Chapter 11

Recommendations

Major Themes:

11.1 Recommendation for Justified Land Use
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11.1.2 Utilization of Flood Affected Land
11.1.3 Plan for Flood Borne Sand Dominated Areas
11.2 Proper Irrigation System and Agriculture
11.3 Settlement Re-structurization
11.4 Conclusion

11.1 Recommendation for Justified Land Use

11.1.1 Utilization of Wasteland

There are diversified wastelands all over the basin. Sometimes badland acts as wasteland, wetland as wasteland, less moisture content top soil as wasteland etc. So, resolution should be prepared on the basis of different angles. Laterite dominated badland should be used as forestry based activities and some species of biodiesel like Japrova could be cultivated there. This step will help to protect exaggerated riling and gulling activities and also help to produce some economic remuneration.

Wetland should be used as good fishing ground, irrigation storage and flood water storage. Perennial fishing will not be possible, but seasonal fishing with care and after flood natural fishing could be done.

In the upper part of the basin where soil moisture availability is less in after monsoon periods, inferior crops cultivation and afforestation should be done. Most part of the upper part was remain in rest but less water chasing inferior crops could be cultivated. Degraded forest land should not be converted in to cultivated land because the existing soil fertility and water availability will not support good development of agriculture. Organized afforestation by the local people in cooperation with govt. body can produce ample direct and indirect economic return. Existing tribal communities
could be involved in shape of participatory forest management. Production of fuel wood, wood for furniture, small industries for Sal leave preparation, cultivation of bees and collection of honeys, forest based different pickle industries etc. can increase the economic value of the forest and importance of forest to the local people. This forest product based small scale food staff production is not any abstract proposal. “Banalakshi” an organized production and selling centre of such goods within this basin command areas have sprouted and well established near Illambazar.

11.1.2 Utilization of Flood Affected Land

It is better to leave the frequently flood affected land for the extreme monsoon period (July to Sept.). If cultivation of crops is necessary on those lands, paddy seeds like Jaladhi, Jaya, Kajol Kotha, Math Hasrul, Ganga Joli, Ghatpouni, Jingasal should again be recalled because these seeds have genius capability to adopt with flood and marshy land. These non structural measures will be a fruitful step to adjust with flood. Moreover til, mustard, onion, vegetables etc. cultivation can be done after flood periods. Aus paddy in between April to Mid July can be cultivated.

Table 11.1: Land Utilization Plan for Flood Affected Land

<table>
<thead>
<tr>
<th>Flood Category</th>
<th>Previous Crop Types (30 years before)</th>
<th>Present Crop Types</th>
<th>Ecological Crop Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive</td>
<td>Monsoon: Jaladhi, Jaya, Kajol Kotha, Math Hasrul, Ganga Joli, Ghatpouni, Jingasal</td>
<td>Monsoon: IR 36, Swarna, Post Monsoon: very marginal amounts of Mustard, vegetables, wheat, grams, potato</td>
<td>Monsoon: Paddy varieties - Jaladhi, Jaya, Kajol Kotha, Math Hasrul, Ganga Joli, Ghatpouni, Jingasal; Jutes</td>
</tr>
<tr>
<td></td>
<td>Post Monsoon: potato, wheat, grams, sweet potato, vegetables</td>
<td>Post Monsoon:</td>
<td>Post Monsoon:</td>
</tr>
<tr>
<td></td>
<td>Pre Monsoon: Some inferior varieties of pulses</td>
<td>Pre Monsoon: summer paddy, marginal amount of onion and vegetables</td>
<td>Pre Monsoon: Til, onion, vegetables, summer pulses etc., some paddy cultivation in the water available areas</td>
</tr>
<tr>
<td></td>
<td>Cropping Intensity: 110%-130% (Productivity were less)</td>
<td>Cropping Intensity: 130%-170% (Monsoon</td>
<td>Cropping Intensity:</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Low</th>
<th>Monsoon: Swarna Laghu, Ratna etc.</th>
<th>Monsoon: IR 36, Swarna,</th>
<th>Monsoon: Early cultivation of present varieties like IR 36, Swarna varieties etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Monsoon: Mustard, vegetables, wheat, grams</td>
<td>Post Monsoon: Mustard, vegetables, wheat, grams</td>
<td>Post Monsoon: Mustard, vegetables, wheat, grams</td>
<td>Post Monsoon: Mustard, vegetables, wheat, grams</td>
</tr>
<tr>
<td>Pre Monsoon: Some grams and most part of the lands were remain fallow</td>
<td>Pre Monsoon: Boro paddy and some vegetables</td>
<td>Pre Monsoon: Til, onion, vegetables, summer pulses etc.</td>
<td>Pre Monsoon: Til, onion, vegetables, summer pulses etc.</td>
</tr>
<tr>
<td>Cropping Intensity: 120%-140% (Productivity were less)</td>
<td>Cropping Intensity: 140%-170% (Monsoon crop failure is very common)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Prepared on the basis of people’s perception and experience of the researcher.

