

## **Need of an integrated flood and erosion management policy for Assam**

**Partha J Das**

*Water, Climate & Hazard Division,  
Aaranyak, (Guwahati, Assam)*

The biggest challenge to development of Assam

The problem of flood and erosion started impacting people seriously in Assam after the devastating floods of 1954. Since then the intensity of the problem and its adverse impact has gradually increased so much so that now this dual disaster has posed as the most serious economic, agricultural, environmental as well as development problem for the state. The state suffers from colossal economic loss and damage every year from flood and riverbank erosion. As per the flood damage data, maintained by the Assam Water Resources Department (AWRD), during the period 1953-2011, an estimated 858,000 ha of land, about 2.5 million people, and more than 77,000 households have been affected by floods on average per year while average annual loss due to flood was about of Rs. 200.00 Crores (AWRD, 2011). More than 4.27 Lakh Hectares of land has been eroded away by the river Brahmaputra and its tributaries since 1950, which is 7.40 % of area of the state. Since 1954, some 8,000 ha of land (valued at \$20 million) are lost annually. As a result of floods and erosion about 10,000 families have been displaced (ADB, 2006), many of who become landless each year causing significant social and economic disruption.

Taken together the aggregate impact of annual flooding and round the year riverbank erosion is the single most serious threat to the sustainability of development initiatives and their benefits in the state. The question that one would ask then is 'why have we failed to mitigate the twin problem of flood and erosion effectively and adequately in Assam?' There are many answers to these questions, from the layman's version to the expert's opinion. What one can safely surmise from this debate is that it is a actually combination of factors from lack of knowledgebase to absence of proper policy to governance deficit, that one needs to consider to explain why we have not succeeded in securing people of the state from these two water induced disasters to the desired extent. Since the problem is getting more complicated year-by-year, it is highly relevant to revisit the premise of policy and practice at the national and state level and try to understand what ails the flood management system in the state.

The primary purpose of this essay is to advocate for a state level integrated flood and erosion management policy for Assam. This may not be the panacea for all problems that the existing management system suffers from, but will definitely provide a set of sound principles, elaborate guidelines and smart strategies for



dealing with the flood and erosion menace. The policy will also streamline the system, facilitate good governance and create a reference and benchmark for taking action on ground.

#### Evolution of flood and erosion management policy

At the national level, the first formal policy statement on flood control in India was enunciated on 3 September 1954 by the then Union Minister for Planning and Irrigation of India, Mr. Gulzarilal Nanda, in the aftermath of the devastating floods of 1953 and 1954, which affected many parts of India. This policy statement envisaged three types of flood control measures: immediate, short-term, and long-term. Immediate measures (first phase) included revetments, spurs, and embankments at selected sites; short-term measures (second phase) included construction of embankments and channel improvement covering large parts of affected areas; and long-term measures (third phase) consisted of building of storage reservoirs on certain rivers and additional embankments if found necessary (Brahmaputra Board 1985; Mishra 2002). This was the beginning of policymaking in the realm of flood management in India.

In this policy statement the objective set before the nation was to rid the country from the menace of floods by containing and managing floods. However the main philosophy of the national flood policy statement changed later and evolved since then as new thinking based on new knowledge and experience influenced it from time to time. For example, the report of the 'High Level Committee on Floods' submitted in December, 1957 noted that 'absolute or permanent immunity from flood damage is not physically attainable by known methods of flood control and therefore, Flood plain zoning, flood forecasting and warning, and like measures should be given due importance, particularly as these do not require large capital investment'. The report viewed that 'in general, embankments are satisfactory means

of flood protection when properly designed, executed and maintained, but a suitable combination of this method with other methods such as storage dams, detention basins, etc. is usually more efficient and should be adopted as resources permit'. At the same time the report showed wisdom by suggesting that the 'effects of embankments on river regime be considered, before approving such proposals'.

Later, in the 1980s, the report of National Flood Commission (NFC) promoted the idea of "learning to live with floods to an extent" (NFC 1980). Thus, although structural measures and embankments were emphasized in the very first policy on floods in independent India, their limitations were also recognized from the beginning. It was also said in the same context "no single measure can provide a complete answer to the problem of floods. Each case will have to be considered on its merits and a measure or a combination of measures adopted if a proper solution is to be found out" (Mishra 2002).

