MANUAL ON COMMUNITY APPROACH TO FLOOD MANAGEMENT IN INDIA

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The Associated Programme on Flood Management

World Metreorological Organization

Global Water Partnership

Manual on Community Approach to Flood Management in India

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The Associated Programme on Flood Management

The Associated Programme on Flood Management (APFM) is a joint initiative of the World Meteorological Organization and the Global Water Partnership. It promotes the concept of Integrated Flood Management (IFM) as a new approach to flood management. The programme is financially supported by the governments of Japan and the Netherlands.

The World Meteorological Organization is a Specialized Agency of the United Nations. It co-ordinates the meteorological and the hydrological services of the 185 countries and territories and as such is the centre of knowledge about weather, climate and water.

The Global Water Partnership is an international network open to all organizations involved in water resources management. It was created in 1996 to foster Integrated Water Resources Management (IWRM).

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Preface

Flood is a serious problem for India that inflicts suffering to the millions, specially the poor and vulnerable sections of the society. Several approaches to alleviate flood misery have been pursued in the past, but with limited success. The problem seems to defy solution. Hence, a fresh approach is clearly needed. It goes to the credit of Geneva based World Meteorological Organization (WMO) to have taken the initiative in exploring the potential of a new approach, namely Community Approach to Flood Management. For this purpose, it decided to sponsor pilot studies in Bangladesh, India and Nepal.

A Kick Off meeting held in Dhaka in early November, 2002 divided the work into two phases which were carried out as per details provided in Section 1.1 of Chapter – I. The second phase of the work started from June 2003 and got completed in May, 2004 when a Manual on Community Approach to Flood Management was prepared and submitted to WMO. This was the most important output of the second phase. Thereafter, the Manual was tested under actual flood conditions during the flood months of 2004 in one selected area of Bihar. Lessons derived from this testing were also incorporated at suitable places in this publication.

As one who has dealt with flood problem for three decades and was a Member of the National Commission on Flood 1977-80, Government of India, it has given me immense satisfaction to be associated with this study. I hope that there would be further studies and follow up action in this respect so as to enhance the capability of the under-privileged sections of our society to practise improved methods while coping with flood.

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Abbreviations and Glossary

1	AAY	Ambedkar Awaas Yojana. This is central sector scheme formulated with the objective of providing low cost houses to backward castes below poverty line in rural areas.
2	ADM	Additional District Magistrate
3	Ahu/Aus Paddy	These are autumn varieties of paddy popularly known as Ahu paddy in Assam, Aus paddy in West Bengal, grown between March-April and harvested during July-August.
4	Aman/Sali paddy	These are late winter varieties of paddy mostly transplanted after flood is over during October/November. To raise these varieties, seed beds are prepared in June-July on uplands where nurseries are grown for transplantation.
5	APL	Above Poverty Line. As defined by Planning Commission, poverty line is per capita consumption expenditure level based on daily calories requirement of 2400 in rural areas and 2100 in urban areas. At 1999-2000 prices, the poverty line at all India level was Rs. 327.56 per capita per month for rural and Rs. 454.11 for urban areas.
6	BDO	Block Development Officer. Head of developmental administraion at the block level.
7	Boro Paddy	Subject to assured irrigation facilities, these varieties of paddy are grown during January-February and harvested in May-June. These varieties are commonly known as summer paddy and pertain to high yielding varieties such as Jaya, Padma, IR-8, TN-1 etc.
8	BP	Bleaching Powder.
9	BPL	Below Poverty Line. It refers to those households who are living below this line. (as mentioned under item no. 5)
10	BUP	Bangladesh Unnyan Parishad
11	CBO	Community Based Organisation.
12	Community Development Block	Known briefly as Block. It is an unit under a district carved out for development of rural areas under its jurisdiction.
13	CPR	Community Pooled Resources.
14	DA	District Administration
15	District	A major administrative unit below the state headed by a Magistrate who is appointed by the state government.
16	DRDA	District Rural Development Agency. This is an agency of the state government at the district level for poverty alleviation and area development programmes of Ministry of Rural Development.
17	IRMED	Institute for Resource Management and Economic Development
18	FGD	Focussed Group Discussion
19	FMC	Flood Management Committee.
20	FMD	Foot and Mouth Diseases among cattle.

21	GP	Gaon (Gram) or Village Panchayat. A set of one or a few adjoining villages which constitute the lowest unit of democratically elected CBO.
22	HF/VHF	High Frequency/Very High Frequency
23	HS	Haemorrhagic Septicaemia
24	I&WD	Irrigation & Waterways Department (West Bengal)
25	IAY	Indira Awaas Yojana, a central sector scheme formulated with the objective of providing low cost houses to economically weaker sections below poverty line in rural areas.
26	IBS	Individual Beneficiary Scheme. This is a centrally sponsored scheme on cost sharing basis between centre and states in the ratio of 75:25 intended to benefit SC/ST households living below poverty line by providing them assets for income generation.
27	Kharif Season	Sowing/transplanting period of crops between June-July and harvesting during September-October.
28	KVIB	Khadi & Village Industries Board. This is an organization of state government for promotion of khadi (hand spun fabrics) and local village industries.
29	KVIC	Khadi & Village Industries Commission. It is a permanent commission of the central government for development of (khadi hand spun fabrics) and local village industries.
30	LPG	Liquefied Petroleum Gas
31	Make Shift Cattleshed	A temporary arrangement for keeping cattle during floods.
32	Make Shift Shelters	Temporary shelters on uplands, embankments, raised roads, high rise public buildings to accommodate flood victims till normalcy is restored.
33	MLA	Member of Legislative Assembly (elected representative of the State Assembly)
34	MO	Medical Officer
35	Mouza	A group of villages (West Bengal)
36	MP	Member of Parliament (elected representative of parliament at the national level)
37	MPFS	Multi Purpose Flood Shelter for providing temporary shelter to flood victims during flood.
38	NPIC	National Programme on Improved Chulha
39	OBC	Other Backward Castes. It is a social classification among population eligible for getting benefit under government schemes
40	ORS	Oral Rehydration Solution
41	PHED	Public Health Engineering Department
42	PRA	Participatory Rural Appraisal
43	Pradhan/Mukhia	Chairperson of the Gaon (Village) Panchayat known differently in different states such as G.P. president in Assam, Mukhiya in Bihar etc.
44	PWTP	Portable Water Treatment Plant

45	Rabi Season	Sowing/transplanting period of crops between October-November and harvesting during March-April.
46	SC	Scheduled Castes. It is a social classification of population eligible for getting certain benefits under government schemes.
47	SF/MF	Small farmer/Marginal farmer. Small farmers are classified as those owning an average holding of land between 1 and 2 hectares. Marginal farmers are those holding an average land upto 1 hectare.
48	SGRY	Sampoorna Grameen Rozgar Yojana. It is a Central Government scheme for economically weaker section households which aims at providing additional wage employment in rural areas with food grains given as part of wages.
49	SHG	Self-help Group. A small group of about 10 to 15 persons formed to help each other through raising loans for earning their livelihood by pursuing some gainful activities at the household level.
50	ST	Scheduled Tribes. It is a social classification among population with a view to provide certain incentives under government schemes.
51	State	An administrative unit next below the country having well defined legislative and administrative powers and overall responsibilities and governed by a democratically elected government.
52	Summer Season	Showing period between March-April and harvesting during May-June.
53	TSC	Total Sanitation Campaign.
54	VLW	Village Level Worker. A government employee posted at the village level to provide necessary technical help and overall guidance to villagers in respect of agricultural and rural development programmes..
55	VO	Voluntary Organisation.
56	VO	Veterinary Officer
57	ZP	Zila Parishad/Zila Panchayat. It is a democratically elected community based constitutional body at the district level having specified powers and responsibilities for development of rural areas.

Chapter - I

INTRODUCTION

1.1 Background

India is one of the most disaster prone countries in the world. About two thirds of its land is vulnerable to natural disasters of which flood is a major one, specially in the Gangetic-Brahmaputra-Meghna Plains. As estimated by the National Commission on Flood, the flood prone area in India constitutes about 40 million hectares. This is about 25 per cent of the cultivable land. Average damage caused by flood fury to house properties, public utilities and standing crops, evaluated in terms of money, adds upto to the extent of Rs. 13470 millions (US $ 306 million) in a year. This is, apart from, the loss of human lives and livestock numbering 1,595 and 94,772 respectively, and the miseries that it causes.

Most of the well known approaches to flood management, both structural and non-structural, have been tried in some part of the country or the other, but with limited success. A brief summary of these approaches is provided in the next chapter. All such approaches have, however, been characterized by **total dependence on government machinery not only for large schemes but even for small ones including flood preparedness**, **flood fighting and post-flood measures**. No doubt, Government intervention is unavoidable in some cases and at some times, but it has its own limitations because of the usual inaccessibility, delay in response etc. Moreover, Government does not have an adequate and extensive machinery to reach every affected household during flood, specially in the interior villages. NGOs too may not have a presence in many areas.

Hence, a need to introduce community involvement in flood management has been felt for some time. This approach is in conformity with the current trend of participative approaches to socio-economic development and welfare activities. **Community participation** is a process where the concerned communities function and contribute as a cohesive group to perform a predetermined activity. The basic premise behind this approach is that the **involvement of the people in flood management is expected to be more effective and useful**. Such an approach also provides an opportunity to the community to meet its obligations towards its members. Community involvement would, of course, be more effective if people are fully conscious, empowered and trained. Community participation would be forthcoming if community can expect to derive visible benefits from it. People, therefore, should be provided an opportunity to play a more active role and the official machinery provides facilitating and catalytic support only. It may be noted that this task has now become easier in India since community based organizations elected by the people known as **Panchayats have become functional at**

village, block and district levels as a part of the Indian Constitution (73rd Amendment, 1992).

A word of caution is needed at this stage. Community participation can only mitigate the hardships and losses caused by floods. It has little effect on controlling or moderating floods. It assumes that floods would continue to come and that people have to live with them. Therefore, the Manual developed as a part of this study, provides guidelines to the community **to face floods and to reduce the consequent losses**.

A major initiative towards undertaking a study on community approach to flood management was taken in **2002** by the Geneva based World Meteorological Organization **(WMO)**, when it decided to sponsor a coordinated study on this subject in Bangladesh, India and Nepal under its Associated Programme on Flood Management. Bangladesh Unnayan Parishad (BUP) of Dhaka was assigned the role of the coordinator. The work for India was entrusted to this Institute. The present study is a result of this initiative.

The WMO organized **a Kick Off meeting in Dhaka on November 6 and 7, 2002**. This was attended by experts from all the three countries. The work was divided into two phases and separate guidelines were worked out for each phase. The first phase of the work commenced immediately following the Dhaka meeting and was completed by the third week of February, 2003. Thereupon, a consolidated report was prepared for all the three countries. This report along with supplementary notes from three countries was presented during the **3rd World Water Forum held at Kyoto (Japan)** during March ending 2003.

The first phase of the study indicated a high potential for community approach to flood management. Thereafter, WMO sponsored the second phase, which started in June 2003. Field works was completed by the end of February 2004 and the report was submitted to WMO on 25th April, 2004. The Manual on Community Approach to Flood Management was the most important output of the second phase. With further financial support of the WMO, the third phase of the study was undertaken in one area to test the Manual in actual flood situations in Bihar. This was done during June to October 2004. New experiences gained from this phase, were also incorporated in the Manual.

1.2 Objectives

The first (pre-Kyoto) phase of the study was concerned mainly with finding out the then prevailing status of community participation in flood management with particular reference to information on flood forecasting and warning, risk management, coping practices of the communities and assistance provided in cash or kind by government and other external agencies.

The second (post-Kyoto) phase of the study was concerned with providing an operational framework for community approach to flood management as per details given below.

(1) To review the phase-I findings and to gather additional knowledge about the flood affected communities.
(2) To indicate concrete steps for institutional strengthening, human capacity development training and support services to reduce risk and vulnerability.
(3) To undertake appropriate activities to strengthen self-help capacity of communities for improved integrated flood management, practices.
(4) To gather information on efficacy of existing non-structural and structural measures and examine the feasibility of the concept of flood insurance particularly focusing on the poorest segments.
(5) To assess and raise public awareness regarding preparedness, response planning, flood proofing, flood shelters, flood plain zoning, changing land-use etc., with particular reference to needs of women and children.
(6) To prepare a set of guidelines for action or a Manual on community approach to flood management to help people to undertake their flood response activities more systematically and effectively.

Preparation of the Manual was the most important objective during the second phase of the study. The Manual covered several aspects of flood management like flood preparedness, flood rescue and relief, agricultural and livelihood planning, health and sanitation etc. Some of the activities as indicated in the Manual could be undertaken before flood, some during and some after flood. It may be clarified that the Manual focuses on "normal" monsoonal floods and not flash floods. **Raising public awareness and capacity development training were the other important objectives**. While dealing with coping strategies of flood affected people, particular attention was given to requirements of women and children. Testing of the Manual in actual flood condition and deriving lessons from the same was the principal objective of the third phase of the study.

1.3 Methodology

Information for the first phase of study was obtained mainly through Participatory Rural Appraisals (PRAs) conducted in the study areas, while that for the second phase, was obtained from several sources including field studies and government publications, reports etc. as provided in the Bibliography at the end of this report.

The Manual was **evolved** mainly by discussing the relevant aspects with the people, their representatives as well as knowledgeable persons and government functionaries at district and block levels in the states of Assam, Bihar and West Bengal during the study team's visits to these areas. Action research was conducted as an interactive process. The information, ideas and suggestions emerging from the field visits were critically examined and evaluated by **a multi-disciplinary Expert Group**, constituted by IRMED in Delhi. New ideas emerging from the interactions with the Expert Group were

in turn tested during the field visits from the point of view of their feasibility. The field visits were undertaken in four stages.

In the **first stage**, a detailed survey along with PRA in each of the selected villages was completed for preparing the first draft of the Manual on community approach to flood management. A copy of the Draft Manual was sent to WMO which in turn gave its valuable comments and suggestions. These were incorporated while revising the Draft Manual.

In the **second stage**, intensive Focused Group Discussions (FGD) took place in the selected villages with (i) village youths (18-45 years), (ii) women, (iii) elite group consisting of teachers, doctors, affluent persons and (iv) poor/destitute (Flood Victims). Based on the feedback obtained through these discussions, the Draft Manual was revised and a copy of the same was sent to WMO in the first week of December, 2003. The Revised Draft Manual was translated into Hindi for the use by public in Samastipur district of Bihar and in Bengali for similar use in Murshidabad district in West Bengal and Cachar district in Assam.

In the **third stage**, the Institute organized a workshop in each selected study district so as to generate awareness about the need for and potential of community approach to flood management, to receive suggestions for improvement in the Manual and identify training programmes for the villagers. The workshops were attended among others, by the district/block level government officials relevant to Relief & Rehabilitation, Health Care, Animal Husbandry, Agriculture, Flood Control, Public Health Engineering etc. In addition, local experts and representatives of Panchayati Raj Institutions (PRI) from village, block and district levels also participated. In these workshops, the Revised Draft Manual as translated in local languages was discussed thoroughly. The views expressed by experts were taken into consideration while making further improvements in the Manual. The workshop in Bihar was held on 22nd January, 2004 that in West Bengal on 4th February, 2004 and in Assam on 18th February 2004. A total of 138 persons participated in these workshops.

The work in the **fourth and the last stage** involved training of local volunteers (men and women) from the selected villages and nearby areas who were likely to play a major role in handling issues related to rescue and relief, health care and hygiene, veterinary care, appropriate farming practices, regeneration of economic activities etc. A total 313 persons participated. The training activities took place between the fourth week of February to the middle of March, 2004. A few changes in the Manual were also made at this stage. Appendix 1.1 at the end of the book provides a profile of participants in the above mentioned workshops and training programmes.

The tables below provide a summary of various activities undertaken in the selected areas. A few photographs are also provided at the end of this chapter.

Schedule of Activities

State	Participatory Rural Appraisal (PRA)	Focus Group Discussion (FGD)	Workshop	Training
Assam	11 to 14.09.2003	18 to 20.10.2003	18.02.2004	12.03.2004
Bihar	12 to 15.09.2003	11 to 13.10.2003	22.01.2004	16.03.2004
West Bengal	18 to 21.09.2003	16 to 18.10.2003	04.02.2004	27.02.2004

Number of Participants in Training Workshops

State	Workshop	Training	Total
Assam	48	114	162
Bihar	53	80	133
West Bengal	37	119	156
Total	**138**	**313**	**451**

In the third phase of the study, covering the period from middle of June to middle of October, 2004, the Institute appointed an Extension Officer to carry out the testing of the Manual in one of the flood affected areas in Bihar. A Flood Management Committee was formed by people. Several meetings of this Committee took place. The Committee members along with village volunteers took an active part in flood management activities at the local level during the period when their villages were flooded.

1.4 Selection of the Study Area

In view of financial constraint as well as time, the Dhaka kick-off meeting decided to confine the pilot studies to **two areas in each country** and **two villages in each area** for both the phases of the study. However, in view of wide variation in the socio-economic and agro-climatic conditions prevailing in India, it was subsequently decided to take up one more area in India to build a more representative information base. The selection of areas in India was guided by the consideration that community participation is a social phenomenon which is influenced mainly by institutional rather than technological or hydrological factors. Hence, it was decided to go along the administrative ladder of states, districts, blocks, panchayats and villages for selection of the sample units through **a multi-stage sampling procedure**. **From the Ganga basin, the more frequently flooded state of Bihar and West Bengal were selected while Assam was selected from the Brahmaputra- Barak basin**. **West Bengal** also has one of the longest experience of functioning of a community based organization under Panchayati Raj system in India. In each state, a list of frequently flooded districts having floods in recent years was prepared and from the list one district was selected at random. Following this criterion, the district of **Samastipur in Bihar, South 24-Paraganas in West Bengal and Cachar in Assam** were selected. Pursuing a similar approach, one block, two panchayats

and two villages (one from each panchayat) from each district were selected for the pilot study. The purpose of selecting two villages from two panchayats instead of one, was to give a wider coverage to the sample. The selected villages were Sajanpur and Purnahi in panchayats of the same name under Warisnagar block of Samastipur district in Bihar, Dakhinmohanpur Part VII in Swadin Bazar panchayat and Gargaripar in Rangirghat panchayat under Sonai block of Cachar district in Assam and Ranbulia and Basanti under Gosaba and Basanti blocks respectively in South 24 Parganas of West Bengal.

The second phase of the study was to be conducted in the same areas, but logistic considerations dictated a change in the case of West Bengal because the selected area, namely, the Sunderban practically remain inaccessible owing to heavy downpours and cyclonic storms during the period from June to October, 2003 when intensive field work was to be conducted. Hence, another district namely Murshidabad was randomly selected from a list of frequently flooded districts. Thereafter, following the methodology described earlier, villages Shivnagar and Nazirpur in Akhirganj and Khairbana panchayats respectively in Bhagwangola-II block of Murshidabad district were selected.

The study area for Phase II of the Pilot Study was as given below.