**11.1.3 Plan for Flood Borne Sand Dominated Areas**

Embarkment breaching and spread of sand over fertile agricultural land is one of the recognized problems in the downstream catchment. So, to avoid this problem, design of embarkment should be changed.

Embarkment should be broad based and narrow apex and should be stair stepped. It will help to soak and reduce the striking force of flood discharge.

The curvature of the embarkment should be caged right from the base, because these places get maximum corrosive force from rushing discharge. These steps will help to reduce the tendency of embarkment breaching.

Sensitive places of the embarkment should be surfaced and pitched to save it from sudden breaching.

The places already affected by sand splay, phase wise sand removal programs should be activated. The quality sand could be served to the brick kiln factory, households who are willing to construct concrete houses. Government, agricultural landholders and the consumers of the sand can share the cost.

Brick kiln industry should pay attention to repair the embarkment affected due to frequent movement of track and tractors for sand excavation from river bed before monsoon invasion.
Non-structural Measure

Instead of the cost staking removal of sand heap, existing land should be taken into cultivation programs either mixing of required bio-fertilizers and chemicals.

Table 11.2: Proposal of Cropping Chart in Sand splay Area

<table>
<thead>
<tr>
<th>Depth of sand in cm.</th>
<th>Nature of farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 25</td>
<td>Adding organic manure, farm yard manure, introduced root crops like potato, beet, carrot, tomato, in the post kharif season. Crops like pumpkin, cucumber, watermelon, creeper like vegetables etc. also could be introduced.</td>
</tr>
<tr>
<td>25 to 45</td>
<td>Kharif dhancha (kind of fuel stick), or green manure like sun hemp, karang etc. during kharif season etc. should be cultivated.</td>
</tr>
<tr>
<td>45 to 60</td>
<td>It is suitable for agro forestry, by digging 45 cm. diameter for multipurpose trees like subabul (acacia), neem, sisu, cashew nut etc. Surface to be planted by black and green gram after one year</td>
</tr>
<tr>
<td>&gt;60</td>
<td>Various wild grooves forage crops, like dinanath, paspalam dilatanum, and Chinese cabbages etc. can be planted.</td>
</tr>
</tbody>
</table>


For minor change of sand splay texture, spraying of soil from outsides could be done. It will help to raise the level of soil consistencies. Aforestation on embankment can help to clutch the soil tightly and propensity of erosion will be increased.

Besides, adequate engineering strategies should be taken to nourish the embankment and abstain from sudden flashing of discharges from artificial storage devices like dam and barrages. However, it is necessary to keep importance on how to maintain the hydro-ecological rights of the river, otherwise it will be difficult to provide any fruitful suggestion to check sand splay hazard.
11.2 Proper Irrigation System and Agriculture

Irrigation supplies a strong support for stable agriculture. But, at present, massive increase of irrigation intensity specially ground water based irrigation system has confronted us with critical water crisis and this water crisis has even felt to the seasonal wetland dominated low lands of this basin nay in most of the basin in Rarh Bengal. For the sustaining of boro paddy during non monsoon period, a massive volume of water is lifting from ground water storage and it causes rapid lowering of ground water table all over the basin areas. If such rate continues, within next 20 or 30 years people will face severe drinking water scarcity too. Present ground water lifting rate is 10% to 20% greater than rate of ground water recharge.