After this initiation, a number of committees, commissions, and task forces were formed to study flood problems, assess government programmes, and recommend strategies to deal with flood and erosion problems in various regions of India. Among the important milestones that defined the evolution of the flood management regime in India the Report of the National Commission on Floods is considered groundbreaking. The National Flood Commission (NFC) or the 'Rashtriya Barh Ayog' was constituted in 1976 by the Government of India to 'evolve a coordinated, integrated and scientific approach to the flood control problems in the country and to draw out a national plan fixing priorities for implementation in the future'. The report of the NFC, regarded as an important document reflecting the realities of the flood management regime in the country, evaluates the country's approach to and programmes on flood control since 1954 and provides important policy



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guideline for future flood management in the country. The NFC made 204 recommendations, but most of these recommendations were not followed, as reported in the reviews of the Central Water Commission (CWC) in 1987 and the National Commission for Integrated Water Resources Development in 1999.

The report of the National Commission for Integrated Water Resources Development (NCIWRD) submitted in 1999 observes that there are no universal solutions that can provide complete protection against floods. It, therefore, recommends a shift in strategy from structural measures to a mix of structural and non-structural measures including the efficient management of flood plains, flood proofing, disaster preparedness and response planning, flood forecasting and warning, disaster relief, flood fighting including public health measures, and flood insurance. "The report further suggests that performance review of selected embankments may be carried out and based on the findings, planning, designs and management of embankments may be reviewed for obtaining better results. It also recognizes the importance of associating the beneficiaries in the upkeep and surveillance of embankments during the monsoon season for prevention of possible breaching" (Thakkar 2006).

Another important milestone in the evolution of policy for mitigating flood and erosion in India is the 'Report of the Task Force on Flood Management and Erosion Control', constituted by the Government of India in the aftermath of the catastrophic floods in northeastern, eastern and northern India in 2004. This report provides important guidelines for flood protection work (MWR 2004) enriched with fresh ideas.

The report emphasizes the urgent need to plug breaches on embankments, raise and strengthen embankments, carry out bank protection work and anti-erosion work, construct high-rise platforms, provide sluices in

embankments, provide weak sections of embankments with fuse plugs, and construct drainage development schemes as short-term measures. The Task Force report advocates for storage reservoir projects upstream in flood causing rivers in Assam to find a "permanent solution to the problem of floods and erosion". Further, it suggests non-structural measures such as the revival and maintenance of wetlands, watershed management, flood plain zoning, and the extension and modernization of flood forecasting and warning systems. It also advocates for community participation in the maintenance of embankments.

The Task Force recommended several measures and financial reforms to ensure the flow of adequate financial resources to the states to implement flood management measures. It suggests that flood control schemes should be funded through the Centrally Sponsored Scheme in the ratio of 90 per cent from the central government and 10 per cent from the state government, instead of the then prevailing ratio of 75: 25. It asks the government to earmark funds in the state sector as additional central assistance for the maintenance of embankments. The report introduced the idea of a 'flood cess' of 1 to 2 per cent that could be levied on new infrastructure such as roads, buildings, and power plants in flood prone states to mobilize resources for a revolving fund to be used for flood protection in the states.

It is unfortunate that the policies and practices of flood management being adopted in India so far are literally the same that were introduced in the 1950s with only the immediate and short-term measures such as embankments being promoted more vigorously than other measures. The equally important non-structural measures have been largely neglected so far.

Coming to the case of Assam, the state's flood control measures were an emulation of the national policies and programmes. 'Outlined plan for flood control in Assam' along with various



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comprehensive plans were prepared and the priority areas, which needed immediate and urgent attention were identified.

The AWRD has ensured protection of major townships in both the Brahmaputra and Barak valley and schemes have also been taken up to relieve the drainage congestion in the cities and other important areas. However six decades after the first flood control policy was adopted, practically the same structural strategies are being perpetuated. With embankments becoming the symbolic icon of flood management although its limitations and negative consequences are well known.