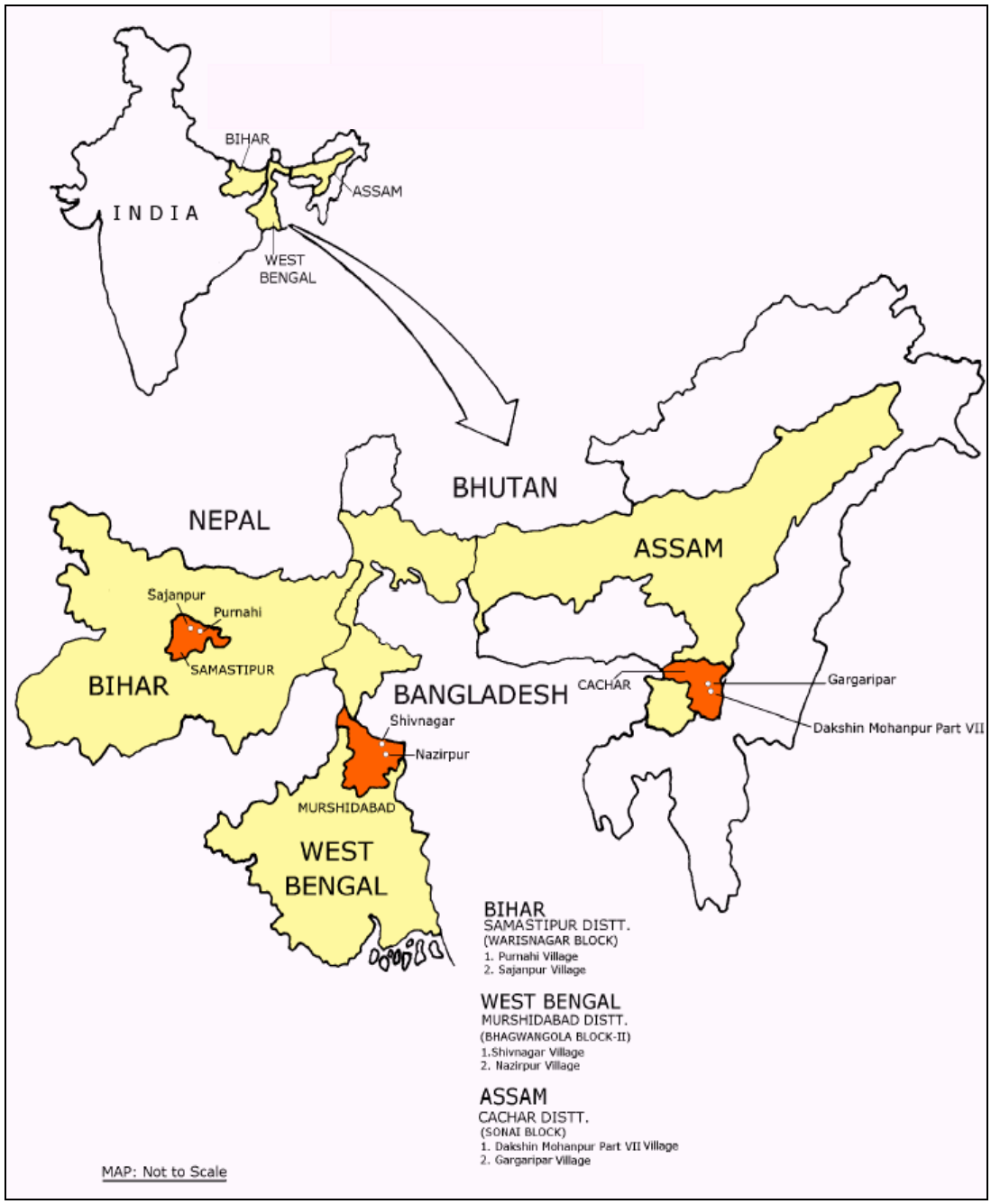
State	District	Block	Gram Panchayat	Village
Assam	Cachar	Sonai	i) Swadin Bazar ii) Rangirghat	i) Dakhinmohanpur Part-VII ii) Gargaripar
Bihar	Samastipur	Warisnagar	i) Sajanpur ii) Purnahi	i) Sajanpur ii) Purnahi
West Bengal	Murshidabad	Bhagwangola-II	i) Akhirganj ii) Khairbana	i) Shivnagar ii) Nazirpur

A sketch of the study area has also been shown in Map-I on the following page. Background information about the study areas is provided in Appendix 1.2 at the end of the book.

In the third phase, one Panchayat (Tira Jatmalpur) in Kalyanpur block of Samastipur district in Bihar was selected for testing the Manual during the flood season of 2004.

MAP-1

The Study Areas



1.5 Socio-economic Profile of the Study Areas

Any good strategy of flood management should take into account the socio-economic features of the concerned areas. These features for the selected states, districts and villages, therefore, are examined below.

Table 1.1 gives information on demographic profile of the three selected states and districts. As can be seen from this Table, flood prone districts have **high density of population**; in fact higher than the respective state averages. The density was 1,310 in Samastipur against an average of 880 in Bihar state as a whole, 1,101 in Murshidabad against 923 in West Bengal and 380 in Cachar against 340 in Assam. These districts, therefore, have higher pressure of population on land.

Table 1.1 : Demographic Profile of Selected States and Districts

Demographic Profile	Assam		Bihar		West Bengal	
	State	District (Cachar)	State	District (Samastipur)	State	District (Murshidabad)
Population (million)	20.6	1.44	82.8	3.41	80.20	5.86
Density (no. of persons per sq. km.	340	381	880	1301	923	1101
Annual Growth of Population (%)	1.90	1.90	2.84	2.56	1.80	2.40
Rural Population (%)	87.13	86.00	90.00	96.40	72.00	87.51
Male Population (%)	51.76	51.42	52.00	51.89	51.71	51.23
Overall Literacy (%)	64.28	68.42	47.53	45.76	69.22	55.05
Male Literacy (%)	71.93	76.51	60.32	57.83	77.86	61.40
Female Literacy (%)	56.03	59.85	33.57	32.69	60.99	48.33

Source : Census of India, 2001

The decadal growth of population between 1991 and 2001 in Bihar as also in the selected district (Samastipur) is quite high compared to the national average. It is 28.43 per cent in Bihar and 25.63 per cent in Samastipur as against 21.3 per cent in the country. The decadal growth rate is found to be of the order of 19 per cent in Assam and 18 per cent in West Bengal. This is below the all India average. The growth rate in Cachar district of Assam is similar to that of the average for the state i.e. 19 per cent. But the growth rate of population in Murshidabad district of West Bengal is much higher i.e. 24 per cent compared to 18 per cent in the state.

Another salient feature of the three selected flood prone districts is that all are **predominantly rural**. More than 86 per cent of their population is rural. Moreover, the share of rural to total population in most of these districts is also higher than the average for the state. Among the selected districts, Samastipur ranks the highest in this respect having 96.4 per cent of its population as rural.

There is no remarkable difference in the sex composition of population either in the districts or in the states. It is reported to be somewhat similar between districts and states, i.e. 51 to 52 per cent. These districts, however, have a lower literacy rate compared to the average for the respective states except in Cachar, where the level of literacy is higher than the average for the state. The female literacy in all the selected states and districts is lower than the respective male literacy. This difference is markedly more in Bihar than in Assam and West Bengal. The sample villages of West Bengal have higher literacy level (75-80%) as compared to the sample villages of Assam (60 – 75%) and Bihar (43-58%).

Primary and middle schools are available in or around every village while high schools are located either in the village or at a distance of upto 4 km. Facility for college education is available at a distance of 7 to 9 km., while that for technical education at a distance of 15 to 25 km.

Villages selected for the study have different population sizes. Three villages, one each in Assam (Dakhinmohanpur Part VII), Bihar (Purnahi) and West Bengal (Shivnagar) were quite large in respect of population size varying from 4250 to 4500 (2001 census) while one in Bihar (Sajanpur) was medium sized with a population of 2258 and one each in Assam (Gargaripar) and West Bengal (Nazirpur) were quite small having a population of 642 and 500 respectively. The village population consisted of different religions and castes with their composition varying from village to village. Muslims were over 70 per cent in both the villages of West Bengal and Dakhinmohanpur Part VII of Assam. The caste-wise composition of population in sample villages of Bihar indicated large concentration other backward caste households, followed by forward castes and scheduled castes.

Agriculture was the primary occupation for over 85 per cent of population in the two sample villages in Bihar, for about 75 per cent in West Bengal and for 60 to 65 per cent in Assam. Apart from working on agricultural farms in the village, most marginal farmers and landless labourers in the sample villages pursue non-farming activities such as dealing with grocery items, vegetable vending and other items of daily use. In both the villages of Assam, quite a few are in government/private services. Average wage rate for a male worker varied between Rs. 40 (US $ 0.9) to Rs. 50 (US $ 1.13) while that for a female, from Rs. 30 (US $ 0.7) to Rs. 40 (US $ 0.9) per day.

Healthcare facility is woefully inadequate in most of the villages. A health sub-centre existed only in Dakhinmohanpur Part VII in Assam and at a distance of 1 to 4 km. in other villages, while the health centres were available at distances varying from 2 to 7 km. from the respective villages. The village Dakhinmohanpur Part VII in Assam has a veterinary sub-centre whereas households in the remaining villages have to travel distances ranging from 2 to 15 km. for availing this facility. For the remaining villages, the medical as well as veterinary care centres were located at a distance of about 4 km. on an average.

In both the villages of Assam, there are a number of Registered medical practitioners (RMP), Anganwadi workers as also a few medicine shops. But none of the sample villages in Bihar had any RMP or medicine shops. Each village, however, had a nurse and one village had Anganwadi worker also. There was one ICDS centre as also a homeopathy doctor in Nazirpur village of West Bengal. There was no Anganwadi worker or medicine shop in any of the two villages in this state.

As regards availability of safe and potable drinking water, the position was unsatisfactory in almost all the selected villages. Households in four sample villages of Assam and Bihar generally get drinking water from the tank/pond and open well supplemented by hand pumps (for better off households only). Water from these sources particularly during floods is not considered safe. Part of the drinking water supply in Assam was met from Govt. tubewells. But households in Nazirpur and Shivnagar villages of West Bengal were better placed as they got drinking water primarily from tubewells and hand pumps. But handpumps or even some of the tubewells are shallow pumps. Hence during flood, their water also gets contaminated. Further, underground water in villages of West Bengal and Assam was found to be arsenic contaminated.

Communication facilities in the villages under study are not adequate. Some of the villages have no metalled roads. While those with metalled roads are of very poor quality having pot holes and cuts in several places. Some of these also serve as embankments and temporary shelters during floods. Public transport is available in only one village i.e. Dakhinmohanpur Part VII in Assam. No village has railway station of its own but the distance to the nearest railway station from these villages vary from 3 to 31 km.

Both the villages in Bihar and one village each in Assam (Dakhinmohanpur Part VII) and West Bengal (Shivnagar) have post offices in the village. No village except Dakhinmohanpur Part VII in Assam has a telegraph office.

There is a non-functional primary agricultural credit society in Nazirpur (West Bengal). There is no other financial institution like co-operative or commercial bank in any of the villages covered under pilot study. Villagers take credit from non-institutional sources like village money lenders, big farmers, big businessmen etc. at very high interest rates and on the basis of collateral securities like land, house, ornaments etc,

All the sample villages are electrified. The electricity connections are mainly available for domestic use. Use of electricity for agricultural and industrial purposes is limited.

Shivnagar village in West Bengal has a flood centre in the village itself with a capacity to house about 50 families at a time. However, for the other village, i.e., Nazirpur, the designated flood centre is at a distance of 1.5 km. Such a facility is not available in any of the other villages. The flood victims in these villages take shelters on embankment, roads & highlands etc.

Community based institutions are very few in the selected areas. The study team came across three self help groups (SHGs) in Dakhinmohanpur Part VII (Assam). Both villages in Bihar had a community centre each while youth clubs were there in both the villages of Assam. There was a Mahila Mandal (Centre for Women Association) in Gargaripur village of Assam and a Shishu Skiksha Kendra (learning centre for children) in Nazirpur village of West Bengal.

During the course of several rounds of interactions with the villagers in each of the selected areas, the households were asked to priorities their needs in order of importance during the period of flood in their villages. Taking all the six villages together, **the people's needs in order of priority** were (i) Shelter, (ii) Drinking Water, (iii) Food, (iv) Health Care & Sanitation, (v) Fuel, (vi) Privacy of Women, (vii) Education and (viii) Care of Livestock.

1.6 The Output

Guidelines or manuals on flood management developed so far in India are designed mainly for use by functionaries of government departments. In all such cases, tasks to be performed by different government functionaries are indicated in detail while there is little mention of community involvement.

Hence, the Manual on Community Approach to Flood Management, the first of its kind, prepared by the Institute as a part of this pilot study is its most important output. It was evolved through a very elaborate and rigorous process in consultation with villagers, local and district level officers, and noted agricultural, livelihood and institutional development experts. Subsequently, during Phase III of the study, the Manual was also tested during actual flood conditions in one area of Bihar. A few additional suggestions which came during this phase, were also incorporated in the Manual. If implemented, the Manual is expected to bring about a substantial reduction in people's sufferings due to floods.

Several rounds of field visits undertaken by the Study Team as also training workshops resulted in **enhanced public awareness** with regard to the potential as well as operational aspects of community approach to flood management. These workshops also raised **villagers capacity** to deal with the problem more effectively. The villagers knowledge on rescue and relief, health and sanitation, agriculture and veterinary care etc. increased substantially. They became better equipped to manage floods in future. The training programme, if applied to other areas, can have a **snowballing effect** as well.

1.7 Plan of the Book

Chapter II, which follows, deals with a macro (all India) analysis of floods. It provides a brief analysis of nature, causes and spatial dimensions of flood, resultant losses, policies of the government for coping with the situation etc.

Chapter III gives an analysis of the prevailing scenario regarding public participation in flood management.

Chapter IV entitled 'Community Oriented Flood Management Strategy" gives an outline of the desired strategies for flood management, suggested by the author and Team Leader of the study. It indicates the components of structural and non-structural measures and examines their limitations. Thereafter, it provides a detailed framework with respect to community approach to flood management. It also serves the purpose of introduction to the next chapter containing the Manual.

Chapter V consists of the Manual on community approach to flood management. It provides a set of guidelines for action by the legislature, the administrator, the community and the NGOs. It has three annexures.

The report ends with Appendices and a bibliography.

A view of the rehabilitated huts in village Purnahi on 22nd September, 2003. (Bihar)

Dr. N.M.P. Verma, Member of the Project Team having discussion with a group of villagers including the lady Chairperson (sitting on the chair) of village Panchayat, Purnahi on 22nd September, 2003. (Bihar)

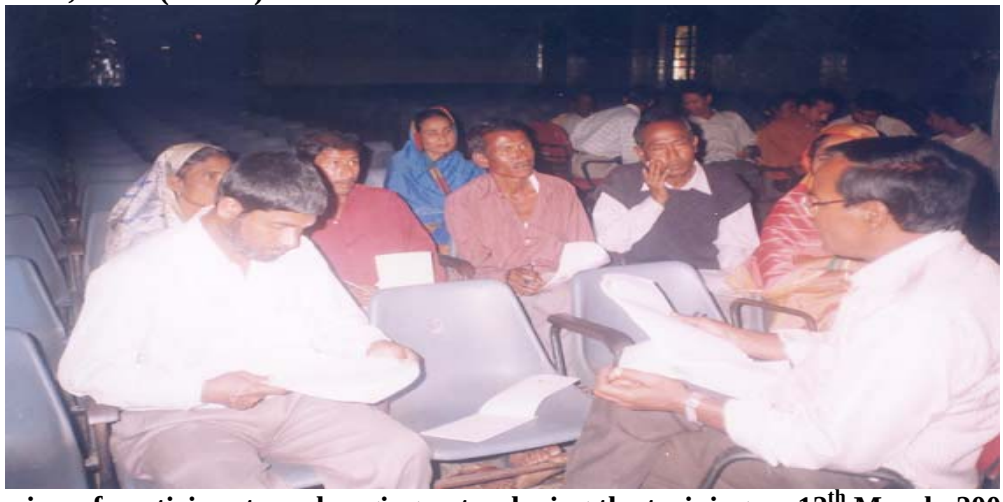
Dr. Kamta Prasad, Team Leader of the project explaining Draft Manual during the workshop on 22nd January, 2004. (Bihar)

A female participant raising a question during the training on Health Care & Sanitation on 27th February, 2004. (West Bengal)

An instructor explaining a point to the participants during the training on Agriculture & Allied Activities on 27th February, 2004. (West Bengal)

A view of the training on Agriculture & Allied Activities on 27th February, 2004. (West Bengal)

A view of participants undergoing training on Awareness Generation on 12th March, 2004. (Assam)



A view of participants exchanging notes during the training on 12th March, 2004. (Assam)

Chapter - II

FLOODS AND THEIR MANAGEMENT IN INDIA

This chapter provides brief background informations on nature, causes and incidence of floods and flood damages in India. It also analyses flood management measures adopted so far in the country. The contents of this chapter are based entirely on secondary sources of information.

