

CHAPTER – VII

FLOOD AND FLOOD CONTROL MEASURES

The State of Assam covers an area of 78,438 Sq. Km. The Brahmaputra and Barak valleys, which are named after the mighty Brahmaputra and Barak rivers and two hill districts constitutes the total land mass of the State. The unique geographical location criss-crossed by a vast network of 48 major and 128 small rivers originating from the hills and mountains surrounding the State is largely responsible for the recurring floods and erosion of river banks. When the discharge in the rivers along with their tributaries synchronises during monsoon, the State faces flood havoc and the damage caused is colossal. Further, deforestation in upstream and downstream areas of surrounding Hill States and Assam respectively has caused excessive siltation, resulting in abnormal rise in the surfaces of major rivers. The siltation problem is acute in the case of rivers of Upper Assam and Central Assam.

The problem of flood and erosion in Assam is menacing and probably the most acute and unique in the country. The heavy monsoon rain over catchments of Himalayan and Patkai ranges of hills posing threats to gently sloping narrow valley of the rivers coupled with high seismic activities in the easily erodable hill slopes along with certain anthropogenic causes create heavy flood in the State. Every year during the successive weaves of floods, most of the areas in the valley of Assam remain submerged for a considerable numbers of days causing wide spread damages to crops, public & private properties, disruption of vital communication link within the State, with neighbouring States and also with the rest of the country. This phenomenon takes place because of the occasional failure of the already existing flood prevention structure, which have outlived their lives. The recurrence of flood added with unabated erosion too caused thousands of hectares of land loss and hundreds of people landless virtually destroyed the socio-economic development of the State. It is reported that on an average 2500 hectares of land is being eroded by the Brahmaputra annually.

Flood control activities in Assam started after announcement of National Policy for Flood in 1954 by the Govt. of India. Though there was short term and long term measures envisaged in National Flood Policy of 1954, to get the immediate relief to the flood ravaged state, construction of embankments as short term measures had been widely adopted. In the State as a whole total area eroded by the Brahmaputra, Barak and their tributaries since 1954 is 3.86 lakh hectares, which constitute 7 per cent of the total area of the State.

The 'Rashtriya Barh Ayog' has identified 31.05 lakh hectares of flood prone area in the State of which Water Resource Department through implementation of various project has protected 16.50 lakh hectares of flood affected land.

At a glance, the achievements of Water Resources Department in terms of infrastructures development are:-

1. Construction of embankment	4465.85 Km
2. Drainage Scheme	854.19 Km
3. Anti erosion / protection works	746 nos.
4. Sluice	86 nos. (major) & 539 (medium & minor)

Flood Control Strategy During 11th Plan

Till 10th Five Year Plan, flood and erosion problem in Assam has been tackled by executing various short term measures with the funding under State Plan, Central Sector, Additional Central Assistance (ACA), NEC, JRC

and NABARD [RIDF-XI, RIDF-XII (2006-07)]. The funds available from the above sources were inadequate to combat such complex and gigantic problem. These short term measures although yielded good results, such measures have its limitations. Moreover, the flood management network which had provided reasonable protection to flood prone area, the protective measures mainly embankments got shattered during the unprecedented flood of 2004. The Task Force constituted by the Government of India on the aftermath of 2004 flood devastation strongly recommended fortification of present embankment system by scientific methods and with protective and river training measures wherever necessary. Accordingly the Task Force recommendation of ₹ 720.00 crore forms the core part of the 11th Five Year plan programme.

Strategies Short Listed

The flood problem in Assam is critical and enormous as recurrence of flood apart from inflicting damages in the protected area, damages existing vital infrastructure facilities, the core sector of development. In order to combat/reduce flood problems, the Water Resource Department has chalked out action plan for implementation during the 11th Five Year Plan.

- Raising & Strengthening of existing embankment system, so as not to cause any dwindling of already protected area;
- New embankment to be taken up to bring more areas benefited as under benefited area, in present perpetual flood inundation area;
- Anti-erosion works and protection works of valuable fertile lands, protection of vital important towns and industrial areas;
- Removal of drainage congestion to bring more areas under protective arena;
- Flood proofing programme, such as raised platforms etc.;
- Dredging of selective reaches, particularly in the tributaries and at the outfalls;
- Annual scientific collection of flood damage data, basin wise preparations of flood risk maps and flood plain zoning;
- River morphological studies through satellite imageries for study of bank migration to find out probabilities of areas likely come under attack of erosion and take cost effective and timely preventive measures;
- The north bank tributaries originating from Bhutan, creates acute flood problem in the lower Assam Districts particularly Barpeta, Kokrajhar and Dhubri due to sudden onrush of flood discharge, particularly with breach of Artificial dams caused due to huge landslides in the upper catchments in Bhutan territory, along with flow of huge sediment loads. Frequent monitoring by the Joint group of Experts Committee may be given priority to tackle the problem;
- The existing flood forecasting and flood warning network is to be further augmented, particularly bringing tributaries flowing down from Bhutan and Tibet (China) under the umbrella of this network;
- Water shed management in selected hilly catchments of Northern tributaries, which have deteriorated in recent times very fast, due to varied reasons, should get priority, so that the functioning of flood management structures have desired results.