Government efforts to protect people living on riverbanks from floodwaters and mitigate the impacts of floods have largely consisted of structural measures, mainly embankments. Attempts to control the erosion of natural riverbanks and embankments have been made using structures like porcupines, bamboo screening, and revetments. These structural measures have met with mixed success, protecting people from floods and erosion effectively for a long time in some places, while failing to contain flood waters and even increasing flood hazards in other places. Although experts recommended a 'judicious mixture of structural and non-structural measures', structures continued to dominate the formal flood management approach of the state government. The long-term measures like flood storage reservoirs suggested in the national policies were never seriously tried in the state.

Right in the aftermath of gaining independence, in those years of infrastructure building with a weak economic foundation, there were reasons for preferring structures like embankments to other options flood control, mainly to achieve immediate and visible results with low cost investment. However, perpetuating flood management using mainly embankments for the last six decades has been an indication of policy paralysis. The fact that many other

complementary measures like flood forecasting, flood early warning, watershed management, channel improvement, community based embankment monitoring and management and resilience building were never adopted or initiated with the right earnestness. The flood management system has suffered from policy myopia and institutional rigidity in the state for more than half a century.

#### The Way Forward: Towards an Integrated Flood and Erosion Management Policy

From the analysis given above one would understand that dominance of structural approach combined with technical and governance inadequacies in flood and erosion management is a key issue responsible for continuing and increasing misery of the people due to these disasters. What, then, is a suitable way forward? In this section we are presenting our observation that are derived from consultations with a large range of stakeholders, experts, decision makers, civil society and community carried out during 2007-2016 on various occasions throughout Assam.

It is high time that Assam adopts an Integrated Flood and Erosion Management Policy specific to the state. At present what the state has in the name of policy is actually a set of guidelines derived from national and state level programmes mooted for flood and erosion management from time to time during the last six decades. It is important that the useful and relevant principles, recommendations, and conceptual frameworks available and scattered in national and state level sources such as reports of commissions, task forces, policies, acts, vision documents, action plans etc. are collated, improvised and synthesized in to a single policy document. This policy should also contain innovative scientific, technological and governance strategies to address existing and emerging issues and challenges in the realm of water induced disaster management. This might necessitate broad based institutional reforms including creation of new institutions and



integration of existing ones following principles of Integrated Water Resources Management (IWRM).

Important sources from where policy makers can pick up guidance for pragmatic flood and riverbank erosion management are, the report of National Flood Commission, 1980; the report of the National Commission for integrated Water Resources Development, 1999; the Master Plan of Brahmaputra Basin, 1985 that was modified in 1996; the report of the L.C. Jain Committee (1990) appointed by the Planning Commission of India and the report of Task Force for Flood Management and Erosion Control, 2004 the National Disaster Management Act, 2005; National Water Policy of India, 2012; Draft Water Policy of Assam, 2007; National Policy on Disaster Management, 2009, Report of Working Group

on Flood Management and Region Specific Issues for XII Plan of the Planning Commission of India, 2011; Report of the Working Group on Disaster Management for the Twelfth Five Year Plan (2012-2017), 2011; the draft National Water Framework Bill, 2016 etc.

The Master Plans for the Brahmaputra and Barak rivers that were updated by the Brahmaputra Board in 1996 provide (i) a broad planning framework for flood and river erosion management through better data and knowledge gathering; and (ii) short- to long-term measures, comprising flood forecasting and warning, floodplain zoning, flood proofing, and watershed management (Brahmaputra Board, 1985, 1996). The National Disaster Management Authority (NDMA) has also prepared a set of guidelines for flood risk management to assist the ministries and departments of the national government, the state governments and local governance agencies (like the Panchayati Raj Institutions (PRIs) and Urban Local Bodies) in preparing flood management plans (NDMA 2008).

The National Water Policy, 2012 seeks to

promote 'good governance through transparent informed decision making as crucial to the objectives of equity, social justice and sustainability along with meaningful intensive participation, transparency and accountability as the guiding principle for decision making and regulation of water resources'. It suggests averting water related disasters like floods, through structural and non-structural measures, with emphasis on preparedness for flood with coping mechanisms as an option and even greater emphasis on rehabilitation of natural drainage system (NWP, 2012).