2.1 Flood Scenario in India

2.1.1 Nature and Causes of Flood

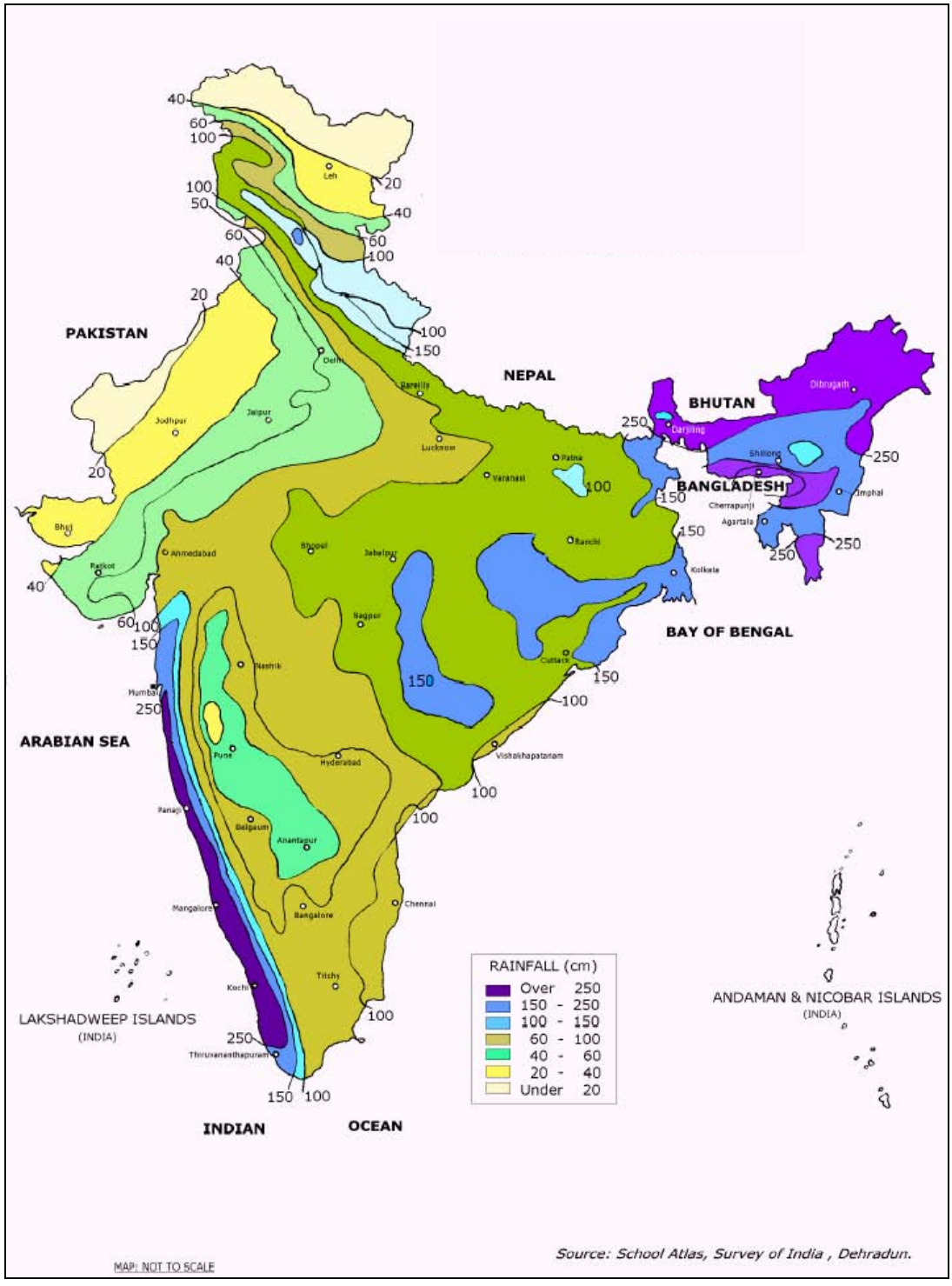
Most of the floods in India are caused by **rivers overflowing their banks.** Flash flood occure in areas near foot hills. Floods are also caused by **delay in the drainage** of the rain water due to high stages of the river at the outfall and stagnation of water behind embankments. In coastal areas, floods are caused by **cyclones and typhoons**. Other causes include backing up of waters in tributaries at their outfalls into the main river often with synchronization of floods in them; ice jams or landslides blocking stream courses resulting in the backwater overflowing river banks. The root cause of flood is excessive rainfall which occur mainly in the monsoon months of July to September. The spatial distribution of rainfall is highly uneven as can be seen from MAP-2. The river basins are shown in MAP-3.

Most of the major rivers causing flood in India flow down the slopes of the Himalayan mountains which have friable soil mantle. Hence, the flood water flowing through them carry considerable amounts of **sediment** which result in silt accumulation in reservoirs and in the flood plains. The central India and peninsular rivers, on the other hand rise and flow through geologically more stable areas and receive much less rainfall also. These rivers, therefore, carry less sediment and cause less flood problems.

Floods also occur in areas which have been provided protection against flood. Such floods are caused mainly by breaches in or overtopping of embankments or excessive release of water from the reservoirs. In the absence of sluice gates, accumulation of rain water behind the embankments further adds to the problem. Floods in the protected areas cause more havoc than those in the unprotected areas because of the additional land use activities undertaken in such areas.

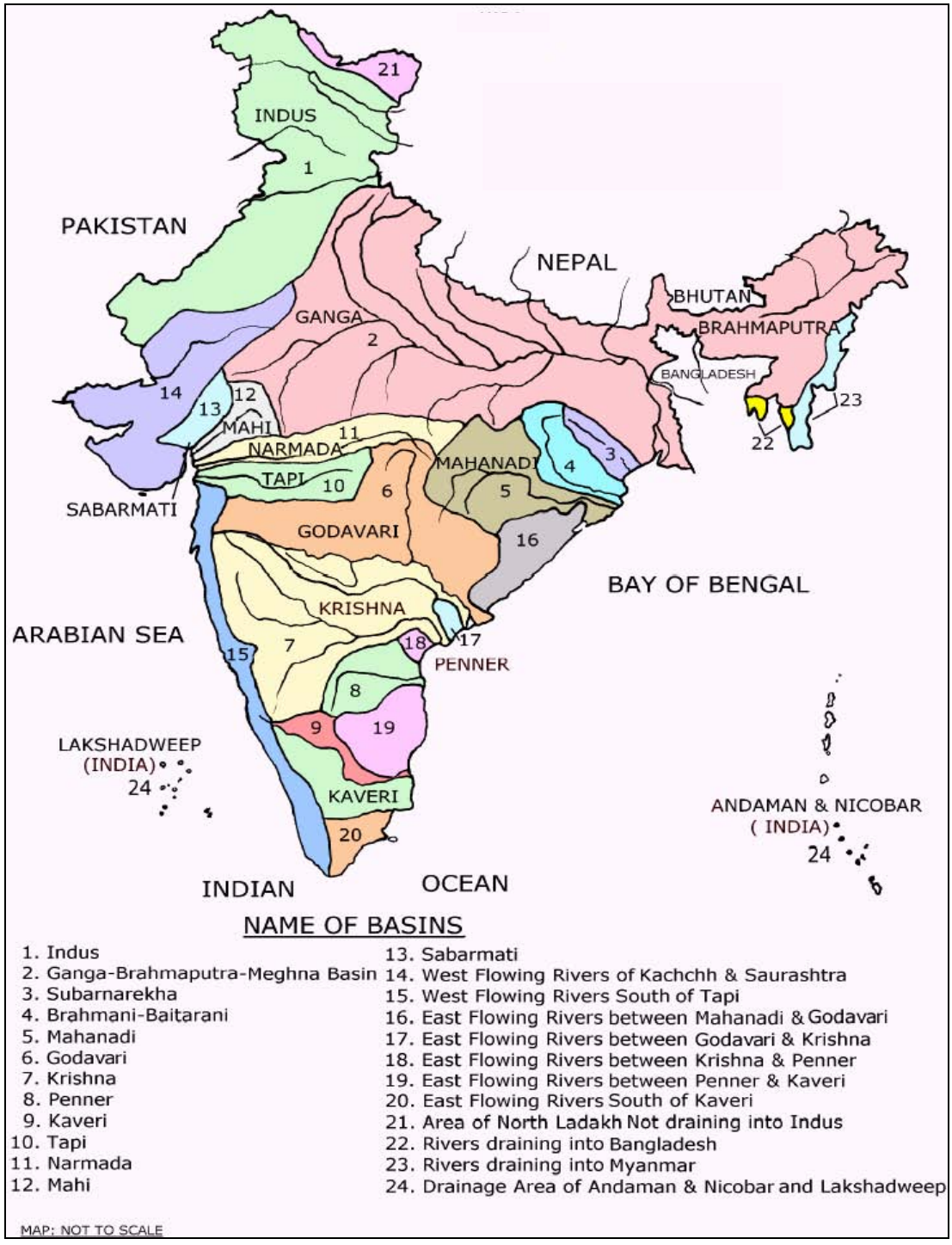
MAP-2

Annual Average Rainfall in India



MAP-3

River Basins in India



NAME OF BASINS

1. Indus
2. Ganga-Brahmaputra-Meghna Basin
3. Subarnarekha
4. Brahmani-Baitarani
5. Mahanadi
6. Godavari
7. Krishna
8. Penner
9. Kaveri
10. Tapi
11. Narmada
12. Mahi
13. Sabarmati
14. West Flowing Rivers of Kachchh & Saurashtra
15. West Flowing Rivers South of Tapi
16. East Flowing Rivers between Mahanadi & Godavari
17. East Flowing Rivers between Godavari & Krishna
18. East Flowing Rivers between Krishna & Penner
19. East Flowing Rivers between Penner & Kaveri
20. East Flowing Rivers South of Kaveri
21. Area of North Ladakh Not draining into Indus
22. Rivers draining into Bangladesh
23. Rivers draining into Myanmar
24. Drainage Area of Andaman & Nicobar and Lakshadweep

MAP: NOT TO SCALE

2.1.2 Flood Prone Areas

With reference to flood, India can be divided into four regions. (MAP-4)

1) **Brahmaputra and Barak river** basins comprising states of Assam, Arunanchal Pradesh, Meghalaya, Mizoram and northern parts of West Bengal, Manipur, Sikkim, Tripura and Nagaland.
2) **Ganga river basin** along with its numerous **tributaries** like Yamuna, Sone, Ghaghra, Gandak, Kosi, Mahananda, comprising states of Uttaranchal, Uttar Pradesh, Bihar, West Bengal, South & Central parts of Haryana, H.P., Rajasthan, M.P. and Delhi.
3) **North West** river basins consisting of rivers like Sutlej, Ravi, Beas, Jhelum and Ghaggar covering states of Jammu and Kashmir, Punjab and parts of Haryana and Rajasthan.
4) **Central India and Deccan** river basins comprising of rivers as Narmada, Tapi, Mahanadi, Godavari, Krishna and Cauvery covering Central and Southern India. Of these, the state of Orissa is the most flood prone.

Flood in the first region, is severe and quite frequent with very high silt charges in the rivers. Some of the rivers like Teesta, Torse and Jaldakha have a tendency to change their courses while in flood. Flooding in the second region is more or less an annual feature which is aggravated by drainage congestion. The major problem in the third region is that of inadequate surface drainage which causes inundation and water logging over vast areas. The fourth region does not have very serious problem of flooding except for some of the rivers in Orissa. The delta areas of some of these rivers on the east coast periodically face flood and drainage problems in the wake of cyclonic storms. Assam, Bihar, West Bengal, U.P. and Orissa are the worst flood affected states (see Chart-2.1). The percentage of flood prone area to total area of the state is highest in Bihar followed by Assam and West Bengal as can be seen in table 2.1 given below.

MAP-4

Flood Prone Areas in India

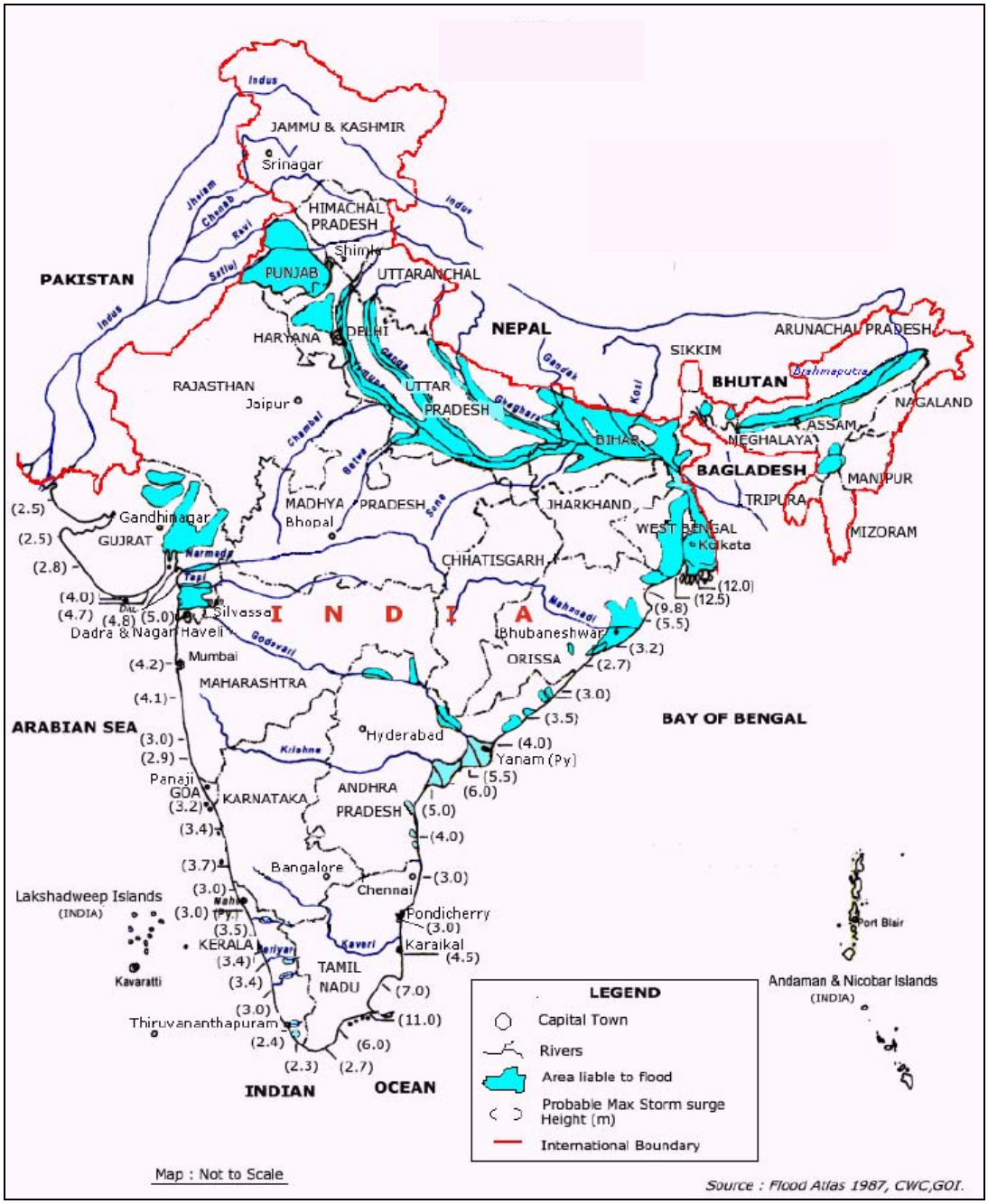
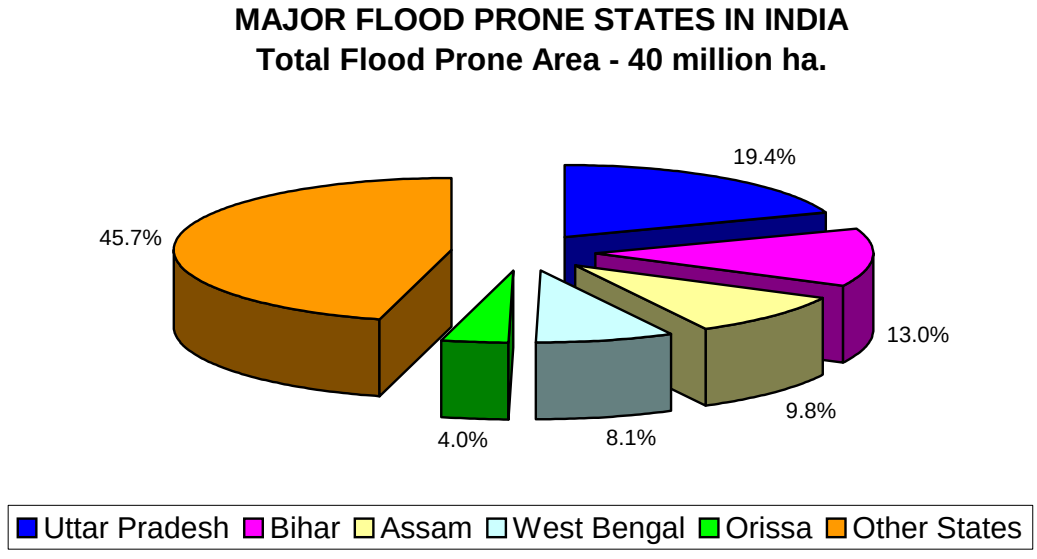


Table 2.1 : Major Flood Prone States in India.

Major States	Flood prone area as % of total area of the state	Flood prone area of the state as % of total flood prone area of the country
Uttar Pradesh	32.61	19.4
Bihar	55.22	13.0
Assam	50.14	9.8
West Bengal	37.42	8.1
Orissa	10.34	4.0
Other states	6.92	45.7
Total	**12.17**	**100.0**

Source : Based on data from Report of National Commission on Flood 1980 and Census of India 2001.

Chart 2.1



2.1.3 International and Interstate Dimensions of the Flood Problem

Most of the major floods are caused by rivers which are international or inter-state. For example, flood damage in Bihar is caused mainly from rivers flowing from Nepal such as Kosi, Gandak, Bagmati, Kamala Balan etc. Similarly most of flood damages in Assam is due to rivers coming from China, Bhutan and other states. Yamuna and Ganga which cause damage in UP, Bihar and West Bengal are inter-state rivers. This peculiarity hinders the ability of any state government to take up most appropriate measures for moderating floods and adds to the complexity of the flood problem in India.

2.1.4 Flood Losses

Year-wise data on flood losses in India for 1953-2002, are given in Appendix 2.1. The average figures are given at the end of the table. It can be seen from the table that there are marked **annual variations in the extent and intensity of flooding**. Area affected has varied from 1.46 million hectare (1965) to 17.5 million hectare. (1978) with a mean figure of 7.378 million hectare Heavy flood damages affecting land area over 10 million hectares have occurred during 1971, 1973, 1976, 1977, 1978, 1980, 1984, 1988 and 1993. (Appendix 2.1). The population affected per year on an average, has been 32.985 million. The trends of some of the losses are depicted in Figures 2.1, 2.2 and 2.3. Figure 2.1 shows that, notwithstanding considerable yearly fluctuations with respect to total and crop area affected, there is no long term trend. In other words, the areas affected by floods have on an average remained more or less the same despite a number of flood protection measures taken by the government. One can also see that the three dimensions of damages as depicted in figures are positively correlated. Appendix 2.1 shows that loss to cattle is much more than the loss to human beings. Average figures for number of human lives lost per year have been 1,560 while that for cattle, the loss has been 92,791.