Government is well acknowledged about this scenario and different reports regarding ground water conditions of different parts of India reveal the same facts. In spite of such upcoming danger, government has been liberally permitting mini deep tube well, deep tube wells with govt. subsidies. On the contrary, govt. in their report of ground water conditions has been repeatedly expressing upcoming crisis of ground water.

High time it is now to implement strict rules so that amount of lifting will not exceed amount of ground water recharge and people should encourage less water consumptive inferior crops during off monsoon periods.

Pond irrigation and crop cultivation should be re-invited. 100 days working project in the rural areas could be used as a good vehicle for reviving of clogged pond and excavation of new ponds where necessary.

11.3 Settlement Re-structurization

In response to flood intensity, settlement re-structurization in the lower parts of the basin is necessary. Three settlements e.g. Sabitrinagar, Aharinagar etc. is now looming large in flood danger and these settlement should be shifted and rehabilitated to some safe places. These settlements are embankment nestling settlement, so, proper fortification of the settlement in these portion should be needed. Basement of the settlement should be at least 1.5 meters above natural ground surface. Indigenously, some people do this job but this should be for all people. High cost house should not be constructed in this zone as it will increase economic loss during flood.
11.4 Conclusion

In fine, it can be said that different physiographic condition, hydro-morphological conditions, ground water status, canal water availability, surface runoff situation, soil erosion conditions etc. impart mixed impact on agricultural and settlement pattern. Some of the examples from the different chapters can be cited out. Laterite soil with high propensity in the upper and parts of middle catchment hampers production and productivity of the crops. Similarly, normal settlement practice is also getting hampered in this area due high rate of soil erosion, soil liquefication etc. In the upper catchment thin soil cover over granitic and gneissic rock does not support good productivity. Less intensive agriculture pattern, inferior crop practices, less productivity etc. are some good evidences in favour of physical background. High drainage frequency, density, coarse soil texture, soil physiological aridity etc. encourage high rate of soil erosivity and less availability of water content. Due to having a throng of livelihood barrier, settlement pattern is very scattered and small and total settling area is significantly less in compare to the middle catchment.

In the middle catchment, irrigation facility, relatively deep fertile alluvial soil, lack of alternative livelihood etc. have collectively encouraged people lean toward intensive farming practices. Of course, allure of good production from farming practice accelerates settling tendency and sprawling of settlement.

In the lower catchment the physical setup is quite different. Most part of the geographical land is highly flood prone, large part is covered by wetland with long duration water stagnation. Wetland itself can be treated as storehouse of resources but due to lack of management practices, no such life supporting outlays are yielding from wetland unit. People are trying to replace these wetland units by agricultural land. So, in this area, tendency of agricultural practices is growingly rise up removing wetland entity. There is a conflicting situation. In the one hand there is fertile alluvial soil, renovated by every year, with excellent potentiality of production and on the other hand the land is frequently affected by flood, sands play problems, embankment breaching, long days water stagnation etc. Overlooking all these physical barriers, peasants are showing enthusiasm to spread a good agricultural dynasty in accordance with flood situation. Using surface water and subsurface water they are used to use intensive summer paddy, good vegetables cultivation in the non monsoon period to substitute the loss or bareness of production during monsoon season. The wetland units where seasonal or permanent water stagnation is happening, people are engaged with collecting fishes. To save settlement from flood, most of the villages prepared an elevated basement of their houses or where possible they used to select lofty embankment as the basement of
settlement. In building material use, preparing structure of the houses etc. reflect the settlers’
traditional wisdom in accordance with the physical conditions. In agriculture, diction of seeds,
selection of crop etc. time preference for different crops etc. also some good sign for their
traditional knowledge. Sporadically, some areas are addicted with modern farming practices
and the rate of crop failure is excessively high. So, modern technologies and modern farming
practices are not always superior than traditional knowledge and practices. Therefore it is
better to think over how to blend these two ends of knowledge to yield a better output.