

MONOGRAPH
ON
FLOOD MANAGEMENT



Department of Disaster Management
Government of West Bengal

FOREWORD

Occurrence of flood in India is a common phenomenon. Every year some part of the country comprising of one or more States/UTs get inundated due to flash flood, cyclonic storm followed by intense downpour, localized heavy rainfall or release of water from the reservoirs of the State/adjoining States resulting in severe damages, both to life and property.

An attempt has been made through this monograph to prepare a ready reckoner for the Disaster Managers working in the field for managing flood. The input of this monograph is based on “hands on” experience of the officials of the Government of West Bengal in managing flood. It is hoped that it will stand the test of utility for tackling the menace of flood by the present day Disaster Managers.

Suggestions, comments and inputs from my colleagues in preparing this monograph are sincerely acknowledged and for further improvement are most welcome.

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Flood refers to the phenomenon of influx of water beyond its normal confines in an area resulting in disruption of normal human activities, destruction of properties, loss of animal & human lives and environmental damage. Flood can be in the form of local inundation due to heavy rain or due to accumulation of run off/discharge after heavy rain in the catchments and or due to breach of embankment.

Causes of flood:

Major contributing factors for flood are:

- i) accumulation of water due to localized heavy rainfall,
- ii) accumulation of run-off after heavy rainfall,
- iii) discharge from upper basin areas,
- iv) distinctive features and drainage condition of river/canals/dykes, etc.,
- v) shape of the catchment's area,
- vi) shape and strength of river/coastal embankments.

Paradigm Shift in Approach to Flood Management:

During flood, large tracts of land get inundated and, thereby, disconnected from the adjoining areas resulting in disruption of normal day-to-day activity in that area. Though natural calamities like flood cannot be avoided, its impact in terms of loss of lives and damage to properties can be minimized by undertaking appropriate management practices for preparedness, prevention and mitigation measures. This constitutes a holistic approach towards management of flood with emphasis not only on the traditional post disaster response; but also on pre-disaster preventive/mitigation preparedness as well, thereby, laying down the Standard Operating Procedure (SOP) for a Disaster Manager (DM/SDO/BDO) for flood management. SOP for proper management of flood comprises of three phases:

- A) pre-flood phase,
- B) during flood phase and
- C) Post-flood phase.

A. PRE-FLOOD PHASE:-

Activities during pre-flood phase are essentially aimed towards **Preparedness and Mitigation.**

Preparedness refers to all such protective measures that are undertaken to enable an individual, the community and the government to respond appropriately to a flood situation. It includes formulation of a viable emergency action plan encompassing deployment of early warning system, maintenance of inventories of relief materials, training of personnel for rescue and evacuation, verification and updating of existing search, rescue and evacuation plans for areas that are vulnerable from recurring floods or have a history of flood. All these measures of preparedness aim at minimizing loss of lives, disruption of critical services and damage to properties when the flood actually occurs.

Mitigation refers to the measures taken to reduce both the impact of flood and the vulnerability of the area in order to reduce the magnitude of an impending disaster. Thus, mitigation activities focus on the hazard itself and the elements, which are either exposed or are contributory towards the impact of the threat.

Keeping the above in view, the Disaster Managers are required to review the following activities as part of SOP for pre-flood phase:

1. PREPARATORY MEASURES:

1.1 Vulnerability Assessment: Mapping of flood prone area is the primary step in vulnerability assessment for flood. Past meteorological records give reasonably good indication of flood/inundation of an area with periodicity and extent of such occurrence. Based on study of these records, a profile of the flood prone areas of a district should be prepared clearly indicating the vulnerable areas/villages and also the vulnerable population and assets therein. Such villages/areas should be earmarked for appropriate measures at the time of actual flood.

1.2 Database Preparation: A data base by filling up name, address, telephone numbers (mobile, fax, office and residence), of all officials, police, local/nearest Para-military and Defence establishments, local govt. representatives, NGOs and of vital support services as per Appendix-1, should be prepared and updated. It should be ensured

that such information for Sub-division, Block and Gram Panchayat levels are also prepared and maintained.

1.3 Early Warning Dissemination system: Early Warning Dissemination System is the most important component of flood management and therefore it is essential that smooth functioning of the system is verified well in advance to ensure its effective functioning in times of actual need. Except for flash floods, usually there is a reasonable time gap available for flood by river water between the areas located upstream compared to the areas located downstream. Therefore, flow of water through the major rivers, its tributaries, canals/dykes, etc., in the district as well as in the neighbouring upstream districts should be closely monitored. Heavy precipitation in a given area for more than usual duration in itself constitutes warning for flood. As such, amount of rainfall should be properly recorded and monitored. High tides with/or high wind velocity can also cause flood by raising the level of sea/river water above the embankment level as well as also by breach of embankment. Reports from Indian Meteorological Dept., Irrigation Dept., which provides advance warning of weather disturbances, should be scrupulously monitored. It is imperative for a Disaster Manager to keep his information channel open and on high alert to receive and disseminate all such information, which carries advance warning of an impending flood.