The Draft Water Policy of Assam (DWPA), 2007 recommended that 'structural interventions such as embankments, dykes, spurs, revetments, dampeners, porcupines etc. should be considered only after careful detailed studies and investigations as a part of a package' (DWPA, 2007). It also emphasizes on 'regular and adequate maintenance of such structures with the involvement of the stakeholders'. Further it recommends provision of sluices at appropriate locations of existing embankments to arrange for adequate drainage to get rid of water logging on the countryside. The state policy also advocates for structural erosion control measures such as revetments by boulders and geotextiles and downstream transport of sediments to reduce the intensity of erosion. On the other hand the National Policy on Disaster Management, 2009 insists "infrastructure like embankments should be constantly monitored for safety standards in consonance with worldwide safety benchmarks and strengthened where deficient" (NPDM, 2009).

Besides drawing relevant elements of recommendations from the above sources, the proposed policy has to cater to the priorities mentioned below. Inter-departmental coordination will be the key requirement for executing the suggestions and recommendations of this policy. The Assam Water Resources Department (AWRD), the Revenue and Disaster Management Department and the Assam State Disaster



Management Authority (ASDMA), the Flood and River Erosion Management Agency of Assam (FREMAA) and the Brahmaputra Board will have to play the lead role in policy implementation through integration of some of their activities with common goals.

The need of a strong research institute equipped with high calibre scientific and technological manpower and state of the art infrastructure and technology cannot be overemphasised for providing scientifically valid solutions to the water problems in the state. The Assam Water Research and Management Institute (AWRMI), set up by the state Government back in 2013 has the potential to be upgraded to such an institute of international standard. It is being designed as a 'state of the art' institute to facilitate planning, design and implementation of river erosion and flood protection works in Assam'. However, collaboration with the technological institutions, Universities and other reputed institutions of India as well as abroad will be essential to maintain global standard of quality of research and generate holistic knowledgebase. Such an institution, under the able leadership of a reputed scientist or technocrat, can significantly contribute to provide solutions to the plethora of problems in the realm of flood and erosion disasters.

Application of new and innovative technology for controlling riverbank erosion is a crying need in the state. Erosion prediction models can be useful in forewarning the disaster managers about where to take protective measures and thus saving valuable land resources. On the river engineering front, experts now endorse a combination of bank stabilisation and channel improvement approaches. Construction of embankments should be minimised to protect only critically important stretches of river with high value infrastructure and heritage. Flood inundation and water logging can be significantly reduced by improving drainage systems and restoring natural waterways while designing hydraulic structures in ways that do not fragment

the flood plain and natural river connectivity.

Flood forecasting, which is provided to the people in terms of water level during the flood season in the state, is mainly confined to the mainstream of the Brahmaputra and the Barak rivers. However, similar forecasting is also required in the tributaries since the cumulative damage done by these rivers are greater than the main stems. Along with forecasts early warning of floods is also very useful to people based on which they can save their lives and properties by preparing to face impending flood waves. In both cases it must be ensured that the advanced information of floods actually reach the vulnerable people on ground.

Strengthening the hydrometeorological gauging network in the state is another priority area, which can facilitate more reliable forecasting and early warning besides enabling engineers to design improved flood proofing structures on rivers. The number of functional hydrological data gauging stations maintained by the AWRD and the CWC to monitor discharge, water level and sediment load in the state is not adequate nor evenly distributed. Similarly the state does not have enough of weather monitoring stations. Apart from the ones maintained by the India Meteorological Department, the authenticity of the data generated by many other stations is not reliable.

Integrated river basin management is now considered as a fruitful approach to planning and sustainable management of rivers and their water resources. It is also an effective way of reducing the risk of flood and erosion disasters by taking into consideration the interlinking of physical, social, economic, environmental and cultural aspects of causes, management and impacts. In case of Assam we have more than fifty rivers, big and small that originate and/or flow from our neighbouring states like Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Tripura and Nagaland and other countries like Bhutan and



China. For basin wide management of rivers there must be collaboration and cooperation between and among basin sharing states and countries. While trans-national river management is difficult to be achieved since it is a matter of national priority involving diplomatic relationship with other countries and internationally valid protocols, it is worth pursuing the course of joint collaboration on inter-state rivers within the country.

