PEO Study No.110

EVALUATION OF THE KOSI EMBANKMENT - A CASE STUDY - 1979

1. The Study

Considering the stupendous value loss which floods had continuously been effecting in terms of large scale inundation and crop destruction, breakdown of communication system and essential services and other human sufferings, the Government of India introduced, since 1954 a series of measures like construction of new embankments, river training, drainage improvements in the water-logged areas,town protection measures, strengthening of existing embankments and construction of flood moderation reservoirs across the catchment areas of rivers etc. The Kosi embankment, one among them, was taken up in 1955 and completed in 1959. Till 1977-78, an expenditure of about Rs.403 million was made on it. Prior to its construction, the Kosi River had been inflicting an annual loss in the range of Rs.6 crore to Rs.10 crores, flooding for 2 to 3 months at a stretch.

At the instance of the National Flood Commission appointed by the Government of India in 1976, the Programme Evaluation Organisation undertook in 1978 an evaluation study of the Kosi Embankment. The main approach of the study was to compare the present status of the project area with that which had prevailed prior to its execution. This approach was constrained by the non-availability of comparable data for the period prior to the completion of embankment and by the non-accounting of changes that might have occured independent of the project. The study report was published in 1979.

2. Objectives

i) To study the cost incurred on construction from time to time; and

ii) To study the impact of the project on;

   (a) employment and income,
   (b) impetus to development activities,
   (c) appreciation in land value,
   (d) improvement in the means of communications, and
   (e) health and sanitary conditions.

3. **Sample Size/Criteria for Selection of Sample**

From among the 3 districts of Bihar protected by the embankment (Purnea, Saharsa and Darbhanga), Saharsa was purposively selected considering the location of the embankment, the problem of waterlogging due to the embankment and the maximumm protection in terms of area coverage. Those villages of Saharsa which fell in the population range of + 50% of the average population per village in the district constituted the selection frame. These villages were, then placed in 5 zones: (a) villages within 5 kms of the eastern embankment, (c) village lying beyond the tailend of the embankment, (d) villages lying in the area affected by the 1948 flood\but not included in (a), (b) and (c) above and (e) villages lying in the area affected by the 1954 flood but not included in (a), (b), (c) and (d) above. From each zone, 22 villages were selected through simple random sampling.

To evolve a comparative picture of `before' and `after' the embankment, only those households whose family heads were of 40 years of age or above and had been living in the village at least for the last 20 years were included in the selection frame. These households were then divided into four groups on the basis of their principal occupation i.e. cultivators with holdings below 2 hectares, those with 2 hectares and above, labourers (agricultural and non-agricultural) and others (artisans, traders etc.). A total of 119 households, spread over 10 chosen villages of Saharsa district, were selected from the above 4 groups through simple random sampling method.

4. **Reference Period**

The survey was conducted during the period January, 1978 and June, 1978. Data were collected and analysed for a long period which spanned from 1948 to 1977-78.

5. **Main Findings**

1. Long embankments on both sides of the river and a barrage upstream Hanuman Nagar helped to hold the river. The local people, thereby, developed a sense of security. An area of 1.6 lakh hectares in the district of Saharsa could be protected from the ravages of flood. The barrage helped in creating irrigation potential through the network of canals.

2. Of the total expenditure of Rs.403.21 million incurred on the embankment uptill 1977-78, 67 percent was spent on capital works, 28% on maintenance and only 5% on establishment. More than Rs.1 crore was being spent on its maintenance every year. Proper maintenance of the embankments and the construction of new aggradation spurs were essential to withstand serious flood hazards.

3. The net sown area had increased over a period of time in all the five zones, but the increase was higher in the unprotected zones I and III Irrigation facilities improved in all the zones especially in zones III, IV and V. The uneven and diversified topography hindered progress in irrigation. Only a negligible proportion of the vast undeveloped area could, thus far, be levelled and shaped.