Fig. 2.1 : Damages to Population, Area and Crops Area Affected due to Floods/Heavy Rains during 1953 to 2002 (India)

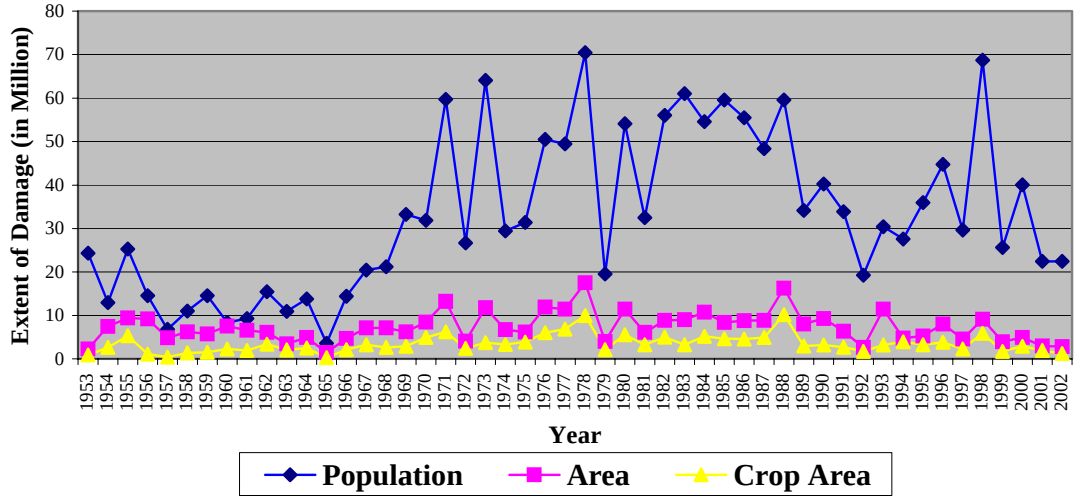


Fig. 2.2 : Cattle Lost due to Floods/Heavy Rains during 1953 to 2002 (india)

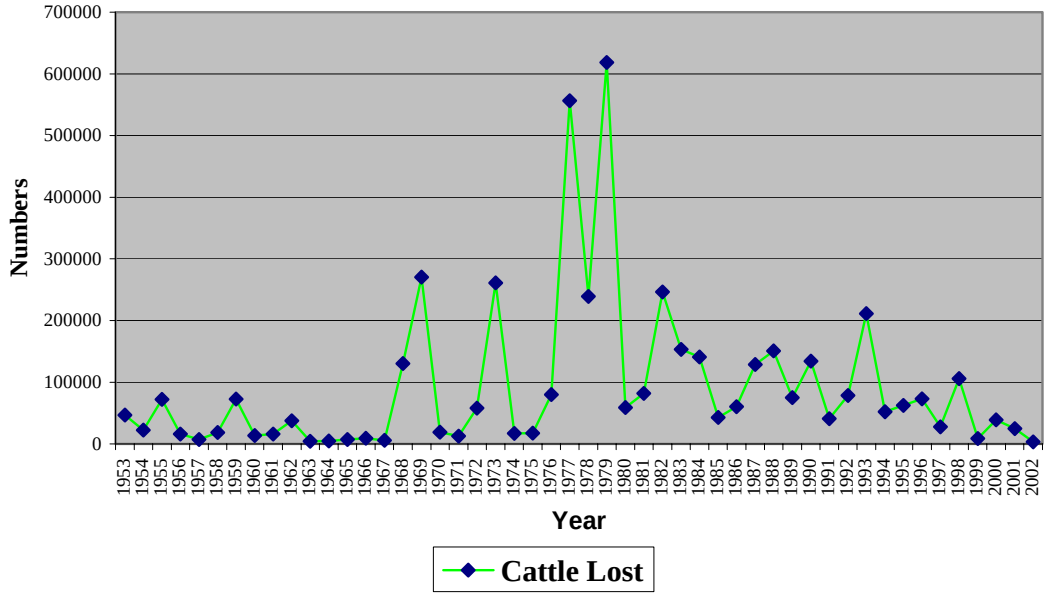
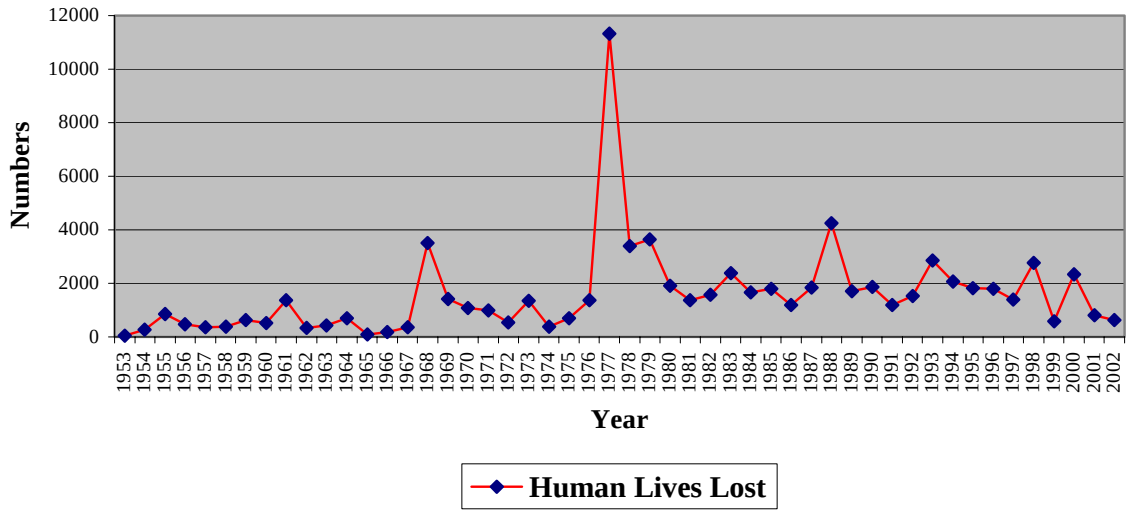


Fig. 2.3 : Human Lives Lost due to Floods/Heavy Rains during 1953 to 2002 (India)



Besides inundation, many rivers also cause bank erosion resulting in loss of land resources and the consequent perpetual loss of production from the land. The Brahmaputra river is notorious for this. The Brahmaputra Board has estimated that in the Majuli Island, the annual loss of land due to erosion could be about 3.9 sq. km.

Apart from year-wise flood damages to crops, houses, cattle, human beings etc., there is a long term effect on **socio-economic backwardness of flood prone areas**. Farmers in these areas have little incentive to make long term investment in farming since fertilizers used in the fields get washed away whenever a flood occurs. Investments on roads and railways also suffer due to floods. Hence, entrepreneurs are less willing to have long term investment in flood prone areas. Consequently, such areas continue to remain poor and backward.

2.1.5 Beneficial use of flood Water

A mild flood brings with it a good amount of fine silt which includes agro/human/animal wastes etc. having rich nutritional values. Hence, their deposition on crop land increases fertility. The increase in soil moisture due to flood has a similar effect. Ground water also gets recharged. Tanks and ponds which dry during the preceding dry months get filled up and become useful for fishery as well as for providing irrigation. Hence, farmers regard mild floods, as a boon rather than a curse even though they suffer some losses. The loss of standing crops is made good through higher yields of crops in the post flood cropping season. The above experience, however, does not hold good in cases where flood water results in deposit of sand in place of fine silt as happens sometimes in Orissa. In case of major floods, the harmful effects tend to outweigh the beneficial effects. People find it difficult to cope with them.

2.2 Flood Management Policies

Measures taken for flood management are often classified as **structural or non-structural**; the former aim at modifying the flood while the latter aim at modifying the susceptibility to flood damage as well as modifying the loss burden. Both types of measures have been adopted in India.

2.2.1 Structural Measures

2.2.1.1 Embankment : Embankment has been the most widespread method adopted so far even though its inadequacies had been pointed out from the very beginning. Its main advantage lies in providing **quick and visible** results to localized areas particularly against moderate floods which come quite frequently. As per available records, 16,800 km. of new embankments have been constructed between 1954 and 1998. Barring occasional breaches, these embankments have given reasonable protection to an area of about 15 million hectare, apart from about 3 million hectare protected prior to 1954. Spurs and revetments which are needed for anti-erosion works are used mainly for protecting urban areas and often form part of town protection schemes.

2.2.1.2 Reservoir : India has got about 4300 large dams with reservoir capacity of more than one million cubic meters. Most of them, however, have been constructed for irrigation and hydel power. Flood cushions have been specifically provided only in the chain of reservoirs on the Damodar river in Jharkand State and Ukai multipurpose project in Gujarat. Other reservoirs having flood cushion are Rengali Dam and Bhimkund project in Orissa and Baigul reservoir in U.P. Hence, the flood storage capacity as a percentage of live storage capacity has been negligible in India, even though its desirability has been emphasized in several policy pronouncements/ official reports.

2.2.1.3 Other Structural Measures : Other structural measures are not extensive. Catchment area treatment is taken up in the upper reaches of reservoirs to moderate the sediment flow in them. During the last ten years, increasing attention is being paid to watershed development programmes. The best example of natural detention basin is in the state of Jammu & Kashmir. Channel improvement has not been resorted to widely because of high cost involved. Drainage improvement measures have been taken on a localized basis in several areas.

2.2.2 Non-structural Measures

The 1954 National Policy on Flood, which initiated an era of systematic approach to flood management in India, had given vent to a feeling that the problem of flood could be solved. This optimism, however, soon gave way to a more realistic assessment that complete immunity from flood was not possible with the technologies developed

so far. Hence the damages caused by flood can at best be minimized and not altogether eliminated. Such a view was articulated as early as 1957 by the High Level Committee on floods which recommended for giving due emphasis to measures like flood plain zoning, flood forecasting and warning particularly as these do not require large capital investment. Similar views have been reiterated again and again at some point or the other. Their progress is described below.

2.2.2.1 Flood Forecasting & Warning : A national flood forecasting and warning system has been established by the Central Water Commission (CWC). Government of India. This system issues flood forecasts at 157 stations of which 109 cover Ganga-Brahmaputra - Meghna river basins. On an average, about 6000 flood forecasts are issued every year with a maximum of 7943 forecasts issued during the year 1998. The system under CWC is largely on major inter-state rivers. States often supplement this by their own efforts at other stations.

According to the present CWC norms, a forecast is considered to be reasonably accurate if the difference between forecasts and corresponding observation levels of the river lies within 15 cm. In case of inflow forecasts, variation within 20 per cent is considered acceptable. The accuracy of forecasts has been quite high, generally above 95 per cent as can be seen from figures for 1991-2000 given below.

Table 2.2 : Accuracy of Flood Forecasts

Year	No of Forecasts Issued	Accuracy of forecast	
		No of Forecasts within ± 15 cm, ± 20%	% of accurate forecast
1991	6603	6225	94.3
1992	4764	4567	95.9
1993	6643	6438	96.9
1994	7476	7087	94.8
1995	6417	6189	96.4
1996	6467	6226	96.9
1997	5465	5263	96.3
1998	7943	7775	97.9
1999	7055	6826	96.8
2000	6510	6315	97.1

2.2.2.2 Flood Proofing : Flood proofing comprises of raised platforms for flood shelter for human beings and cattle and/or raising the public utility installations above flood levels. There are some scattered examples of this measure like raising of a few flood prone villages in eastern U.P. during 1956-60.

Land fills in a few villages in West Bengal and Assam to keep houses above flood levels as also raised platforms for cyclone cum flood

disasters in Orissa have recently been constructed. The progress made so far, however, is insignificant compared to the need and the potential.

2.2.2.3 Flood Plain Zoning : Flood plain zoning is a device for regulating land use in the flood plains for minimizing the damages due to floods. The Central Water Commission has been urging the states to introduce it. It circulated a model bill to the states for this purpose in 1975 i.e. about 30 years ago. But the response of the states has been lukewarm. As a result, no state except Manipur has passed any legislation so far. Not much progress has been made even with regard to the preparation of survey maps on a suitably large scale (1 : 15000 with contour interval 0.3 to 0.5 metre) which would be needed for implementing flood plain zoning. Maps prepared so far cover only about 55,000 sq. km. of flood prone area. Further observations on the usefulness of flood plain zoning are made in Chapter IV.

2.2.2.4 Disaster Preparedness and Response Planning : A system for disaster preparedness and response planning including flood fighting has been in operation in India for a long time. Government has the primary responsibility for this. NGOs also play a part, though limited. Unlike measures discussed earlier, which are coordinated by Water Resources Department of Government, this effort is coordinated by District Collector under the supervision of Revenue Department of the State Government.

2.2.2.5 Flood Rescue and Relief : There are well-laid out procedures at the local, state and national levels for rendering relief. These involve evacuation, rescue, providing food, drinking water, health care, temporary shelter, clothing, financial assistance for repair/rebuilding of damaged houses, relief works etc. The local administration under District Collector supervises the arrangements. But the relief provided per capita is usually very low and the relief administration at local levels is often reported to be inefficient.

2.2.2.6 Flood Insurance : There is no flood insurance as such in India. However, separate insurance schemes are available for covering losses of dwellings units, household articles, crops, agricultural implements, livestocks, fisheries, rural industries etc. Insurance policies covering loss of life, disabilities, loss of limbs or eyes etc. are also available in rural (grameen) and urban areas of the country.

A crop insurance scheme was first introduced in 1972-73 in selected areas but its eligibility was restricted to only those farmers who had taken loans from banks. The scheme was revised in the year 1985 and further revised and renamed as National Agricultural Insurance Scheme in 1999. The new scheme covers all farmers whether they have taken a bank loan or not. Its coverage extends to losses on account of crop failure which may be due to flood or otherwise. As learnt, the experience in respect of crop insurance has not been encouraging. Very few farmers have taken the insurance policies.

Claims generally found to exceed premia in every year. During Rabi 1999-2000 to Rabi 2002-2003, claims amounted to Rs. 35780 million (US $ 813.2) against the premia of Rs. 6974 million (US $ 158.5). One reason for this could be inflated and/or bogus claims which can not be ruled out. A scheme for insurance of cattle against their suffering due to several causes including flood is also in place. Under this scheme, policies cover death of cattle due to accident which includes flood, cyclone and other calamities, diseases, civil disturbances etc. The coverage of both the schemes has been limited so far even more so in the major flood prone states. Insurance against flood risks is thus quite negligible in India. The reasons for this as well as strategy for the future are explained in Chapter IV.

2.2.3 Conclusion

As can be seen from the above, most of the measures advocated for flood management, have been adopted in India. The structural measures have been more important than the non-structural ones. But, the structural measures implemented have generally been local like embankments and drainage channels whereas the flood problem is essentially international and inter-state. Moreover, measures adopted have generally been found to be single, considered in isolation and not in combination with other similar measures as visualized under a comprehensive or an integrated approach. Public participation has been missing not only in structural measures but also in non-structural ones which are planned and executed mainly by government agencies.

Chapter – III

PRESENT LEVEL OF PARTICIPATION

This chapter provides information on the present level of community participation in flood management with particular reference to (i) flood forecasting and warning, (ii) coping practices followed, (iii) assistance provided by different agencies (including government agencies), (iv) assessment of risks in terms of loss of human/cattle lives, damage to house properties, public utilities and (v) potential available. The information for this chapter was obtained through a series interactions with local people in the study areas comprising of PRAs and FGDs with the villagers and key government officials at local levels, and through training workshops.

3.1 Assam

3.1.1 Forecasting and Warning

There is **no flood forecasting and warning system** either at the block or gram panchayat level. Villagers depend heavily upon sources like radio transmissions and local newspapers; but these flash the information usually after the villages are already flooded. Villagers also make their own assessment of the probability and extent of flooding based on the quantum of rainfall as well as their experience, instincts and **indigenous methods** such as unusual climbing up of birds/hens etc. on to higher altitude, coming out of ants, frogs and snakes etc. from their natural habitations, crawling of birds in an unusual manner etc. In the absence of forecasting from reliable sources, people tend to suffer heavy losses from flood compared to what they would have suffered had they been informed in advance.

3.1.2 Coping Practices

When floods are in the offing, people take precautionary measures with a view to reduce their losses and sufferings. They **store in advance** essential items such as foodgrains, fuels etc. for about 2 to 3 weeks (probable duration of flood). **Early harvesting of crops** is another measure. Farmers keep seeds in tin containers in flood free zones either in baskets hanging from the ceiling in their houses or keep them with friends/relatives in flood free areas. Cattle owners preserve dry fodder which can be used in place of green fodder during flood. Households having friends/relatives nearby, arrange to shift calves and ailing cattle to such places. However, this practice is not very common. Side by side, villagers erect raised platforms (Machan) made up of bamboo, wood sticks etc. inside their houses for the use of women, children and the aged. Some keep one bed or one piece of furniture over the other to raise height of the living place. For safe transport during flood, **floating platforms (Bhur)** made up of banana stemp,

bamboo sticks etc. are used by some households. These platforms also help them in catching fish. But all these attempts are based only on individual initiatives. During flood, people generally **forget personal animosities** and help each other to the extent they can.

3.1.3 Assistance Provided

By and large, Government is the main source of providing outside assistance during flood. However, such **assistance** is provided usually **after** communication links are re-established and normalcy is restored. Assistance by government is in the form of grain (rice), cash towards house damages, provision of boats for rescue and relief etc. However, in most cases, the grain supplies are **delayed** due to disruption in the communication links. In a recent flood, each household got 500 grams of rice, 200 grams of pulses per day for about a week till the duration of flood. As rated by villagers, the quality of eatables supplied by the government was not upto the mark. Further, the distribution of relief materials was also **not equitable** as it did not take into account the size of the family and the actual need of the sufferers. For rescue and relief operation, neither the block nor the gram panchayat was found to own any boat. During this flood, **boats** were taken on indent from district headquarter which were **less than the requirement** and were not available on time. The district fell short of the supply of boats because floods came simultaneously in a number of panchayats/villages thereby making the demand for boats very high. The compensation for partially damaged houses provided by the government was Rs. 200 (US $ 4.5) while that for fully damaged ones was Rs. 500 (US $ 11.4). This **amount was inadequate** and was received after one or two years. The government also provided 2 kgs. of seeds per acre to the farmers of Dakhinmohanpur Part VII as compensation for crop losses. This was considered quite insignificant compared to the loss incurred on seeds, chemical fertilizers and labour. Unlike relief management, some extent of community participation in rescue operation was found, although it was not satisfactory. In a few cases, neighbouring villagers come forward to provide shelter to flood victims. At times, assistance from some NGOs also becomes available.

3.1.4 Risk Assessment

A majority of villagers in both the selected villages of Assam live in high flood risk areas. The risk is more during major floods that occur periodically. However, mild floods of manageable nature do not provide that much of a threat. Since these occur more frequently, **people have learnt to survive through experience**. Apart from the **risk of drowning**, villagers were also concerned with the risks on account of **water borne diseases** like cholera, food poisoning, dehydration, diarrhea, high fever, snake/scorpion bites etc. **Students** pursuing studies face the risk of disruption of their classes and academic sessions. Risk management exercise, however, is entirely individualistic.

3.1.5 Potential

There is enough potential available in villages but this needs proper exploitation through a systematic approach. Although the villagers are aware of their strength, they lack proper leadership. They are willing to join the community flood management drill provided proper guidance is available through specific **training/orientation programmes** for flood management particularly in the areas of health/veterinary care, agriculture, rescue & relief etc. organized from time to time so as to make them equipped with specialized skill to tackle flood situations. A flood management committee may provide guidance to the villagers in handling different aspects of flood management. Most flood management activities are **labour intensive**. People are willing to assist if a **token payment to compensate** with their cost of living is provided under the flood management programme. This is apart from a few volunteering their services in community interest for **3 to 5 days, free of costs** in a flood season.

3.1.6 Expectations from Government

People expect that the government will protect them from the sufferings caused due to floods. They expect the government to construct **multipurpose dams** on the upper reaches of the river so that these can moderate floods. They would like **sluice gates** to be constructed at a few places in the existing embankments for controlled release of water so that the pressure of floods will reduce to a sustainable level. As most floods are due to breaches in the existing embankments, people expect that the government should **repair the breaches** in a manner that these may last long. There was a strong felt need for one **flood shelter on uplands** in every panchayat to accommodate about 500 families. Another need was for **acquisition of boats** (4 to 5) at the panchayat level for immediate rescue and relief operations. Provision of safe and potable drinking water during flood months was another expectation from the government. .

