of contractual forms to facilitate leasing in/out (purchase/sale) of the services of land, labour and other complementary assets(inputs). In a dynamic context, the society has a further option of devising and adopting new technologies in order to overcome the twin problems of unevenness in distribution in the ownership and control of resources and of limited substitutability across factor inputs. In a liberalised and globalised framework, therefore, the options are far greater than mere physical redistribution of only land assets. The essence of the present approach is therefore to create an overall environment and property rights over all resources and not merely on land so as to provide the strongest possible motivation for acquisition and disposition of entrepreneurial skills. The major hypothesis of this study is that land reforms in the narrow sense is only a component of the whole package of agrarian reforms, which alone can release enough entrepreneurial skill to promote the necessary technological and institutional innovations for achieving the goal of growth with equity.

**SECTION 5: LIMITATIONS OF THE PRESENT STUDY AND CONCLUSIONS** Before we conclude it is necessary to mention some of the limitations of the present study. The lack of availability of accurate and precise databases is a vital constraint in taking up studies of this nature. The third section used data from National Remote Sensing Agency (NRSA). However, the figures relate to the year 1988-89 and are quite backdated. Still they had to be used as this appears to be the only exercise that used a uniform methodology in arriving at the estimates for all the states of the country. Land use data estimated at the state levels are hardly comparable because of definitional discrepancies. We should point out one apparent discrepancy between the data used in section 3 and the subsequent sections in respect of salt affected area. As per estimate of NRSA none of the eastern states are endowed with such type of land. However, when we analysed data estimated at state level, we came across such type of land existing in all the states under the present study. Consequently, while suggesting the policy mechanisms in the subsequent sections, we considered ways to tackle problems of salt affected areas as well. A study on land use pattern should also emphasise the management of fisheries and animal husbandry in a greater detail. The constraint of space has restricted us from according justice to these sectors.

The present paper has been an attempt to provide a perspective on the multitude of uses land is put to in the Eastern states of India, namely West Bengal, Bihar and Orissa. The following features are necessary to be kept in mind while preparing land use plans to ensure their desired implementation.

- Minimize reliance on centralised decision-making bodies and their budgetary provisions.
- Nor do leave everything to be decided by the unconstrained functioning of the existing market forces.
- Evolve self-governing and self-sustaining decentralized user group institutions at local level (e.g. at the level of villages and micro-watersheds) with appropriate higher-tier organisations, which would perform the land use planning exercise as part of their regular business.

- Evolve indigenous and less complex technologies which are consistent with the behavior of such decentralised organisations.
- Highlight interesting cases, in general, and success stories in particular, which can bring out the crucial role of institutions and technologies in land use planning exercise, for possible replication.

The available information and subsequent suggestive policy prescriptions point towards Herculean task ahead of the planners and policy makers to devise an optimal land use pattern necessary for this region. However difficult the task may look to be, we are of the view that institutional changes if brought about to involve people's participation in the truest seen of the term and thereby develop the networks paving for premise control, may make the task easier.

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