Implementation of Various Schemes and Achievements

The Water Resources Department of Assam has been implementing various schemes for tackling the erosion problem and to prevent inundation of the nearby area under different funding heads viz. Central sector schemes and State sector schemes.

FMP (Flood Management Programme): For the 11th Five Year Plan the Ministry of Water Resource,

Government of India has given financial approval to 73 nos. of schemes (each scheme costing less than ₹ 7.50 crore) with benefited area of about 3,12,672 hectare and total cost being ₹ 43170.34 lakh. Till date an amount of ₹ 21648.18 lakh have been utilised against the schemes.

Under FMP nine schemes each costing more than ₹ 7.50 crore with benefited area of about 1,00,463 hectare has been approved. A total amount of ₹ 27544.93 lakh has been earmarked to implement the schemes of which ₹ 14089.42 lakh have been utilised.

Another three schemes with a benefited area of 53000 hectare and estimated cost of ₹ 109.20 crore have been sanctioned by the Government of India under FMP for the year 2010-11.

NEC (North Eastern Council): NEC has taken up two numbers of schemes with benefited area of about 24,500 hectare with an estimated cost of ₹ 1993.13 lakh. An amount of ₹ 849.866 lakh have been utilised against these schemes.

Year	Number of schemes	Estimated Amount (Rs. in lakh)	Benefitted area (in Hectare)	Achievement	
				Physical progress (in percentage)	Financial progress (Rs. in lakh)
2009-10	2	1993.13	24,500	100	849.866

Source: Office of the Chief Engineer, Water Resource Department

JRC (Joint River Commission): Under this head four number of schemes with an estimated cost of ₹ 374.187 lakh have been completed successfully. An amount of ₹ 251.39 lakh have been utilised against these schemes.

Year	Number of schemes	Estimated Amount (Rs. in lakh)	Benefitted area (in Hectare)	Achievement	
				Physical progress (in percentage)	Financial progress (Rs. in lakh)
2009-10	4	374.187	16.88	100	251.39

Source: Office of the Chief Engineer, Water Resource Department

NLCPR (Non-Lapsable Central Pool of Resources): Under NLCPR, a scheme with an estimated cost of ₹ 1150.327 lakh was taken up in Dhemaji District and has been completed successfully in an anticipated benefit area of about 10,000 hectare. Amount utilised for this scheme is ₹ 982.38 lakh.

Year	Number of schemes	Estimated Amount (Rs. in lakh)	Benefitted area (in Hectare)	Achievement	
				Physical progress (in percentage)	Financial progress (Rs. in lakh)
2008-09	1	1150.327	10,000	99.5% of work completed (progress of work)	983.00

Source: Office of the Chief Engineer, Water Resource Department

ACA (Additional Central Assistance)/SPA SCHEMES: Under the ACA/SPA scheme Govt. of India approved five numbers of schemes for the year 2007-08 for ₹ 1668.00 lakh. An amount of ₹ 1535.60 lakh have been utilised for completion of the schemes with benefited area of about 10900 hectare.

In the year 2008-09, Govt. of India has approved 45 numbers of schemes with estimated cost of ₹ 14133.56 lakh under ACA/SPA with an anticipated benefited area of about 188200 hectare. Out of the total schemes, 29 number of scheme are completed so far and the rest are in progress.

During the year 2009-10, another 4 number of schemes with estimated cost of ₹ 2187.00 lakh have been sanctioned under the same head. The work is in progress and ₹ 100.00 lakh have been utilised so far. Moreover, an amount of ₹ 13349.00 lakh has been proposed for 60 number of flood management schemes under one time Additional Central Assistance for the year 2010-11.

NABARD

A. NABARD (RIDF-XI):

Under RIDF-XI, 19 schemes were taken up with an anticipated benefited area of about 89960 hectare and all the schemes have been completed as on October, 2010. An amount of ` 7983.11 lakh have been utilised out of the estimated amount of ` 8244.408 lakh.

B. NABARD (RIDF-XII):

Under RIDF-XII, proposal for 20 schemes with an estimated amount of ` 9962.97 lakh with benefited area of 99800 hectare have been approved. Out of the total, 18 schemes have been physically completed and the remaining two are on the verge of completion. Expenditure incurred against the schemes is ` 9646.65 lakh.

C. NABARD (RIDF-XV):

The NABARD has sanctioned a loan amount of ` 48.0925 crore for 13 numbers of schemes for the year 2009-10 against the estimated amount for the schemes is ` 50.62 crore. Administrative approval for implementation of the schemes is awaited.