As suggested by the BDO (Sonai Block) of the area, provision of safe drinking water could be done through construction and maintenance of **mini water supply plants** costing around Rs. 1 lakh (US $ 2272.7) each which would provide about 1200 litres of water per hour. Another local demand related to construction of a 1.28 km. road cum guide bund along the river from Uttar Mohanpur E&D to Dungripar old PWD road (link road) costing Rs. 10 lakhs (US $ 22727.3). The existing disaster management committee at the block level could be bestowed with specific power and functions with legislative approval to make it more useful. Similar committees at the panchayat level may also be constituted. It was felt that **resources from Rural Development fund** could be utilized for rescue, relief and income generation activities in flood affected areas provided some modifications are made in the existing guidelines. As regards allocation of shelter under Indira Awaas Yojana (IAY) and Prime Minister's Gramin Yojana (PMGY), the amount of assistance may be

increased to Rs. 40,000 (US $ 909.1) per unit for construction of houses above flood level with projected RCC posts in flood affected areas.

3.2 Bihar

3.2.1 Forecasting and Warning

There is a flood forecasting and warning system at Jitwarpur in Samastipur town of Bihar. The district administration claims that it functions round the clock during flood months and uses print and electronic media for relaying flood related informations to different blocks five to six hours in advance. The blocks in turn flash out the messages to panchayats/villages using public address system. However, the villagers contradicted the claims of the district authorities taking a stand that the system was found faulty on many occasions. Again, five to six hours advance warnings were not considered enough by them specially **during night time** when people are sleeping. A warning signal of at least **one day in advance** was considered necessary for taking precautionary measures. Further, the forecasts do not take into account the likely breaches in the embankments which is another cause of flood. The Karhe river embankment, for example, was cut during 2002 flood in the midnight by the villagers of the other side of the river causing flood in the villages facing embankment. It was very late till the district administration came to know about it the next day. Similarly, in 1987, there was a major damage due to a breach in embankment near Begumpur village. However in mild floods, as villagers reported, neither the district forecasting and warning office nor the villagers feel any urgency.

3.2.2 Coping Practices

Once the villagers come to know about expected flooding, they become alert. They start assessing the intensity of flood and when necessary, make arrangements for **shifting to nearby uplands**. Cattle are also shifted to safer places. Most households find **roads and embankments as the safest places to take shelter** during flood while a few make use of roofs of neighbours or school buildings if available at a reasonable distance. Some send their families to the **nearest flood free villages/towns**. The above practice is followed only when a high flood is anticipated. In normal circumstances, when anticipated flood is mild, households prefer to stay back at their houses. However, for emergencies, they make **raised platforms inside their houses** using bamboo/wood sticks etc. to shift women and children to ensure their safety and security. Since the area is flood prone, people have virtually trained themselves to make some arrangements as per their capacity. They start accumulating money and materials during pre-flood period for possible use during and post flood period. During 2002, there was a high flood which forced people to stay outside their houses in the temporary settlements arranged by them nearly for a month or so.

Coping practices followed during 2002 flood as also in the past were **partly individualistic** and partly through community participation particularly in rescue operations.

3.2.3 Assistance Provided

During the high flood of 2002, relief assistance in the marooned villages were provided by block/district administration, NGOs and people from neighbouring flood free villages and towns. These agencies came forward for help at different times starting with the panchayat/block administration followed by NGOs, district administration and others. The village panchayats prepared the list of victims deserving relief and helped the government staff in relief distribution. During 2004 flood in Bihar, particularly in Tirajatmalpur panchayat where the Manual was tested, a one time **relief of 25 kgs of wheat, 500 grams of chura (flattened rice), 500 grams of satoo (roasted gram/maize powder), 500 grams of salt and Rs. 200 (US $ 4.5) in cash** were provided to each affected family through the block administration. This was not only inadequate but was also not given during the period of acute crisis. It was alleged that the list of beneficiaries was not prepared in a systematic manner. Local level government officials tried to justify the delay on the ground that policy decisions at higher levels based on the availability of grains with the local godown of the Food Corporation of India, were taken late. The community had reservations about distribution of equal quantity of relief to every household which **did not take into account the size of the households**. The help provided by NGOs mainly comprised of materials in kind such as milk, bread, polythene bags, clothes, utensils, medicines, bleaching power, building materials etc.

3.2.4 Risk Assessment

Households residing close to the river banks or in low lying areas stated that they were more prone to the risks of **loss of lives of human** being and properties compared to those staying away from the bank. But the risk with regard to probability of occurrence of flood is the same for all as no one knows when flood will come. The risk is more if flood comes in the midnight as happened during 1987 when people hardly could do anything for their protection because of the shortage of boats for ferrying people and materials to safer places. There are risks involved in operating overloaded boats since they might capsize at any time causing loss of lives and properties. Since this is a chronic flood prone area, villagers feel that **loss of crop is certain**. That is why, farmers avoid taking risk of cultivation of major crops during this period. They half-heartedly cultivate the land for growing fodder or crops like sweet potato which is normally harvested before flood.

3.2.5 The Potential

Villagers have vast experience of local problems which would be useful for flood management. **Community spirit also prevails among them particularly during calamities**. At those times, villagers are willing to contribute their labour. Some members of the community are

also resourceful enough to **help others** in terms of providing raw materials for making boats, re-construction of dwelling units, cattlesheds and temporary shelters. Some training would raise their potential still further. The community is also willing to take up **desilting work of choked drainage system** around the village so that waterlogged areas can be drained off and made use for raising crops or community nursery for transplantation of paddy after the flood is over. Members of the community mentioned several areas such as construction of makeshift cattlesheds, temporary shelters for flood victims, making of boats/nets, arrangement of dry/condensed food, medicines for human beings and cattle, purification of water, reconstruction and rehabilitation etc. for their participation in their own interest.

3.2.6 Expectations from Government

The community expects that **a dam may be constructed** as a long term solution to avoid flood in the area. Villagers opined that if both the rivers causing flood in the area, i.e. Karhe and Burhi Godak are connected through a canal, then this may be used as a good source of irrigation. Members of the community are ready to offer their labour for all the structural and non-structural measures of flood management subject to payment of a nominal amount for the same. Villagers are interested in having **a community flood shelter** which may work as a multi-purpose centre for various vocational activities and social functions. The community members insisted that all existing breaches on the embankments and those **weak points** on embankments on Burhi Gandak and Karhe rivers where breaches are likely to take place, should be identified and repaired/strengthened forthwith on priority so as to avert mild floods which are frequent in the area. For receiving training, villagers expect the government to pay some stipend for meeting daily expenses. They were of the view that panchayats should be entrusted with the job of relief distribution because the panchayat members are more sympathetic and better acquainted with the local problems. They felt that there should be some legislation for delegation of financial and administration powers to **village panchayats to deal with flood related issues**. The villagers also showed a strong desire for quick restoration of communication links, electricity supply etc. for effective rescue and relief operations. The need **for mobile phones** was stressed because landline telephones often turn non-functional due to faults in cables owing to velocity and duration of flood water.

3.3 West Bengal

3.3.1 Forecasting and Warning

Villagers complained that the **forecasts and warnings** issued by the Irrigation and Waterways department of the government of West Bengal through its offices at the local level, **were not always accurate**. Moreover, there was **considerable time lag** (even upto 24 hours in certain cases) between the issue of forecasts and warning by

higher authorities and their receipt at the village level. Radio transmissions also give information on flood forecasts, but these are not specific to the selected villages. Hence, villagers do not take them seriously. As in Bihar, the same practice is followed for transmission of the flood related messages from higher level to block, block to panchayat and panchayat to the village. However, in a majority of cases, the information regarding the rise in the water level of the river and possible breaches (weak points) come from the villagers as also group 'D' staff of Irrigation and Waterways department of the government posted at different points to guard against natural or man-made breaches on the embankments. This source takes at least 4 to 6 hours to reach to the concerned departments for taking remedial measures. As people say, this arrangement is not fool proof. On several occasions, group 'D' staff were not found on duty particularly during night when villagers were also asleep. People feel that there should be forecasting and warning system if not at panchayat level, then at least at the block level so that villagers come to know quickly about the impending floods. To be more effective, the warning should be in the form of red alert followed by siren/blowing of horn etc. which could reach every village at a reasonable distance.

3.3.2 Coping Practices

After receiving the information on ensuing flood, the panchayats circulate the message to the villagers through public address system so that people become alert to take care of their belongings on the basis of priorities. At the same time, **village youths** and other active persons in the locality **keep watch on known vulnerable points on the embankments** against possible breaches to be caused due to flood. They stockpile stone boulders, sand bags etc. at the site to face any eventualities which may arise during the course of rise in the level of water in the river. However, these activities performed by the villagers entail some cost which the government normally reimburses. As pointed out by the local level government officials, such claims tend to be exaggerated resulting in delay in settlement. When asked why the weak points of the embankments were not repaired before the flood season, government officials referred to **paucity of fund with the concerned department for undertaking the repair**. Because flood in this area is a regular feature, people are used to face it. In anticipation of flood, they preserve eatables in condensed and dried form including rice, pulse, oil etc. for 2 to 3 weeks. They also stock fuels for cooking and lighting keeping in view their likely shortage during flood. Some first-aid medicines against fever, dehydration, cholera etc. are also kept in reserve. During flood, most weaker section households start taking one meal a day and avoid taking food in the night. Children, sick persons and aged who are vulnerable to illness, are, however, fed as usual.

3.3.3 Assistance Provided

Assistance during flood normally expected from government is for (1) repair, strengthening/renovation and extension of embankments to

prevent entry of flood in the villages, and (2) allotment and distribution of relief. People were totally against bureaucratic approaches adopted by the government functionaries for the first aspect. The main issue as pointed out by CBOs is that they were usually not **consulted at the time of planning** the repair/renovation works. They were asked only to supervise the operation of the work initiated by I&W department. There were frequent disputes during execution owing to which works at some places were left incomplete.

With regard to relief distribution by Panchayats, villagers pointed out that it was **fair** but **was much less than the requirement** in terms of quantity. Supply was only in kind i.e. rice @ 6 kgs per family irrespective of the size of the households. This was not considered equitable. They felt that distribution should be based on the number of members in a family. The quality of items supplied was within manageable limits. During the preceding flood, partially collapsed house owners were compensated @ of Rs. 1000/- (US $ 22) each while fully damaged house owners were paid an amount of Rs. 2000/- (US $ 45). For crop damages due to flood, a packet or two of seeds of paddy and jute was supplied by the government to the affected families. These compensations were termed as inadequate by the villagers. Also, the items for relief distribution came to the panchayat only after the flood was over. So also was the supply of disinfectants (bleaching powder) and other chemicals for maintaining sanitation in the village during and after flood.

3.3.4 Risk Assessment

Villagers of both the villages in West Bengal reported that they are exposed to several types of risks owing to frequent floods in their localities/areas. Those staying close to embankments are exposed to greater risk particularly when flood comes in the mid night when they can hardly do much to protect themselves and their movable properties. Despite bitter experience in the past, house owners in low lying areas **have not adhered to flood plain zoning** while making new constructions. They rebuild the houses in the same locality where threat of fresh flood is imminent. This was found to be the case in the Shivnagar village of West Bengal. The situation was not different in the other village (Nazirpur). After the erosion of Padma in 2000, the entire village has been relocated again in the flood prone area away by 4 to 5 km. from the original habitation. If this trend continues, there seems to be no solution to their problems. **Crop losses are usual in flood prone areas**. Sometimes, the villagers take risks of sowing crops anticipating flood in August or September. But flood comes before that which makes the farmers to bear loss burden to a great extent. Risks are equally high during as well as post flood periods with respect to spread of epidemics among human beings and cattle. **Students also suffer loss of their studies**.

3.3.5 Potential

Villagers felt that they have enough potential to **be involved in planning, decision making and even execution of flood control works**. They felt that post flood reconstruction work undertaken by them would be quicker and in conformity with the felt needs of the community. They would be in a better position to decide priorities given the advantage of staying in the village. As such, several types of activities currently being handled by the government can be undertaken by the community in a better manner. Examples can be given of post flood repair and maintenance of approach roads, bridges, culvurts, public utilities, Apart from these, the community can help in the construction/allocation of flood shelters, temporary cattlesheds, making of boat for rescue and relief, making of fishing net, attending to water purification, veterinary care, rescue and relief operation etc. To do all this, **they needed some orientation programme** in respective fields. The responsibility for arranging such programmes should be that of the flood management committee. In lieu of the services provided to the community, they expect to be compensated suitably.

3.3.6 Expectations from Government

The villagers expect the government to take up activities which would be needed for protection of their lives and properties. They indicated a strong desire for construction of **sluice gates** and **repair of breaches** along the embankment of river Padma. Night watch during flood months may be kept over the vulnerable points of the embankment so as to keep the villagers informed of the possible breaches, if any. Similarly, **high flood signal markers** wherever installed along the embankment **may be updated** to make people aware about the incidence of the last flood. As they say, if not a rain gauge station, at least a flood forecast and warning system should be installed in every block to minimize the reporting time about the flood to the villagers. As **drinking water** from hand pumps/tubewells is mostly arsenic contaminated, government should arrange for its treatment on case to case basis. Since there are limited health care facilities at the panchayat/village level, mobile dispensaries equipped with doctor and medicines may be an easy option during ordinary time; but prior to the occurance of flood, these units may be kept ready preferably on uplands having easy access to the villagers. Government should encourage farmers to opt for **comprehensive crop and cattle insurance schemes** in a bid to avoid the risks of damages to crops and cattle due to flood. If necessary, the schemes may be subsidized initially to make them popular among farmers. At the panchayat level, there are a number of sub-committees on education, health care, agriculture, irrigation and cooperation etc. But a sub-committee on flood management has been found missing under the legislation. Villagers wanted that a **sub-committee on flood management should be given a legal status** so that the committee would be in a position to place its requirements in advance to the concerned department for works to be undertaken on priority.

3.4 Overview

The present level of community participation in flood management is characterized by inadequacies and inefficiencies in several aspects. This is primarily due to **lack of community spirit among villagers**. No one in the past among local leaders, officials of the government and NGOs/VOs made any effort to evoke a sense of community sprit in them (villagers) for flood management in an effective manner. In the absence of any formal institutionalized approach, people take family based decisions when facing the flood. Even during heavy floods, many households prefer to stay back in their own houses to look after their belongings and cattle even though instances of theft and related problems are not frequent. The reasons for not shifting to safer places (temporary shelters) as cited by the villagers, are lack of privacy and space for keeping their belongings as also location of such shelters, which are far off from their houses. Hence, they generally respond to flood by way of raising bamboo/wooden platforms for providing safety and security to children and women. While leaving their houses, the family generally moves together. However, in some cases, one male member of the family stays back to guard the property against possible thefts.

Forecasting and warning mechanism in all the districts under study was inadequate. Flow of information about impending floods has many gaps that cause delays in the process to the detriment of the people. The local people's expectations in this regard are high as they expect prompt warnings about floods at the village level.

Food and shelter assistance is thoroughly inadequate and is received late. There are differences in the quantum of flood relief provided in different states. The assistance provided is not based on ground realities in most of the cases.

There is no leadership/local organization which can issue guidelines, pertaining to flood management at the village level.

Chapter - IV

COMMUNITY ORIENTED FLOOD MANAGEMENT STRATEGY

As already pointed out in Chapter II, there has been different approaches to flood management. What should be the preferred strategy for flood management in India? The issue is being examined in this Chapter.

4.1 Overall Long Term Strategy and Its Limitations

In India, an appropriate flood management strategy evolved gradually during the decades of the fifties to seventies of the last century. It started with the National Policy on Floods in 1954 and culminated with the report of the National Commission on Floods in 1980. In between were the reports of the High Level Committee on Floods, 1957, the Ministers' Committee on Flood Control, 1964 and Ministers' Committee on Flood and Flood Relief, 1972. Discussions and reports since 1980 have veered round the knowledge base provided and the strategy indicated in the 1980 report. The author of this book was a member of the National Commission on Floods and is still in full agreement with the strategy then outlined. Elements of the strategy which are relevant to the present work are briefly explained below.

4.1.1 Flood management has to be viewed **not in isolation** but within the broad framework of economic and social development in the country for obtaining the best possible utilization of its land and water resources. Management of floods should be a part of the overall plan for management of the water resources. The thrust, therefore, is towards an **integrated approach to flood management**.

4.1.2 Need for a **basin approach to flood management** is emphasized since local approaches might conflict with the larger interests of the basin as a whole. For example, people living in a particular area would like to be provided complete protection against floods, unmindful of any adverse effects which might result elsewhere in the basin. Moreover, only a basin approach can take care of the predominantly inter-state or international nature of the flood problem in India. Establishment of effective basin authorities would require the Union Government to muster sufficient political courage to exercise the powers conferred on it by Entry 56 List I (Union List) of the Indian Constitution, for "regulation and development of inter-state rivers and river-valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in public interest." But the required political will has not been forthcoming so far.

4.1.3 The important role of reservoirs in flood moderation is recognized. But a reservoir purely for flood control may not be economically viable. At the same time, a reservoir for irrigation and or hydel power only may not materially help the solution of the flood problem. Flood moderation should, therefore, form an explicit component of **multipurpose reservoirs**.

4.1.4 A single measure by itself is not likely to be adequate in mitigating the flood problem. In spite of measures like reservoirs, soil conservation and afforestation, flood runoff might still remain to be dealt with. Hence, several other **measures, both structural and nonstructural, would also be needed**. Their suitability would vary from area to area. The task of planning lies in **selecting the optimum combination of the measures** available for tackling the problem in a given situation. In the absence of adequate flood control measures, one may have **to live with floods**.

4.1.5 The current practice of treating flood control as a state subject to be financed from state funds tends to favour adoption of methods like embankments whose planning and execution are within the states' full control. A state is expected to be less interested in spending its funds for more desirable measures like watershed management and flood control reservoirs which could be located in or giving benefit to other states. Apportionment of such benefits to different states for the purpose of cost sharing might become a cause for disharmony and wrangling among them. **Central financing for inter-state flood control work must, therefore, become an integral part of the comprehensive approach to flood management** as is the case in most of the important flood prone countries of the world.

4.1.6 The role of **Public participation** in flood management is quite important. Digging of drainage channels, soil conservation, afforestation, watershed management, land use regulations and flood emergencies are the types of works where involvement of the local population would be most valuable.

4.1.7 Comprehensive planning of water resources development is, however, **a complex and time consuming process**. Apart from collection of extensive and diverse sets of data covering various aspects, there may not be suitable reservoir sites; or people in distant catchment areas may not be willing to undertake conservation measures. This indeed is the most important problem facing flood management on major/inter state or international rivers in India. Sites for major reservoirs useful for flood moderation and areas required for soil conservation and afforestation are located in other countries, mainly Nepal, cooperation from which gets bogged down in the maze of political problems. There are some problems within the country also. Flood, however, is a pressing problem which arises every year. It would, therefore, be advisable to **implement flood moderation plans without waiting for comprehensive plans for the water resources** in case the latter were not visualized within a period of 10 years.