4. The factors which retarded the adoption of new agricultural technology as had been highlighted by the Kosi Technical Committee (1971) in its report, included fragmentation of holdings, status on land, inadequate and untimely supply of inputs including water, unsuitability of land, lack of credit facilities, lack of storage and marketing facilities, etc. It was observed that no serious efforts were made to improve the situation.

5. Earlier, paddy was the major crop of the area. Crops like maize, pulses, oilseeds, etc. were introduced later on. High yielding varieties were also introduced. However, inadequate application of critical inputs like fertilizers and farm yard manure resulted in low productivity in the area. Barring the unprotected Zone III, the yield per hectare of paddy declined in all other zones.

6. The embankment gave rise to some potential threats due to the concentration of the huge sediment load of the river in its central basin. This created problems of seepage and drainage congestion due to choking up of the sluices. It would not only result in over-topping of the embankment, but might also obstruct the current of Kosi further down stream of the embankment and lead to the over-topping of the ridge north of Ganga.

7. The embankment resulted in the submergence of a vast area in Zone II. The menace of waterlogging combined with inadequate drainage made the cultivation of high yielding varieties of crops impossible and threatened the lives of the people and cattle in the affected area. The protected zones IV and V were troubled by the accumulation of rain water and the release of surplus water from canals and unlined channels.

8. The rise in the water table of the Kosi area due to constant inundation and heavy rains was detrimental to agricultural productivity. The progress in the direction of controlling this was not satisfactory.

9. The State Government had sanctioned Rs.2.122 crores for the rehabilitation of the people in the safe zone outside the embankment. It was hoped that after the flood season, the land within the embankment could be cultivated. However, the efforts were mostly in vain because of the attachment of the people to their ancestral homes and the problems in managing cultivation inside the embankments from a distance. Besides, people complained of inadequate building grants as well as unsuitable rehabilitation sites. Most of the rehabilitated families subsequently went back to their old houses insides the embankments.

10. Since all the development activities of the area were not synchronized, tangible benefits could not be realised from the embankment in most of the area.

6. **Major Suggestions**

1. The programme of integrated development to be taken up by the Command Area Development Authority (CADA) should, inter alia, include the ancillary activities like fisheries, animal husbandry, forestry, etc. The CADA should also ensure the streamlining of supply of farm inputs like seeds, fertilizers, pesticides & credit, etc. in the command area. The Authority should also be activated to improve the command area. The Authority should also be activated to improve the main secondary drainage of the protected area.

2. For control of silt, it is essential to take up large scale soil conservation measures in the upper catchment of the river which lies in Nepal. Negotiations with the Nepal Government in this regard should be taken up urgently.

3. The residual canal works and water courses must be completed swiftly and the entire irrigation potential should be utilised. In order to prevent the wstage of water, lined channel should be constructed and proper field drains should be provided.

4. In order to bring down the water table, bamboo boring and tubewell should be encouraged on a large scale.

5. Technological advancements in agriculture should be inculcated to the farmers through demonstrations, Kisan melas, etc.

6. The State Government should explore the possibilities of developing pissiculture in areas where drainage of water is not feasible and of introducing co-operative fish farming in areas submerged under deep water.

7. Proper land levelling and shaping work should be taken up on a priority basis.

8. It is necessary to evolve proper crop planning for the area. Cultivation of groundnut and short-duration summer fruits in zone I, of coconut in the vast waterlogged area and of `Makhana' in the submerged area may be tried with. Early maturing crops which may be harvested before the advent of flood can be experimented. The HYVs which are not linked with irrigation should be popularised in the area.

9. Development of all-weather-roads, especially feeder roads, should be taken up.

10. Afforestation programme should urgently be initiated on a large scale to check erosion of top soil in the hills.

11. Considering the profuse potential of the area inside the embankments, it would be advisable to activise the scheme of animal husbandry on scientific lines. Poultry and piggery schemes may also be introduced on a large scale.