State Plan

Under State Plan, five schemes amounting to ` 1155.26 lakh with expected benefited area of about 5239 hectare have been taken up during last four years. Works of four schemes have been completed and the rest is on the verge of completion. An amount of ` 955.09 lakh have been utilised against these schemes.

Another five new schemes amounting to ` 900.00 lakh with an anticipated benefited area of 8000 hectare have been proposed for execution during the year 2010-11.

Schemes Proposed under the aegis of Asian Development Bank (ADB)

The Government of Assam is negotiating for a loan of ` 40000.00 lakh from the Asian Development Bank for implementation of an Integrated Flood and Erosion Mitigation Scheme. The fund will be available in the ratio 90:10 i.e. the State will have to bear 10 percent of the total cost. Since long-term measures will take at least 20 years or more to implement, the present flood management in the State is still dependent on various short-term structural measures. Considering the menace of annual devastation of flood with unabated erosion in both the valleys, the proposal namely Assam Integrated Flood Control and Erosion Mitigation Project has been conceived. It is expected that the implementation of this project in phased manner will considerably reduce the annual havoc and subsequent devastation and foster the balanced infrastructural and socio-economic development for the North-East Region of India as a whole.

The three numbers of schemes under the project will be routed through in two trenches. The estimated cost of 1 (first) trench is as follows:

Sub- Project Kaziranga	:	` 1990.15 lakh
Sub- Project Dibrugarh	:	` 9579.94 lakh
Sub- Project Palasbari	:	` 8199.42 lakh

All these three number of schemes have been submitted to the CWC, New Delhi and it is under scrutiny. Clearance from CWC and Planning Commission is awaited for execution of the schemes.

The estimated cost of the II (second) trench is as follows:

Sub- Project Kaziranga	:	` 1825.00 lakh
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Sub- Project Dibrugarh	:	₹ 3982.00 lakh
Sub- Project Palasbari	:	₹ 14423.49 lakh

The II (second) trench projects are still waiting for recommendation from the State T. A. C. to send to the CWC for clearance.

To begin the execution of the projects during Annual Plan 2009-10, an amount of ₹ 5000.00 lakh was provided but work could not be started as the project was not cleared by the CWC, New Delhi. During the Annual Plan 2010-11 an amount of ₹ 6000.00 lakh has been proposed for implementation of three schemes under the new Projects. The project will benefit 110000 hectare with population of about 1 million of the three selected sub-project areas of Dibrugarh, Kaziranga and Palasbari. The project is proposed to be implemented in 6 years (2010-11 to 2015-16).

Ongoing Project

Use of Space Technology for Project Planning

The Water Resources Department with the technical guidance of the North Eastern Space Application Centre (NESAC) and ARSAC Guwahati has adopted the latest space technology such as the Remote Sensing (RS) and Geographic Information System (GIS) for understanding the flood, erosion and other related problems of various reaches of the Brahmaputra River.

Use of Kiramat Tubular Sand filled Mattress for Bank Protection Work

Kiramat Tubular Sand Filled Mattress is used for bank pitching work at Kamarkuchi area in Nalbari district to prevent erosion of river Pagladia. Similarly, bank protection work with geo-mattress at Desang L/B in Sibsagar district is yielding a satisfactory result. Kiramat is EMAS KIARA's erosion control system suitable for application to drainage, river and estuary bank erosion control and is a practical cost effective solution.

Use of Vetiver Grass for Reducing Soil Loss in Embankment

The Vetiver, botanical name *Chrysopogon Zizanioides* is a grass that grows on any kind of soil- sandy, loamy, clay, alkaline, acidic and saline, soil polluted with heavy metals and tolerates very heavy rainfall as well as can withstand drought. Most importantly, it can survive in total submergence in flood water for as long as five months. Its root system attains a length of about 10 feet and has tensile strength of nylon to effectively arrest bank erosion, prevent landslides, reduce runoff and consequently associates the top soil. However, the vetiver system requires a planned maintenance programme in the first two years of plantation to have a matured plant and the expected result thereof.

The grass has been planted in Morigaon District on trial basis and the result has been found to be fruitful.

Use of Geo-Tube for Construction of Dyke

The soil available for earthen embankment on the northern bank is basically sandy which lacks the required cohesion and stability. Thus, the embankments frequently fail due to flood water pressure causing breaches in the dykes. But, if the same material is used in geo-tubes made up of geo-textile materials with sufficient tensile strength gives sufficient stability.

The embankment at Matmara in Dhakuakhana has been constructed using geo-tubes. The dyke is constructed by using geo-textile tube (Mega containers), the geo-tube with fill height of 2.5m, and tensile strength of more than 200 KN/m and UV resistance (ASTMD 4355-500 hrs) more than 80 percent. The construction of the dyke has been completed with financial involvement of ₹ 110.00 crore.