1.4 Stocking of Essential Commodities: Stocking of food grains, POL, medicines, relief materials, etc., form an important part of preparedness for tackling flood. Following actions needs to be taken in this regard:

1.4.1 Relief Materials: Verification of the stock of relief materials should be undertaken at the Block, Sub-division and District level before the onset of the monsoon season. Adequate stock of relief materials should be built up and maintained at every level. Disaster Manager should be careful that the stocks are built on need-base and on the degree of vulnerability of the area to flood. Particulars of the persons dealing with bulk quantities of relief materials, food grains and dry foods should be maintained by the Disaster Manager.

1.4.2 POL: Adequate reserved stock of POL in flood prone areas should be maintained by the M.R. dealers at their MR shops, which shall be released only on permission of the appropriate authority. M.R. dealers in flood prone areas should be asked to stock food grains in their shops well in advance to avoid “dry” situation at the time of disaster.

- 1.4.3 Medicine:** Stock of medicines like antivenin serum, ORS, halogen tablets and certain other life saving medicines for diseases common during and post flood, should be verified in all the hospitals/Primary Health Centres of the district and adequate stock should be built up. Adequate stock of bleaching powder should be kept ready for proper sanitation at the temporary relief shelters and hospitals/Primary Health Centres.
- 1.4.4 Animal feed:** Assessment of availability of animal feed and medicines for livestock should be done and stock should be built up accordingly.
- 1.4.5 Drinking Water:** Provision for availability of safe drinking water at the flood shelters through repair and or installation of tube wells should be done by the Public Health Engineering department/local government authorities before the monsoon season. Concerned agencies should be in preparedness to raise the platform of the tube wells, if needed and at a short notice.
- 1.4.6 A list of locations where essential commodities are stored for emergency use during and or after flood should be prepared, updated and maintained. It is also important that such sites are adequately secured against plundering during crisis.**
- 1.5 CO-ORDINATION:** The District Disaster Management Committee (DDMC) should meet well before the onset of the monsoon season to ensure adequate preparedness for the ensuing monsoon period. This meeting should be attended by the representatives from the Line Depts., like Agriculture, Animal Resource Development, Civil Defence, Food & Supplies, Health, Irrigation & Waterways, PHE, Police, Power, PWD, Telephones, etc. as well as by other stake holders, like, Local Self Govt. Authorities, Local Volunteer Force, NGOs including Indian Red Cross Society, St. Johns' Ambulance, etc. If possible, such meeting should also be attended by the Defence and Para-military forces. The basic objective of the DDMC meeting is to bring all the stakeholders under one common platform for sharing of knowledge and expertise in anticipating the problems likely to come up in case any disaster takes place and to take such preparatory measures in advance, which may mitigate the effect of the disaster to a bare minimum in terms of loss to life and property. DDMC should also endeavour to identify and formulate the development schemes, which can mitigate impact of a disaster, especially flood, and ensure quick and proper implementation of such on going schemes. The Committee

should also ensure repairing of vulnerable structures specially the embankments by the concern Departments responsible for maintaining such structures before the onset of the monsoon season.

1.6 ACTIVATING CONTROL ROOMS: Functioning of Control Rooms should be checked and a drill may be organized to detect loopholes if any in their functioning and rectify the same. Control Room should be strengthened both with modern communication equipments and agile manpower and transport facilities to facilitate exchange of communication in quick time for effective response. It is for the Disaster Manager to assess when to activate the control room. Control Room should function round the clock during flood, for which duty roaster of the persons engaged should be maintained. A register for each control room should be maintained and signed by the shift in-charge/operator. All communication transacting through the control room as well as action taken on receiving a communication, should be recorded in the said register.

1.7 MAINTENANCE OF ESSENTIAL SERVICES: Disaster Manager should review functioning of different Departments concerned with Essential Services like Food & Supplies, Health, PHE, Power, Railways, Roads, Telecommunication, Transport, etc., within his jurisdiction and ensure timely restoration of these services in the wake of their disruption due to flood.

1.8 RESPONSIBILITY AND ACCOUNTABILITY: **As far as possible, responsibility for every level of authority during flood should be fixed. Every such official should be accountable for his action/discretion during disaster.**

A database of nodal officers (containing telephone nos., address, mobile nos., e-mail and fax) of the line Depts. including addresses of local level essential services managers should be maintained in the Disaster Manager's Control Room as well as in the Control Room of the Essential Service Depts.