4.1.8 This, however, **leaves the field open for embankment** as the most easily available structural measure for dealing with the flood problem.

However, embankments, even if properly designed, constructed and maintained (which they are not), often fail to provide protection during abnormal floods when such protection is needed the most. And during periods of mild or tolerable floods when they generally provide effective protection, they prevent the protected area from receiving benefits of flood in terms of fertilizing value of silt, improved soil moisture etc. Embankments are known to produce other adverse effects in the long run. But people reeling under flood fury regard them as a **quick** method of providing protection against floods. That is the reason why there is a great public demand for such works in frequently flood affected areas. It may not be possible for democratically elected governments in India to resist this demand. But care has to be taken to improve their design and performance so as to avoid or at least **minimize the adverse effects**. Suggestions for this would include (i) keeping proper distance between the two walls of an embankment, ii) ensuring proper maintenance, iii) providing properly designed sluice gates on embankments at appropriate places, and iv) widening and strengthening of portions of embankements used by flood victims as places of temporary shelters during flood.

4.2 Non-Structural Measures and Need for a Community Approach

4.2.1 The inherent inability of embankments to provide complete protection against very severe floods coupled with dim prospects for the introduction of other structural measures in the next ten years implies that it is hard to provide complete immunity against floods as was demanded by people during our field visits to the study areas. People have to be told clearly that they have to **live with floods**.

4.2.2 Given the above reality, best possible efforts should be made to **minimize people's sufferings and damages** to their property and crops etc. through non-structural measures as (i) flood plain zoning (ii) flood insurance, (iii) restructuring of cropping pattern, (iv) construction of community centres like schools or Panchayat Ghars on raised platforms for providing shelters to people during floods, (v) timely deployment of adequate number of boats, (vi) dissemination of flood forecasting and warning information etc. The efficacy of these measures would increase if a community approach is adopted as can be seen below.

4.2.3 **Flood plain zoning** has been implemented with success in a few developed countries but as reported in Chapter II, it has made no progress in India. There are two types of reasons for this. Firstly, democratically elected state governments in India have not been able to muster enough courage to enforce restrictions on development activities and settlement patterns in flood prone areas in villages and even in urban areas. Secondly, many people consider this measure as somewhat impractical for the most flood prone states like Bihar, U.P. and West Bengal which already have a very high density of population with little scope for relocation of existing settlements or structures. Restrictions on the establishment of new infrastructural facilities or industries

may have the inequitous effect of condemning vast stretches of already backward areas like the whole of north Bihar or eastern U.P. to a state of perpetual backwardness. This may not be tolerated by the people.

A via media can be worked out by persuading people to move out of very low lying and completely unsafe areas in flood plains. This would require awareness generation, social mobilization and provision of land on highlands. Such tasks can be performed better by the community. The Manual described in Chapter V throws further light on the steps that might be taken in this respect.

4.2.4 As regards **flood insurance**, it has already been mentioned in Chapter-II that virtually no progress has been made in India in this respect. One reason for this is the poverty of the people, their ignorance and backwardness. Another reason seems to be **lack of interest and initiative on the part of insurance companies because of excessive risks involved**. If uniform rates are charged, then a company would find itself burdened with an adverse selection of risks because people exposed to higher flood risks are the ones who are most likely to take such a policy. If rates charged are proportionate to the risks, then the insurance premia might become much higher than the paying capacity of the poor poverty owners from flood prone areas. Thus **people who need insurance most would be the ones who can least afford to pay the premium**. In the case of frequently flooded areas like North Bihar, Eastern U.P. or Assam, insurance companies fear that they might have to pay out claims for several years in succession. This might result in the companies going bankrupt. Another difficulty in connection with flood insurance is the collection and compilation of the basic data for working out a fair and equitable premiums and settling claims for areas of varying flood risks. The cost of administering such a scheme is likely to be very high.

One way of minimizing some of the above problems would be for the government **to subsidise flood insurance**. Given the very poor paying capacity of the flood affected persons, **some subsidy appears to be unavoidable**. The amount spent towards flood relief can partly be utilized for this purpose. A reduction of damages and claims might be possible **by linking insurance to prior adoption of flood plain zoning** regulations; but the difficulties of flood plain zoning may deter villagers from adopting insurance altogether. Another approach could be to provide **group insurance** cover to highly flood prone villages. Premium per family can be worked out keeping the vulnerability and economic condition of the villages. The village community may be involved in the administration of the scheme. In this context, **the role of reinsurance** can also be considered. The total pool at the disposal of the reinsurance companies would be considerably higher. The additional claims that may arise on account of flood damages are likely to be a small fraction of other claims and manageable within the resources of reinsurance. Perhaps **a few pilot projects** each with different features may be taken up in carefully chosen flood prone areas to gain some experience.

Community involvement in flood management is likely to have favourable effects on flood insurance. It can play a major role in awareness generation,

information dessimination and in developing mechanism for its operation. The community can be a bridge between the insurance company and the flood affected people. It can provide help in assessment of damages and in filing of claims etc. In case of group insurance, the community can function as the concerned group. **The adoption of community approach to flood management would, therefore, help in promoting the insurance coverage in rural areas.**

4.2.5 Other non-structural measures like dissemination of flood forecasting and warning information, flood preparedness, evacuation etc. are already being implemented by government at the local. Some of the other measures like restructing of cropping pattern to minimize crop damages etc. can be introduced without much difficulty. Based on the insights gained during several rounds of interaction with villagers and local level government officers. It may be concluded that **the performance of most of the non-structural measures would improve if community plays a major role in their management**.

4.2.6 Community approach to flood management, however, is a new concept which is different from the prevailing system characterized by total dependence of people on government. Transformation from the prevailing bureaucratic to the new community approach would, therefore, require creation of new community oriented institutions and changes in the role of the existing ones specially that of the government. This would also require identification of the different types of tasks to be performed by the community and other institutions along with reasons for the same. What are the institutions and tasks and what is the rationale behind them? How to bring them about? An attempt is made to analyse such issues in the subsequent sections of this chapter. Guidelines emerging from these issues form part of the Manual which is provided in the next chapter. The following sections and the next chapter are, therefore, complementary and should preferably be read together.

4.3 Establishment of a Community Oriented Institutional Framework

4.3.1 Constitution of Flood Management Committee (FMC)

As discussed in Chapter III, there is no institutional mechanism at local levels for taking a collective decision on fighting against flood or other natural calamities. The community is totally unorganized for playing this role. As a result, people in flood affected areas adopt an approach which is mainly **individualistic**. This was found true in all the six sample villages in three states. Also, there were no NGOs working in any of the six villages covered in the sample. By and large, similar situation prevails in most parts of the major flood prone states in the country.

People in flood affected areas depend mainly on government machinery for getting assistance for rescue and relief. As pointed out in

Chapter-I, such a situation is not found satisfactory because of the bureaucratic indifference, delays, lack of transparency and arbitrariness often associated with government machinery at lower levels. Moreover, government machinery can not be extensive enough to exist in every village and at all the times. Besides, distribution of flood relief under government generally suffers from several limitations as was found during the field surveys in Assam and Bihar, reported in Chapter-III. On the other hand, panchayats in West Bengal did good work in respect of distribution of flood relief. There, the distribution was without any discrimination with regard to religion, caste, creed etc.

In view of the above considerations, it is suggested that **a formal institutionalized mechanism under the Panchayati Raj system be constituted at Gram Panchayat level to handle all flood related issues**. This is designated here as **Flood Management Committee (FMC)**. Care should, however, be taken to ensure proper representation from different sections of the society. Those from the weaker sections should deserve a special consideration. Apart from a few members of the Panchayat fulfilling the above criteria, the committee should have a couple of outsiders who are likely to be helpful in flood management. This might include local officers, doctors, engineers, NGOs and others depending on local situation. For example in Assam, it may be useful to include owners of such tea gardens having uplands who can accommodate flood victims by providing them with shelter in their premises during flood. The Committee should consist of **Pradhan as its head so as to give it the required authority and status**. Besides, it should have a Secretary and a Treasurer selected from among its members as per details given in **para 5.1.1** of the Manual.

A word of caution would be needed at this juncture. Despite the FMC becoming fully functional, **the overall responsibility of the government** at block, district and state levels **does not get shorn off**. It has to provide not only the technical inputs but also the infrastructure to facilitate smooth functioning of FMCs. It must also take stock of the flood situation from time to time and take corrective action when required. Several functions of the government have, therefore, been specified in Section 3 of the Manual.

In order to be effective, the FMC should monitor several activities at a time/place including liaisoning with government departments and other agencies for timely help in respect of weather and flood forecasting, issue of flood warning, round the clock vigil on embankments and vital installations, probability of flooding, rescue and relief operations, establishing communication links with relief agencies/ NGOs etc. **An effective and well equipped central point is needed for smooth carrying out of these activities**. As such, it is suggested that a **control room** at the Panchayat premises should be created as it is convenient

from the point of view of location, availability of space and connectivity (road link) etc.

The FMC should also establish a mechanism for **disseminating flood forecasting and warning information through its control room** by establishing communication links with the appropriate agencies. Details are given in **para 5.1.2** of the Manual.

4.3.2 Flood Shelters

Many people are forced to leave their homes in the event of flood which may extend between three to four weeks in major flood prone areas. In order to provide the victims a proper place for temporary shelter **during floods of long duration**, construction of a **Multipurpose Flood Shelter (MPFS)** on uplands is recommended. This should have adequate provision of safe drinking water, ample space for storage of food items, fuels, makeshift arrangement of toilets, separate toilets for women, etc. **Such buildings should be built multistoreyed so that people can feel protected even during very high floods**. For example, in Akhyrganj GP in West Bengal, there are two flood shelters of which one is double storeyed and the other is a three storeyed building. Such buildings should be **as near to the village as possible**. In the sample villages of West Bengal, most households were reported to have avoided going to a flood shelter because it was far from their habitations. During the **flood-free months**, these premises **may be utilized for other gainful purposes** so that the expenditure incurred for construction of the shelter becomes more fruitful. Since the construction of such buildings is an expensive proposition, and can not be handled at the community level, **the necessary funds should come from Government**. FMC, as people's representative, should, however, take initiative in getting this facility constructed. Reference to MPFS is given in **para 5.1.3** of the Manual.

Because of its heavy cost, the multipurpose flood shelter should be taken up only in areas suffering from prolonged flooding. **In case of very short duration flooding** lasting a few days, highlands, embankments, roads can be utilized as temporary makeshift shelters by fixing tents, polythene covers, portable toilets etc. Reference is given in **para 7.1.4** of the Manual. A few **temporary cattlesheds around the flood shelters** should also be constructed to accommodate cattle so that the inconveniences caused in shifting the cattle to unattended places can be avoided. (See **para 5.1.5** of the Manual).

4.3.3 Resource Mobilisation for Flood Management

It is obvious that FMC should have ready access to funds for performing its functions. It is equally obvious that a community approach to flood management should imply some contribution of funds from the community itself so as to install a feeling of self dependence in it. Most households in flood affected villages are, however, **economically weak**, and are generally **reluctant** to make any such contribution specially **in view of the prevailing tendency** to

depend on government for everything. Field studies in the selected villages indicated that well-to-do businessmen who usually make such contributions are generally not found in these villages. Wealthy farmers are also few in number. Hence, it would be unrealistic to expect much financial contribution from the villagers specially at the very beginning of the process of implementation of the community approach. On the other hand, **in order to ensure villagers' active participation, some contribution from them is essential and is feasible also**. During field studies, most villagers indicated their readiness to contribute their labour for flood fighting and other aspects of flood management. They indicated that they would be willing to offer free labour of 2 to 5 days and about 15 days of labour at nominal payments to cover the cost of meals and other necessities for their families. Some monetary resources can also be mobilized through affluent households in the village as also from nearby areas.

Given these constraints, a major portion of funds, say around 70 to 80 per cent or three fourths **has to be obtained from government agencies**. This may be supplemented by contributions from donors, NGOs, international bodies etc. As regards government contribution, it may be said that this **may involve some, but not much, of an additional financial burden on the government since it is already incurring expenditure on many of the activities which would be handled by the proposed FMC**. Transferring the functions to the FMC should be along with transfer of associated funds to the FMC.

It should, however, be made clear that the above suggestion does not reduce the role of the government as a source of technical knowledge to the local people. This responsibility of the government would continue as before. It may further be noted that the community pool of resources that is being mooted here is only for minor or medium floods. **For major floods, funds have to come from the Calamity Relief Funds as per recommendations of the 11th Finance Commission**. For details regarding proposed funding, please refer to **para 5.1.6** of the Manual.

4.3.4 Grievance Redressal

Flood management through FMC is expected to be much better. **But even with all possible care, some people's interests might not be protected to the extent desirable**. When such lapses are reported, the FMC should try to redress those grievances to the satisfaction of the concerned parties in order to maintain harmony and mutual trust in the village. The formation and success of a grievance redressal mechanism will, therefore, be an important factor determining the long term effectiveness of community approach to flood management. Details are in **para 5.1.7** of the Manual.

4.3.5 Legislative and Policy Changes

Without a legislative backup, the proposed FMC may find it difficult to become operational in the manner suggested. It will also find it

difficult to collect donations, obtain relief, assistance etc. from different sources. In some states like West Bengal, Panchayati Raj system has been active for several years. There are committees constituted at panchayat level for agriculture, health, education etc. through appropriate legislative measures, but there is no provision for a committee dealing with flood management. Hence, **the state administration should accord a legal status to FMC** through appropriate legislative measures.

Donations to projects for rural development, education and health are included as eligible items for exemption from personal taxation, but not donations towards flood management and relief. As a result, there is no incentive for donors to come forward and donate money for flood management. To strengthen the hands of FMC and make it self-reliant, the central government, (Income Tax department) should **make necessary changes in the Income Tax Act** to exempt donations for flood management from taxation.

There are several other areas like **allotment of plots for houses** where a change in legislation/policies would be needed for ameliorating the conditions of flood victims. As already mentioned in chapter-II, flood insurance has made little progress in India for reasons explained there. Government should, therefore, look into this and change policies to have **more attractive insurance schemes**. This might entail giving **higher subsidy** by government initially, which can be reduced if the schemes come under the purview of re-insurance. Some of the recommendations made in this Manual would thus require government intervention in terms of legislative action and policy changes. These are detailed in **para 5.1.8** of the Manual.

4.4 Operational Aspects of the Community Approach to Flood Management

Flood management would require action to take care of emergent situations in the **pre-flood, during flood** and **post flood periods**. Specific measures would need to be taken by the FMC and agencies involved to help people in evacuation, training, relief, rehabilitation etc. The details of these are given below.

4.4.1 Pre-Flood Preparedness.

The effectiveness of the FMC would increase if it takes advance action to prepare itself for dealing with the flood problem as and when it occurs. For this purpose, the FMC should make a review of earlier years performance and identify flood vulnerable areas as well as flood escape routes. It should have information about the agencies and places from where it can get large and medium size boats for evacuating people and their belongings to safer places. Sometimes, during the periods of major floods motorized boats are also needed. The FMC must know how and from where to procure these boats. During flood,

essential items like kerosene, LPG cylinders, firewood, dung cakes as well as food stocks etc. tend to fall short of supply due to increased difficulties in transport and communication. Hence the FMC should have a stock of kerosene, other fuels like LPG cylinders, cooking fuels, potable chulhas, wheat flour, potato, onion, pulses, edible oils etc. to avoid last minute hassle during the flood period. Supplies may be recouped later when supplies from Government agencies are received. It is equally or even more important that the households themselves should have sufficient stock of the above items to last for 10 to 15 days. But as was observed during Phase-III of the present study, this is a very difficult task since poor villagers are not in the habit of keeping sufficient stocks of consumable items. Hence, repeated awareness generation campaigns by the FMC would be needed for this purpose.

The effectiveness of FMC would depend on the extent to which the villagers are motivated and mobilized. This would require that people are aware of the different dimensions of the problem, ways of tackling them and their own role in them. This would call for awareness generation among villagers and specially among people based organizations such as Youth Clubs, Mahila Mandals, Nari Niketans, Sishu Shiksha Kendras, Self-help groups etc. The effectiveness of the FMC would increase still further if villagers are provided general as well as specialized training on flood fighting and evacuating measures, purification of drinking water, agricultural practices, animal care etc. People should be motivated to help each other and specially the old, children and pregnant women.

Advance action also includes taking precautionary measures like cutting trees which, being weak and old, may get uprooted during floods. At the same time, new saplings should be planted in place of the old ones so as to help maintain long term ecological balance in the area. Precautions should be taken to switch off the main electric supply lines to avoid any danger of snapping of cables which may result in severe casualities. A close vigil is required to keep public utilities safe from the mischief-mongers.

Crop damages have been found to be a major component of total damages caused by floods. In order to reduce such damages, it would be useful to orient farmers to adopt crop varieties which can tolerate certain depth of water or to grow crops that are harvested before floods come or are transplanted immediately after the floods recede. Fishermen should be advised to complete net making before the arrival of the monsoon. Training should be provided to cattle owners to deal with urgent cases of cattle diseases.

Health care and sanitation should receive very high priority so as to avoid chances of break of epidemics during and after floods. For this purpose, some of the village youth and young women need to be trained as para-medical persons. They can come to immediate rescue being on the spot (village) till the services of doctors become available

in due course of time. These trained persons would also be advised to look after purification of water. (Sub-paras under 5.2.1 in the next chapter provide details).

4.4.2 Response during floods.

During floods, the urgent task is to identify shelter for the evacuated families immediately and arrange boats for rescue operations. Allocating proper shelter to evacuated families as also for their belongings and cattle would also become important. In the case of prolonged flood, the FMC should make arrangement for providing relief to people either in flood shelters or in marooned houses. A special attention needs to be paid to provision of suitable healthcare and medical facilities. The FMC should also make arrangement for collection and distribution of relief items which may be air-dropped by the Government. A special watch needs to be kept on prices of items of daily necessities (Details are given in sub-paras of 5.2.2 in the next chapter).

4.4.3 Post Flood Operations

Relief and rehabilitation become most important after floods recede. Field enquires made in sample villages indicate that CBOs are more useful for relief and rehabilitation than the government machinery. For example, distribution of relief through Panchayats in West Bengal was much better than that in Assam, where the distribution is through government outlets. Hence, **the FMC which has a community back-up should undertake all post flood reconstruction and rehabilitation works on behalf of the community following the principle of bare necessities**. These include a proper and realistic assessment of flood damages, preparation of list of beneficiaries for distribution of relief and rehabilitation materials in a scientific way, sharing of water for irrigation and desiltation of drainage etc. by involving local volunteers. There is also a strong need to keep surveillance over profiteering by a few unscrupulous businessmen who try to do so by creating scarcity during flood. FMC can also play a positive role in settlement of insurance claims for damages to crops, cattle etc. due to floods.