If the interstate rivers shared by Assam can be managed holistically through bilateral cooperation then hydrogeomorphological processes like excessive bed and bank siltation, flooding, flash flooding and bank erosion can be effectively controlled in both upstream states as well as in Assam. It is also now well acknowledged that the flood and erosion problems cannot be adequately mitigated only by taking structural or non-structural measures in the flood plains of Assam without addressing the river's morphology in the upstream catchments that lie in the hills of our neighbouring states.

Therefore we propose that the flood and river bank erosion processes and problems in the river catchments of Assam and neighbouring states need to be considered in the disaster risk mitigation framework at catchment level and treated as part of a larger integrated river basin management plan. Government of Assam has to accept this fact as a matter of policy and pursue proactive water collaboration with its neighbours. Aaranyak, an environmental NGO of Assam, initiated a dialogue between Assam and Arunachal Pradesh on integrated river basin management for mitigation of flood and erosion disasters in interstate rivers in December 2013. The outcome of this interaction was very encouraging with both the states appreciating each other's problems and unanimously voicing a resolution in favour of joint mitigation of water induced disasters in both the states. This process of building partnership in river management and disaster mitigation can lead

to considerable reduction in impact of flash floods, and excessive sedimentation in Assam.

The national Disaster Management Act, 2005 wanted to enact a paradigm shift in disaster management scenario of the country by sifting the focus from reactive approach based on relief and rehabilitation to proactive approach that hinged on preparedness. In Assam we need another paradigm shift in the flood management sector, which entails recognising the importance of risk, & resilience perspective. This risk management framework insists on enhancing people's adaptive capacity through socioeconomic empowerment and augmentation of suitable traditional coping and adaptive practices as well as innovative risk reduction strategies in addition to the conventional structural and non-structural measures.

The observed and anticipated effects of climate change on flooding and sedimentation as well as overall hydrology and geomorphology of the rivers must be accounted for in the flood management plans including construction of structures such as embankments. Rainfall is projected to increase in the Himalayan region of Asia with decreasing number of rainy days, and consequent increase in the episodes of heavy rainfall, and cloudbursts (IPCC, 2014) thereby resulting in the intensity and frequency of flash flood disasters in the Brahmaputra-Barak basins.

The account given above is not comprehensive in scope and content. It mentions only some important issues to be considered if one wishes to effectively address the flood and erosion disasters in Assam by adopting a sound policy instrument. Improving relief and rehabilitation actions, capacity building of professionals, civil society and community and ensuring participation of communities in planning and implementation flood and erosion mitigation projects are some other unavoidable tasks to be accomplished. These are also elements to be included in a climate smart integrated flood and



erosion management policy being advocated in this write-up. On one hand this policy must ensure that the basic issues related to flood and erosion are dealt with effectiveness by making use of top edge scientific concepts and most suitable technology. On the other hand this policy instrument itself has to have enough flexibility so that it can take care of future uncertainties injected into the natural environment by climate change impacts.

It is hoped that having a specific policy will be immensely useful since a policy can provide direction to decision makers and offer options of multiple courses of action to take for short as well as long term benefits. If necessary such a policy can also be formulated in the form of an Act for strict enforcement. An adaptive and progressive policy can go a long way in making flood and erosion management much more fruitful in future if supported with a mechanism that assures good governance in the water management sector in the state.

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**Author's Address :**

Dr. Partha J Das

Head, 'Water, Climate & Hazard Division'

Aaranyak (A Scientific and Industrial Research Organisation of India)

Administrative Office, House Number # 13, Tayab Ali Byelane

Bishnu Rabha Path, Beltola Tiniali, Bhetapara Link Road

P.O Beltola, Guwahati- 781028, Assam, India

Email: partha@aaranyak.org, parthajdas@gmail.com

Telephone: +91-361-2230250, Telefax: +91-361-2228418

Mobile: 94351-16558, 9957189404

www.aaranyak.org

**Notes :**

- 1 India-WRIS-Wiki, Water Resources Management System of India Flood Management  
[http://india-wris.nrsc.gov.in/wrpinfo/index.php?title=Flood\\_Management](http://india-wris.nrsc.gov.in/wrpinfo/index.php?title=Flood_Management)
- 2 The Draft Water Policy of Assam was submitted to the Government of Assam by Assam Science Technology and Environment Council back in 2007. The report is yet to be officially adopted by the GoA as the state's water policy.
- 3 <http://awc.org.in/wrd/otherachievements.php>