1.9 PREPARDNESS FOR EMERGENCY RESPONSE:

1.9.1 Evacuation Plan- A Disaster Manager should prepare and have in place an emergency Evacuation Plan for the people living in the low lying and vulnerable areas. The Plan should include identification of places to be used as temporary shelters for the people evacuated where arrangement for distribution of dry food / cooked food from gruel kitchen may have to be

made in case of exigencies by the pre-selected teams. Transportation and alternative evacuation routes should be charted out in advance.

1.9.2 Search & Rescue- Teams responsible for search and rescue should be properly trained, equipped and deployed strategically. It is essential that in search and rescue operations, representatives from the Local Govt. Authorities are involved. Local NGOs, Volunteer Clubs, able bodied community members should be identified, whose services can be utilized in the evacuation operation during flood.

1.9.3 Relief Shelters-

a) All the existing relief shelters should be physically verified to ensure their usability during flood. A list thereof, should be prepared, updated and circulated to all concern, especially NGOs, the Local Govt. representatives & peoples' representatives. Public/Private telephone nos. in the vicinity of the shelters should be documented for use during the crisis.

b) List of government and semi-government buildings, high rising private buildings in the locality, which may be used as temporary shelters during the crisis, should be prepared, updated and circulated to all concern.

1.9.4 Arrangement of boats & other equipments-

a) Availability of country, mechanized and speedboats in the district, especially in the vulnerable areas, should be assessed well in advance before the onset of the monsoon and documented so that the services of these boats are readily available during the flood. As far as possible, these boats may be got checked by the Civil Defence or other officials regarding their usability and effectiveness during the flood season.

b) Local office of the Fisheries Department should maintain information regarding the number of boats supplied by them in the area, which can be utilized for the purpose of emergency evacuation/transportation, if need arises. This information should be available with the local Disaster Manager.

c) Equipments for search, rescue, debris and road obstacle clearance, Bailey bridge, etc. available with Govt. / Semi-Govt. Organisations or Private Agencies, should be identified for emergency use during flood. IDRN Portal (India Disaster Resource Network) should be consulted for this purpose and an updated database should be maintained.

d) Sites for helipads on high lands should be identified and checked well in advance as a preparatory measure.

f) Necessary coordination with Armed Forces / Paramilitary forces should be done for requisition of their support if need so arises, during the flood.

1.10 STRUCTURAL VERIFICATION AND CHANGES: During the last few decades different methods of flood protection by adopting different structural measures depending upon the nature of the problem and local condition have been tried out. These include construction or renovation of storage reservoirs and embankments, drainage channel improvement, anti-erosion works, etc. Exercise may be carried out in advance to check if any of the said structural methods can be adopted in the area to prevent or mitigate the impact of flood. Physical inspection and repair of all weak structures, especially the embankments, bridges and roads should be undertaken beforehand by the concerned Departmental officers who are responsible for maintaining such structures.

2. MITIGATION MEASURES: Management of any kind of disaster including flood, needs long term strategic planning so that flood preventing or mitigating activities like construction or improvement of drainage channels, strengthening of embankments, desilting of rivers beds, removal of human encroachment along the riverbanks etc. can be dovetailed with the development activities of the area. This needs multi-sectoral planning and integration of disaster management practices with the ongoing development activities in the area by the various line departments. The Disaster Managers should look into the aspects of disaster management practices in the perspective of developmental planning of an area, which will help mitigation of disaster through appropriate development of the area.

2.1 Planning & Capacity Building: In any kind of disaster, first respondent is the community affected by the Nature's fury. It is therefore important to train the community in tackling flood. The Disaster Risk Management Programme encompassing different disasters, to which a community is vulnerable, should be planned and implemented by involving all stakeholders of the area. Adequate awareness generation campaign, training/drill should be imparted to the community and the local govt. representatives in handling flood situation under such programme.

B) DURING FLOOD PHASE:

3.1 Role of local govt. representatives: During flood, the basic responsibility for effective management of the flood situation lies with the District Disaster Management Team with active help for the local govt. representatives. Various other agencies, like Paramilitary and Defence Forces also play crucial role in combating such situation depending upon the

degree of disaster through search, rescue and evacuation of the affected people to safe shelters. However, the role of the local govt. representatives is very important as they are most aware of the terrain of the area, its vulnerability as well as of the pulse of the people. The Disaster Managers are well advised to take their active cooperation during the flood.

3.2 Local Coping Mechanisms: Since time immemorial, traditional coping mechanisms have played a major role in managing disaster in an area. The Disaster Managers should take necessary steps for strengthening these time tested traditional mechanisms for better management of the disaster situations by documenting the same and putting them into practice during the disaster.