In order to reduce damage to houses in low lying areas, people should be dissuaded from having fresh constructions in low lying areas. No doubt this is a difficult task but if FMC takes the lead the problem can be sorted out to a considerable extent. There is also the need for designing houses which are flood resistant to a greater extent. At the same time, advantage may be taken of several housing schemes for economically weaker sections implemented by the government.

Practically all the economic activities remain suspended for a period ranging upto two months due to flood resulting in loss of people's earnings. The FMC, therefore, should arrange specific training programmes and render such other help as may be needed, so that

people sitting idle can utilize their time in pursuing gainful activities. (see sub para of 5.2.3.5 for details)

4.4.4 Government FMC Inter-face

At present, barring a few instances, people are totally dependant on government agencies for help and succour during calamities. Given this culture of total dependence and the fact that to be self reliant in the face of calamities is not easy even in developed and affluent countries, **the role of government and local bodies cannot be eliminated**. The interaction of FMC with government machinery will be mostly with block level administration which works directly under the district administration. In some cases, depending upon nature of activity, the interaction can be with district level administration but passing through the block level administration only. At the same time, there should be due representation of CBOs in the district level flood management or coordination committee operating in each flood prone district. Constitution of district level flood committee is given in **para 5.3.1** in the next chapter.

The areas where people-government interface would continue to play a vital role are indicated in **para 5.3.2** of the Manual. It indicates several areas of interface between government and FMC.

Chapter - V

MANUAL ON COMMUNITY APPROACH TO FLOOD MANAGEMENT

Operational or day to day aspects of flood management would become more efficient if advance planning is done and a Manual containing a set of guide points for action in terms of 'what', 'when' and 'how' is prepared. Such a Manual would be a collection of action points for pre-flood preparedness, response during flood and post flood management. A set of this has been prepared by the Institute as a part of the present exercise and is presented in this chapter. Further changes, if necessary, can be made in a period of next three to five years in the light of experiences gained during the course of its implementation. As already mentioned in Chapter-I, the Manual has been prepared in the context of "normal" monsoonal floods which frequent the areas covered in the pilot study. The Manual gives only the set of action points, the rationale for which has already been given in the earlier chapter. Readers of this chapter are requested to keep in mind the tenor of discussion in the earlier chapter to have a full understanding of the issues.

5.1 Institutional Aspects

5.1.1 The Flood Management Committee (FMC)

- A flood management committee (FMC) will be constituted by the village panchayat to handle all flood related issues/actions at the panchayat level.
- The FMC will consist of men, women, social/occupational and other interest groups.
- The committee will work under the overall supervision and guidance of the village panchayat.
- The total number of members of the FMC will be around 12 to 15 as decided by the village panchayat. At least half the members would be selected by the panchayat either from among its own members or from non-members within the Panchayat area. Such members should, as far as possible, represent different political parties and social groups, and particularly, the weaker sections.
- The FMC will co-opt. the remaining members in such a way as to include specially those likely to be helpful in flood management such as functionaries of block and district administration, local NGOs, doctors, engineers and other persons.
- The FMC will have a President, a Secretary, a Treasurer and such functionaries as the Panchayat may decide.
- The Pradhan (Head) of the Panchayat will be the President of the FMC.

- The FMC will select one of its members as its Secretary to perform the following functions:
  - > Aid and advise the Pradhan on day to day matters related to flood management.
  - > Arrange for a meeting of the Village Assembly (Gram Sabha) of the panchayat and call review meetings of the FMC at periodic intervals as laid down in the Manual, with the due approval of the Pradhan.
  - > Prepare agenda items and minutes of the meetings of the FMC.
  - > Perform such other functions as may be assigned to him by the FMC from time to time.
- The FMC will select one of its members as its Treasurer to perform in the following functions :
  - > Maintain income and expenditure account of FMC
  - > Act as custodian of the funds of the FMC.
  - > Get the accounts audited in the same manner as normal panchayat funds are audited.
- During supersession of the Panchayat, the FMC will elect one of the members to be a caretaker head. This election will be conducted by the concerned Block Development Officer. The Secretary and Treasurer will continue as before. If Panchayat is superseded before the formation of the FMC, the BDO will constitute a care-taker FMC to function till the next panchayat is in place. If the entire Panchayati Raj system in the state is under suspension, then the CEO of Zila Parishad, or the DM as the case may be, shall assume overall responsibility for carrying out the functions of the FMC.
- All the elected representatives of FMC (other than those nominated by government, or co-opted by the FMC) will hold office for three years with one third of the members retiring every year. No member will be eligible to hold office for more than two consecutive terms.
- Forty per cent of total members would constitute the quorum for FMC meetings. The FMC will formulate/lay down other rules and procedures for conducting its business.
- A portion in the village panchayat premises should be earmarked for use of the FMC for its routine business.

5.1.2 Control Room

- The FMC will establish a Control Room which will be headed by one of the elected members of the FMC. His/her name shall be publicized.
- The Control Room will be located preferably in the Panchayat premises.
- The Control Room will have an **Enquiry Counter** and an **Information Display Board** at a prominent place in the Control Room.

- The Control Room will have up-to-date information readily available with telephone numbers of all emergency services at the block and district levels.
- The Control Room will maintain information on ready availability of items such as boats in working condition, tents, eatables etc. and their location in the district to enable it to avail of them in times of emergency. It shall also be familiar with the process of their immediate mobilization.
- The Control Room will undertake the following preparatory measures before the flood season starts:
  - > Advance contingency planning and setting out flood drill.
  - > Allocation of duties during flood to individuals.
  - > Training to individuals identified as above.
  - > Acquisition, repair & maintenance of all equipment required in control room so that they are in good working order at all times.
- The equipment and personnel manning the control room shall be in position, starting at least one week before and till one week after the expected flood period.
- The control room will:
  - > Receive forecasts of rain and flood from district or block administration, nearby villages or towns and other sources as well as from radio, television, lookout posts, etc.
  - > Assess implications of the forecasts and issue warnings to the villagers. It will identify **Red Signal Levels** and re-mark those in the light of experience in the past.
  - > Disseminate the same among the community and local NGOs, wherever available, through notice board, beat of drum, lookout posts or other means.
  - > Issue flood warning to the concerned people as deemed appropriate.
- The Control Room will be in constant touch with the concerned government and other agencies at block and district levels dealing with flood forecasting, warning, and other aspects of flood management. It should be in touch with nearby villages and towns for such assistance time to time.
- The Control Room would work round the clock when floods are imminent and also during the flood including non-seasonal floods.
- The Control Room should be provided with communication links through:
  - > Land line telephones
  - > Mobile/roaming phones, (subject to the availability)
  - > Mini-transistor, walkie-talkie sets, HF/VHF, wireless sets
- The Control Room will identify zones for air dropping of relief materials in consultation with district administration and army personnel. It will keep villagers informed about possible air dropping sites.

5.1.3 Multi Purpose Flood Shelter (MPFS)

- A multi-purpose flood shelter should be constructed for every 500 affected people in the panchayats suffering from prolonged/intense flooding.
  - > Number of such shelters in a panchayat will vary depending upon the extent of flooding and requirement of the area.
  - > Space required for minimum comfort may be about 3 m^2 per person.
  - > The roof of the building should also be utilized by erecting tents, polythene covers, etc. to increase accommodation.
  - > The flood shelters should be constructed on uplands and should preferably be multi-storied.
  - > These uplands should be well planted with trees and grasses to reduce soil erosion.
  - > In the absence of uplands in the vicinity, such a building will be made on stilts of concrete.
  - > The location of the MPFS should be as near to the village as possible to provide easy access to the flood victims. Ideal distance to a flood shelter from most users should not exceed 1.5 km.
  - > In case there are public buildings like schools on uplands, these may be utilized for providing temporary shelter to flood affected people. If necessary such buildings may be modified to serve the requirements of a flood shelter.
- The flood shelter should have a separate room for storage of essential items like food, fuel, drinking water etc., a room for health care and for lactating mothers and infants, privacy of adolescent girls and women. It should have access to potable and safe drinking water, lighting facilities, utensils and separate (permanent or makeshift) toilets, specially for women.
- The MPFS's construction may be funded by state administration, MLA/MP by some donors.
- Funds for its repair and maintenance will come from Community Pooled Resources (CPR).
- The building will be utilized for various other useful purposes like holding of school, craft centre, training centre etc. during non-flood months. It may also be rented out during flood free periods for social functions.
- No one should, normally, be allowed to stay in the shelter after the floods have receded, except in cases where the dwellings of some flood victims have been substantially damaged, making them unfit for occupation before repairs/reconstruction.
- The shelter should be inspected by the FMC at least once in three months and maintained in good condition. The premises should be regularly cleaned particularly after being used as flood shelter.
- The FMC should ensure proper arrangement for waste management in and around the flood shelter.

5.1.4 Makeshift Shelters

- The FMC will create temporary shelters on uplands, embankments, high public buildings etc. to provide shelters to flood victims in case the duration of flood is limited to a few days, say upto 10-12 days at the most. It will provide tents, polythene sheets, medicines portable toilets etc.

5.1.5 Makeshift Cattleshed

- Some sheds should be constructed on uplands for cattle and livestock, preferably near the Flood Shelters. If necessary some temporary arrangement for the duration of flood may be made.
- The cattleshed should have adequate space to accommodate all cattle requiring temporary shelter based on experience in the past. In addition, it should have enough space to store feed and fodder at least for 15 days.
- Households may be advised to make their own arrangement of feed and fodder to the extent possible. In emergency, feed and fodder stockpiled by the FMC can be purchased by the households.
- The FMC should arrange veterinary care camps including mobile veterinary units for treatment of ailing cattle and medicines for common diseases of cattle at the location of the cattlesheds.

5.1.6 Resource Mobilization for Flood Management

- A community pool of resources (CPR) will be created by the FMC for flood management.
- The major proportion of the pool amount, say 80 per cent, will be contributed by district/block/panchayat administration while the FMC will arrange the remaining 20 per cent in cash and kind.
- Grant from the government will preferably be routed through only one department of the government like Revenue or Panchayati Raj or any other department as the state government may feel appropriate.
- Contribution by the community to CPR could also be in the form of labour.
- Monetary resources by the community might be arranged in the following manner.
  - > Through sale of tickets by way of organizing charity shows, sport functions at village levels, video films, folk dances, street plays etc.
  - > By way of collecting donations during special events in the village such as marriages, social ceremonies etc.
  - > By way of excavating silted village ponds/tanks for taking up fisheries.
  - > By way of developing community land/property including flood shelters and giving them on rent during flood free period for marriages, get-togethers, organizing exhibitions etc.
  - > By way of collecting flood cess from big traders / businessmen, other commercial establishments, permanently operating in the area.

- By way of collecting a small per head annual contribution from all households in the village. The amount could vary according to economic status of households. The amount per head would be determined by the Panchayat.
- By allocating a portion of revenue collected from weekly markets etc.
- By persuading local MLAs/MPs to allocate a part of the area development funds controlled by them, for flood management.
- By empowering local administration to utilize a part of rural development funds for flood management and income generating activities at the panchayat level.
- By persuading donors to give donations for flood relief and management. (People would come forward more readily if such donations are included as eligible items in the list of items included for tax exemption under section 35 of IT Act, which provides for tax exemption. This would require legislation by Union Government.)

- Effort may be made by the Pradhan to help in the growth of CPR every year.
- FMC will ensure proper utilization of CPR funds and subject the same to audit which may be done in the same manner as other income and expenditure accounts of the panchayat are audited in order to maintain transparency.
- In the flood related meetings of the Village Assembly (Gram Sabha), the income and expenditure statements must be presented to the general public and their comments sought. The above measures will create confidence among them as well as donors. This may result in additional inflow of funds.
- The FMC will control the CPR funds.
- A separate bank account for CPR will be maintained in a local nationalized bank or Regional Rural Bank or Cooperative Bank as decided by the FMC.
- The account will be operated jointly by the Pradhan and the Secretary or the Treasurer as the FMC may decide.

5.1.7 Grievance Redressal

- The FMC will have a grievance redressal mechanism at the panchayat level consisting of a few of its members and non-members from the village.
- There should be a similar mechanism at the Panchayat Samiti (block) level headed by Pramukh (Chair person) of the block. It should consist of at least two representatives from Panchayat Samiti and a few respected persons from within the block area including those from NGOs and women's organizations.
- The Panchayat level unit will hear individual grievances, with a view to resolve the disputes arising out of allocation of shelter, distribution of relief items and other causes.
- If the aggrieved person is not satisfied with the outcome, he/she may approach the Panchayat Samiti (block committee), the

decision of which will be final and binding on the parties.

5.1.8 Legislative and Policy Changes

- The Panchayati Raj system should be amended to provide for the establishment of Flood Management Committees, along with functions indicated here, in the states and districts where flood problem is serious so that such bodies are set up and made effective.
- In order to make donations for flood relief and management exempt from taxes, necessary changes in the existing Income Tax Act, particularly clause 35 may be made so that more donors may be motivated to come forward. Necessary changes in the IT Act may be brought about to include donation for flood as one of the eligible items for getting tax exemption
- Government should lay down policies for allotment of government/public land for constructing houses for flood victims at subsidized rates on priority basis.
- Government should introduce a change in policy related to allotment of houses to economically weaker sections under Indira Awaas Yojana, Ambedkar Awaas Yojana and other housing schemes so that such houses are constructed on priority in areas that are prone to flood damages.
- Government should help bring about changes in insurance policy so that flood victims are attracted to take up insurance against the losses of their crops, cattle, houses etc. caused by flood. If needed, government may provide or increase subsidy which may gradually be reduced or withdrawn after the scheme becomes popular and flood victims become fully aware of the benefits.

5.2 Operational Aspects

5.2.1 Pre-Flood Preparedness

5.2.1.1 Review and Advance Planning

- The FMC will review last year's performance in terms of success and failures by convening a meeting of all the concerned members well in advance, say, **4-5 months** before the onset of the monsoon season, so that necessary arrangements for the ensuing flood can be free from snags.
- The FMC will recommend the repair of breaches in rivers, rivulets, canals, bridges and roads to the concerned government departments/agencies **2-3 months** in advance.
- The FMC will ask local persons at least one month in advance, to offer their labour for repair of very urgent works in case the same could not be taken up by the concerned governmental agencies. The expenses thus incurred will be reimbursed by the government as per its norms. There should be a well laid out procedure for reimbursement.

- The FMC will mobilize local people to undertake desilting of local tanks/ponds at frequent intervals as per requirement.
- The labour so offered for repairs, desilting etc. should be suitably compensated by the FMC.
- The FMC may pay proper attention to the specific needs of the socially, economically and physically disadvantaged including women and children.
- The FMC must activate its Control Room at least one week before the onset of flood reason and start receiving and disseminating messages pertaining to flood forecasts and warning and continue to do so during the entire flood season.

5.2.1.2 Identification of Flood Vulnerable Areas and Flood Escape Routes

- Areas susceptible to frequent flooding of different depths along with number of affected persons in need of evacuation will be identified with the help of flood control department officials.
- A hazard map showing flood prone zones in order of vulnerability would be prepared for making a contingency plan.
- Views of the stakeholders on various issues will be taken into account.
- The FMC would identify locations of possible shelter areas and keep the people informed of the same.
- The FMC would identify flood escape routes for helping people move out to shelter areas as well as nearby flood free towns or villages.
  - > It would demarcate the roads likely to be submerged so that those routes could be avoided.
  - > It would indicate the areas having less velocity of water for safe plying of boats.
  - > It would caution fishermen and boat rowers to avoid going near high voltage power transmission lines in case water level goes dangerously close to them.
  - > The FMC will use appropriate means like coloured markers hanging down from the trees or flags on poles etc. for the above purposes.

5.2.1.3 Arrangement for Boats

- The FMC will own and maintain a few medium sized boats for its use in normal floods. In addition, the FMC will mobilize a suitable number of large (50 persons capacity) as well as medium (25 persons capacity) boats in working condition, for each flood prone/affected panchayat depending upon its population and extent of flooding. The cost of boats, their operation and maintenance as well as hire charges may be met out of CPR.
- These will be apart from a few small size boats of around 10 persons capacity which some of the households may be having for their personal use.
- The FMC will indent, mobilize or request the district

administration to arrange a few motor boats for use during major floods, when manual boats are unfit for plying or are inadequate.

- The FMC should also identify embarking and disembarking points (jetties) in the village so that power boats can be used when necessary.
- Boats should preferably be made from locally available raw materials. The local communities having potentiality of boat making should be involved in boat making and their operation.
- Sufficient number of persons residing in the village, say at least six to ten per boat, will be trained in handling the boats and sailing. Training will be imparted by local level trained persons. Prevailing wage may be paid to the trainers as well as sailors on per day basis.
- The FMC should ensure availability of adequate space for keeping its boats floating on water during non-flood period. At least one big pond should be identified for such purpose. Such ponds can also be used for other suitable purposes such as for developing fisheries.
- The boats will be used to carry people on a priority basis to safer places. These will also carry food, fodder and other essential items like traditional fuels, LPG Cylinders, Kerosene etc. from longer distances. In case of prolonged flooding, fodder for cattle will also be transported by these boats from the nearby areas to the uplands providing temporary shelter to cattle.
- The FMC should keep stock of a few nets for searching of missing persons. It may supply necessary subsidized raw materials and provide wages to the local willing fishermen for undertaking knitting work for such nets.

5.2.1.4 Arrangement for Kerosene, Other Fuels and LPG for Lighting

- The FMC will arrange sufficient quota of kerosene, LPG Cylinders and other fuels from government for lighting purposes for control rooms, relief camps and flood shelters. In addition, a few petromax lanterns should also be arranged.
  - > Two big size LPG cylinders for a population of 100 should be treated as a standard norm for lighting at common points.
- The expenditure for this purpose should be met from CPR.

5.2.1.5 Arrangement for Cooking Fuels & Fuel Efficient Portable Chulha

- The households will be advised to store their regular fuels for cooking purposes in dry condition. A part of this should be stockpiled in the Multi Purpose Flood Shelters by individual families. This would require repeated awareness generation campaigns by the FMC.
- During relief period, a few LPG cylinders will be kept by the FMC as standby for the duration of the relief camps.
- The FMC will explore the possibility of a common kitchen in the temporary flood shelter.
- It will persuade individual households to adopt subsidized fuel

efficient portable chulhas (ovens) propagated under National Programme on Improved Chulhas (NPIC).

- Alternatively, the FMC may ask individual households to keep one portable chulha made of corrugated sheet or iron buckets as the case may be, for emergency uses.

5.2.1.6 Arrangement for Food Stuff

- The FMC will ask individual families to keep a ready stock of food items for their own use for about 15 days. This calls for repeated awareness generation campaigns by the FMC.
- The FMC will keep a buffer stock of suitable quantities of ration such as wheat flour, rice, rice flakes or chura, puffed rice or murmura, gram and gram powder or sattu, milk powder, dry fruit, gur, salt, edible oil etc. along with cooking pots and utensils at the flood shelter.
  - > A rough estimate of affected people and usual duration of floods should be kept in mind while preserving essential foodstuffs and daily usable items by the FMC.
  - > The use of items stored by FMC for use by individual households will normally entail payment based on actual costs.