3.3 Operationalisation of the control room: Control rooms should be operational round the clock during the phase of flood for quick and effective sharing of information and timely action. Specific responsibility should be assigned to officials. The telephone numbers of the control room should be made public for access by common people. It should also be ensured that other line departments should have their control rooms operational round the clock and work in coordination with the Disaster Manager's control room.

3.4 Co-ordination: The work of search, evacuation, rescue, relief shelter/camp management, distribution of relief materials and food items(cereals/dry food/cooked food), health care, first aid, sanitation, drinking water supply, maintaining communication & transport systems and providing other essential services by different teams / departmental agencies / NGOs and others during flood should be closely monitored and coordinated by the Disaster Manager and impartially so as to ensure that no affected area / population has been left unattended.

3.5 Disposal of caracas & dead bodies: Disposal of caracas and dead bodies is an important issue during disaster like flood. Volunteers / workers should be promptly engaged for this purpose.

C.) POST FLOOD PHASE:

4. Assessment of damages: Quick and correct assessment of damages caused by flood dispels adverse media publicity, false panic reaction and also helps in planning for quick restoration and rehabilitation. As such, extent of damage due to flood should be assessed accurately and report in CA-II Form should be sent to the Government. A Restoration Initiative Team should be formed in advance at the Block/ Sub-Division/District level with all line department officials and the representatives from the local self government to assess the damages caused by the flood. As soon as the situation starts normalizing, this team should

start assessing the damages, which should include assessment of damage to infrastructure and economic assets, repair and or re-construction thereof, flood protective works, relocation of habitat, compensation for damage to crop & cattle, rehabilitation of farmers and restoration of public distribution system for essential commodities, etc.

5. Verification of loss of life: If any loss of life is reported, immediately steps should be taken to verify the information. It is most important to verify the cause of death to check panic reaction as well as outbreak of any epidemic. In case the loss of life is related to flood and the body is available, all legal formalities as per the extant law in this regard should be completed before disposing of the body to enable the bereaved family avail compensation normally available under such situation, from the appropriate authorities.

6. Rehabilitation of the affected people: Affected people rescued or who move into various relief camps/shelters should be provided with food, safe drinking water and basic health facilities. Gruel kitchen at the relief centres in the affected areas should be opened to avoid starvation deaths. Anganwadi workers under the ICDS programme should be involved for mass scale immunization of children, expecting and lactating mothers. Health Department should take steps for checking outbreak of epidemics. Disinfectants should be used liberally around the temporary camps/shelters to arrest spread of epidemics. Help from govt. approved NGOs may be solicited for necessary support in relief and rehabilitation activities. Old people, women, children and infirm should be given attention with priority. Trauma counseling centres may be opened to provide psychological support to the victims, if need so arises.

7. Animal care: Provision for animal feed and fodder may be arranged for the livestock in the affected areas. Stagnant water bodies should be disinfected to avoid outbreak of disease among the livestock. Veterinary/Animal Resource Development Dept officials should be directed to take all steps to prevent and or check outbreak of disease.

8. Physical, Economic & Social Rehabilitation: Various govt. schemes should be implemented for quick rehabilitation of the affected population.

9. Documentation: Lessons learnt from the disaster should be documented for preparation of future risk management plans.

Appendix to flood monograph

APPENDIX-I

	General Administration	Telephone Nos.			
		Office	Fax	Residence	Mobile
	DISTRICT LEVEL				
01	District Magistrate				
02	DM's Control Room / District Emergency Operation Centre				
03	Additional District Magistrate (Relief)				
04	Dist. Relief Officer / Officer-in-Charge (Relief)				
05	District Information Officer				
06	Deputy Controller, Civil Defence				
07	Control Room of Civil Defence				
08	Superintendent of Police				
09	Police control room				
	SUB-DIVISION LEVEL	Office	Fax	Residence	Mobile
01	Sub-Divisional Officer				
02	Second Officer				
03	Sub-Divisional Relief Officer / Officer-in-charge (Relief)				
04	Sub-Divisional Police Officer				
05	Sub-Divisional Information & Culture Officer				
	BLOCK LEVEL	Office	Fax	Residence	Mobile
01	Block Development Officer				
02	Joint Block Development Officer				
03	Block Relief Officer				
04	Officer-In-Charge, Police Station				
	ESSENTIAL SERVICES	Office	Fax	Residence	Mobile
01	Director, Regional Meteorological Centre				
02	Chief Medical officer of health				
03	Superintendent of District Hospital				
04	Sub-Divisional Medical officer of Health				
05	Superintendent of Sub-Divisional Hospital				
06	Block Medical Officer of Health				
07	Medical Officer, Primary Health Centre				
08	Principal Agricultural Officer				