5.2.1.7 Awareness Generation

- The FMC along with local level government functionaries as well as experts from other agencies will organize orientation-cum-training programmes, group meetings/workshops etc. in the villages from time to time, invite experts for interaction and use print/electronic media, posters, pamphlets, street plays and other materials:
  - > To make people aware of the role of community in flood management.
  - > To create community awareness for flood preparedness through coping mechanism at the household level.
  - > To foster self help and cooperative spirit in the village community.
  - > To make people aware of the importance of improved sanitation, better housing and of the need to avoid low lying flood plains for construction of dwelling units.
  - > To make people aware of the relevant insurance schemes like crop or cattle insurance and launch campaigns to motivate them to join the schemes.

5.2.1.8 Involvement of People's Groups

- The FMC should enlist the active cooperation and involvement of functional and interest groups including SHGs, Youth Clubs, Mahila Mandals, Nari Niketans, Shisu Sikhsha Kendras etc. in case these exist in the village.
- The FMC will promote such groups in case these do not exist.
- The FMC should make use of young and energetic persons to keep a close watch on breaches in embankment of rivers, canals, roads and bridges.

- They should be trained and made responsible for repair of minor breaches in order to prevent flood water entering the village. These volunteers can strengthen weak points in the embankment with the help of sand bags, stones, bricks, wood logs, bamboos and other such materials available locally with the community.
- These volunteers should be provided training in flood fighting and rescue operations and their services utilized for protection against flood as per requirement.

5.2.1.9 Self Help and Help to the Distressed

- The FMC will motivate women and the aged to be active enough to look after themselves and help protect their own property and cattle.
- The FMC will ask every household to take care of its own needs of such items as umbrella, polythene sheets, fuel, torch, candle, match box, bamboo sticks, mats, kerosene oil, lantern and other essential items, before the flood is expected.
- The FMC will also keep an emergency reserve of all these items for use during the flood period for which the users have to pay.
- The FMC will motivate the community to be helpful to the distressed persons particularly pregnant women, children and sick persons by setting aside social conflicts, enmity and jealousy.
- The FMC may organize workshops on motivation and extension lectures by psychologists/doctors of the area in evenings at periodic intervals.

5.2.1.10 Training at Community/District Level

- The FMC will organize specialized trainings for those members, local leaders, youth etc. who are likely to play an important role in rescue operation and searching of missing persons.
- Such trainings should be an annual feature and should take place about two months in advance of the flood season.
- The FMC will also organize other specialized training courses on specific subjects like health, sanitation and management of relief camps. Such trainings may be organized at both Panchayat and block levels.
- The Zila Parishad will organize specialized training programmes at district level for flood control officials as also for NGOs at block and district level at regular intervals to strengthen their capabilities for rescue, evacuation, relief management etc. during flood and post flood reconstruction work.
- The FMC will arrange for training in swimming for all persons (men, women and children).
  - > The trainers may be given token honorarium on per day basis.
  - > A few lady trainers may also be engaged for women's training in swimming.
- The FMC should identify and arrange for other areas of training as considered useful for flood management.

5.2.1.11 Precautionary Measures

- Weak and very old trees including fruit bearing trees which have chances of being washed away during flood, should be rooted out in advance. The FMC should ask the owners of such trees to uproot them in community's interest and pay a reasonable compensation to the owners, if so required. Fruits, if any, can be harvested prematurely.
- The tree owners as well as others may be persuaded to resort to replanting of new saplings in place of the old ones so as to maintain ecological balance in the village. Free saplings may be provided from Govt, nurseries.
- The FMC may advise domestic users of electricity in the marooned villages to take precaution against snapping of electricity wires/cables which, being submerged under water, may cause casualty. The FMC should ask these households to switch off their main supply lines to avoid risks at their end.
- The FMC should advise the households to elevate the plinth of their homesteads, change weak pillars/walls, raise plinth of the cattlesheds etc. to minimize the negative impact of floods.
- The FMC will direct the concerned farmers to make the boundaries of their cultivable land identifiable, in case there are past cases of post-flood disputes among them.
  - > All the corners of such land will have brick or stone pillars or babul/jhar or other plant material fencing so that after the flood, boundaries of plots of the concerned owners can be easily identified.
  - > In case of public land (Nazul land), the FMC itself will do this work so that it is not encroached upon by the neighbouring farmers.
- The FMC will advise the villagers for safe keeping of their records pertaining to property rights, educational documents, employment record etc. by way of hanging them from ceiling of the houses in a bid to avoid their damage/loss due to flood and to facilitate their quick removal during evacuation.
- The FMC will advise farmers to take special care of their means of livelihood like nets, pump sets, handlooms, power looms, sewing/embroidery machines etc.
- The FMC will keep a close vigil and take precautionary measures to protect public properties particularly embankments, roads, school buildings, telephone lines, electricity wires, railway fish plates/tracks against destruction by miscreants. This work may be entrusted to a group of villagers on payment of wages at prevailing rates in the locality.
- The FMC may also look into the possibility of breaching the embankment at predetermined places to protect the village from major damages, which might take place otherwise. These points may, however, be identified in consultation with local engineers of the flood control administration and a decision on these may be taken in coordination with government authorities so as to safeguard the interests of other villages.

5.2.1.12 Crop Management

- Farmers should be motivated and educated to adopt cropping pattern and crop varieties which can survive the normal depth and duration of flooding in the area (e.g. sugarcane, jute, small millets and selected horticultural crops). They will also be motivated to opt for sowing of short duration crops which can be harvested before flood season such as quicker maturing varieties of Aus paddy (in Assam and West Bengal) maize, oil seeds, sweet potato, spices etc.
- The FMC should arrange community nursery in June for transplantation of paddy after flood.
- Farmers may be persuaded to harvest crops prematurely in a bid to avoid substantial loss.
- Direct sowing of wheat by zero tillage method may also be adopted in flood prone areas.
- Rice and moong or rice and til in combination should be sown in low lying flood prone areas in order to reap the benefit of dual harvesting from same land without additional inputs as being followed in Bihar.
- The FMC may advise the farmers to take advantage of Krishi Vigyan Kendras which are available in most districts for providing training and extension help to the farmers.
- It may also avail their expertise for orientation programmes and training to farmers.
- Farmers may be induced to preserve seeds in containers for post-flood use hanging them from ceiling of the house or keeping with friends/relatives in flood free areas. These seeds may be used for preparation of seed nurseries at higher grounds. The seedlings grown there would be available for transplantation immediately after the flood water recedes.
- Cultivation of fodder should be encouraged as also aquaculture and fish culture preferably by pen culture through net or raising boundary of the pond based on cost implications.
- People should also grow plants like non-edible banana which can be used for making rafts for transportation during floods.
- Growing of water tolerant varieties of horticultural plants should be encouraged.
- Trees/horticultural and economic plants such as eucalyptus, acacia etc. which can provide bio-drainage in low lying areas, especially along railway tracks, roads, canals, rivers etc., should be planted to minimize incidence of waterlogging especially during flood.
- Drainage outlet should be improved to reduce water stagnation.

5.2.1.13 Monthly Calendar of Crop Operations

- The FMC should have a monthly calendar of crop operations for flood prone areas in the concerned Panchayat. It should review this calendar from time to time in consultation with agricultural experts so as to take advantage of newer technologies, changes in infrastructural facilities and support services.

- A suggested crop calendar for the three areas of Assam, Bihar and West Bengal is given in Annexure I. It may be noted that the crop calendars are devised for the state as a whole. Hence there may be variations in the practices from area to area which may be due to differences in the agro-climatic conditions. Local requirements should be looked into by the FMC.

5.2.1.14 Non-Agricultural Activities

- In order to promote aquaculture and fish culture, community should undertake desilting of village tanks at frequent intervals say, once in one or two years depending upon extent of silting.
- Fishermen should keep their fishing nets ready before the onset of the monsoon.
- Households should also be advised to pay more attention to poultry rearing as an income generating activity.
- They should also collect and stock adequate quantities of raw materials for handicraft and cottage industries related activities.

5.2.1.15 Veterinary Care

- Village youth should be trained to deal with common cattle diseases such as i) Foot and mouth, (FMD) ii) Diarrhea, iii) H.S. iv) Anthrax etc.
- The FMC should arrange for vaccination of cattle before the flood season to avoid spread of epidemics among them.
  (See Annexure-5.2 for details of methods to be used for treatment of cattle.)

5.2.1.16 Health Care and Sanitation

5.2.1.16.1 Paramedical Care

- Local youth and women should be trained as paramedical persons for handling diarrhea, hepatitis-A, typhoid, cholera and other common ailments afflicting human beings.
- Local midwives should have links with hospitals in near-by towns and should be provided transport on priority in case of emergency.
- Arrangement for vaccines for endemic diseases should also be made.
  (See Annexure-5.3 for details of methods to be used for hygiene and sanitation)

5.2.1.16.2 Protection of Village Ponds and Wells

- The FMC should get the village wells supplying water for drinking and other domestic uses converted into ring wells having raised cemented perimeters high enough to prevent the inflow of flood water. All ring wells must be checked and repaired before the onset of flood. For purification of well water 15-20 gram bleaching powder (one match box full) should be added to each well at an interval of 7 days if raining continuously, 15 days if raining in break and 1 month if not raining.
- Village ponds used for domestic purposes and fishing should have

high perimeter walls so as to avoid entry of flood water into them as also escaping of fish during flood. Potassium permanganate or alum with lime (chuna) or bleaching powder may be used in pond for purification of water.

5.2.1.16.3 Disinfection and Purification of Water

The FMC should do the following for disinfection and purification of water.

- Take steps to thoroughly disinfect all sources of well water during and after flood.
- Disinfect ponds to clean suspended and colloidal solids.
- Provide training to local women in purifying drinking water by using alum (a traditional item) or bleaching powder supplied by the Public Health Engineering Department (PHED) of the government.
- Popularize the use of water purifier packets along with instruction for their use.
- Take responsibility for timely distribution of such packets after these are received in the Control Room from the PHED of the Government.
- Provide training on use of various disinfectants for water bodies.
- Arrange to get a mobile package water treatment plant (PWTP) to treat and disinfect flood water, thus solving the problem of raw water source as well as potable water.
- Train people to practise such methods for disinfection of water as boiling and use of Sodium hypochlorite (NaOCl) and Chlorine tablets. (also known as halogen tablets).

5.2.1.16.4 Tubewells and Hand Pumps on Raised Platform

- Outlets of tube wells and hand pumps in flood prone areas should be placed on raised platforms above the flood line and should be constructed with steps and railing to prevent accidental fall of children and others.
- Pumps and boreholes be sealed to prevent the entry of flood water.

5.2.1.16.5 First Aid

- Some of the local people, specially women and youth, should be provided training on first-aid as well as basic health and hygiene matters.
- They should also be trained to distinguish between poisonous & non-poisonous snake bites and to deal with snake bites, scorpion bites, bee and wasp stings, spider bites etc. which are quite common during flood.
- The FMC should popularize the use of ORS to take care of dehydration.

5.2.1.16.6 Control of House Flies

- There should be awareness generation to control houseflies in temporary shelters by elimination of breeding places, making the

food inaccessible to them and by storage of garbage and solid refuse in covered and washable containers/bins.

5.2.1.16.7 Toilets and Garbage Disposal

- The FMC should carefully select the sites for toilets, at least 16 meters away from water sources.
  - > One seat for every 20 persons should be provided. Curtains of old cloth, jute bags, etc. may be used for making cubicles.
  - > Various types of latrines like pit latrines, bore hole latrines, deep trenched latrines can be provided.
  - > Proper disposal of sullage in soak pits is important. Garbage may be dropped in pits away from shelter.

5.2.1.16.8 Nutrition Management

- Loss of nutrition may be compensated by way of additional intake of seasonal/dry fruits, pre-processed food in solid/powdered form along with sufficient quantity of water to avoid dehydration. Oral saline may also be taken to supplement loss of energy.

5.2.2 Response during Flood

5.2.2.1 Mobilization of Boats for Rescue Operation

- The FMC should indent or mobilize adequate number of boats ready for evacuation of people once the water level in the river rises beyond the danger level. While doing so, the FMC should keep in mind the general practice that all the members of a family like to move together.
- It should identify families to be evacuated immediately once flood waters reach near the danger level.
- The evacuation may be prioritized particularly towards physically handicapped, aged, children and pregnant women.

5.2.2.2 Allocation of Shelter

- The FMC will allocate shelter to the needy and distressed people on priority basis.
- The FMC will also allocate make-shift cattlesheds to the owners of cattle.
- The allocation of shelter and cattlesheds should be judicious so as to avoid acrimony and maintain harmony in the community.
- In the absence of any structure, the FMC will provide tent-based shelters to accommodate flood victims.
- In chronic flood prone areas, portions of embankments, roads etc., if used to provide temporary shelter to flood victims, should be raised, strengthened and widened.

5.2.2.3 Assessment of Need & Distribution of Relief

- In case of severe or prolonged flood, the FMC in collaboration with local administration & NGOs, will ascertain the realistic needs of the affected families and will accordingly organize relief camps on the uplands.

- Materials supplied by government to FMC as also donated by NGOs and others, as the case may be, should be distributed rationally to the needy.
- Distribution should be as per essentiality and economic condition of the individuals as determined in a transparent manner in village meetings.

5.2.2.4 Medical Facilities

- The designated health care room or clinic in the flood shelter, wherever possible, should start functioning before flood victims move there.
  - > Flood affected families may be attached to nearest health care centre.
  - > Suitable number of doctors & nurses may be attached to the centre specially set up.
- A minimum stock of common medicines for 15 days, including disposable syringes, for treatment of water borne and other diseases must be kept.

5.2.2.5 Collection of Air Dropped Relief Materials

- In case of devastating flood, when army assistance is provided and helicopters are used to air drop relief materials, the FMC will take the leading role on behalf of the community in collection of air dropped relief items.
- The FMC must ensure that the distribution of air dropped relief materials is done quickly, equitably and in a transparent manner.

5.2.2.6 Cattle Management

- Cattle care camps should be organized periodically in which veterinary care may be provided to the cattle.
- Cattle feed and dry fodder should be rationally distributed. Norms for distribution may be laid down for this purpose.
- Since at this juncture, normal supply of goods and services is less than the demand, 'bare minimum' principle should be applied.
- The FMC should deploy persons who are trained in cattle care and have some experience in handling such cases.

5.2.2.7 Check Price Spiral

- The FMC should check price spiral and emergence of unfair trade practices by middlemen in and around the affected villages to safeguard the interests flood victims.

5.2.3 Post Flood Relief and Rehabilitation

5.2.3.1 Damage Assessment, Relief Administration and flood Insurance

- The FMC should take up rehabilitation work after water recedes.

- The FMC should undertake systematic assessment of flood damages, work out their monetary value at prices prevailing in the locality and identify flood victims eligible for relief.
  - > It should take note of damage to houses, crops, cattle injury and loss, and injury to and loss of life of human beings etc.
  - > A few educated villagers may be provided training on damage assessment and preparing a list of beneficiaries for providing relief.
  - > The FMC will maintain complete transparency in the preparation of list of beneficiaries.
- The FMC will provide estimates of requirements of relief items such as food stuff, kerosene/LPG, medicine, fodder etc. to the relief officers.
- The FMC may allow prolonged stay in relief camp to those flood victims whose dwelling units are completely damaged necessitating longer time for their reconstruction.
- The FMC will keep the beneficiaries informed about the help which government and other agencies are ready to provide.
- The FMC will take steps to see that shop keepers and traders do not take undue advantage of hardships of people and do not increase the prices abnormally in a bid to exploit the flood victims.
  - > Proper monitoring by the FMC may check such evils, failing which the matter may be reported to the appropriate authorities for remedial actions.
- The FMC should assist villagers having flood related insurance policies to file their insurance claims and approach insurance companies for speedy settlement of claims. If needed, it may help insurance companies by providing information on flood damages needed for settlement of claims.

5.2.3.2 Redeployment and Reconstruction of Houses

- The FMC will impose restrictions on further building of houses in very low lying areas. It will also encourage people with houses in such areas to rebuild them on uplands.
  - > For this purpose surplus public or community land, if available on uplands, may be allotted to them by competent authority on concessional rates. (This will require a policy decision by the state government.) Each household will be asked to contribute its own family labour for rebuilding of own houses.
- In case of re-construction of houses completely or substantially damaged by flood, the FMC should create awareness among the owners and persuade them to make the basic structure of houses flood resistant. They can do so by erecting houses on round stilts of concrete which may cost more initially but would prove economical over long run. Those owners who can not afford the above, may construct houses on lands raised higher by taking earth from desilting of ponds or elsewhere. This would also serve the purpose of making village ponds more useful.
- The FMC should also consult knowledgeable persons/institutions about possible designs of such houses.

- The FMC may request the district administration to come forward with and designs of low cost houses which should be appropriate for flood prone areas as constructed under the existing programmes of Indira Awaas Yojana, Ambedkar Awaas Yojana or any other scheme of the government for economically and socially weaker sections and extend the purview of these schemes to flood prone areas on priority basis. (For this purpose, a change in Government policy will be needed). Such houses must avoid low lands.
- The FMC should popularize installation and use of low cost latrine in flood affected areas as constructed for BPL under TSC programme.

5.2.3.3 Compensatory Classes for Loss of Teaching

- In the case of loss of teaching in local schools due to floods, the FMC should try to arrange extra classes in schools on Sundays or holidays and/or increase the daily working hours till the backlog is cleared.

5.2.3.4 Meeting Agricultural Needs

- The FMC should consult agricultural and horticultural experts to review flood specific appropriate cropping pattern and disseminate the information to the community.
- Information on monthwise crop calendar/rotation should be taken into account while undertaking cropping operations. A model calendar is given in Annexure-5.1.
- The FMC should also undertake workshops and training programmes to familiarize farmers with the potential of changes in the cropping strategy.
- Credit institutions should provide micro loans to small and medium farmers to install minor irrigation schemes like treadle pumps so that agriculture in the post flood period becomes more productive.
- Medium irrigation schemes, which are more costly, should be financed by government on a priority. However, these may be handed over to farmers cooperatives or water users associations for operation and maintenance on self supporting basis.
- The FMC will identify suitable uplands for raising plants/nursery which are not likely to be affected by floods.
  - > Seedlings grown there shall remain unaffected by the flood and will be used for transplantation in the farm land after flood water recedes. This will enable the farmers to reap the benefit of crop despite the flood.
  - > This will be useful in case of early flooding when climatic conditions are suitable for growth of the saplings.
  - > This will be applicable to short duration winter paddy, the main crop in the flood affected areas in Assam and West Bengal.
  - > Similar strategy for minor crops as relevant for specific areas may also be developed.
  - > The FMC should arrange for adequate storage/ public godown at gram panchayat level for stocking of food grains and seeds etc.

> The FMC should motivate farmers to opt for crop and cattle insurance. The district level flood committee may help them overcome problems, if any.

5.2.3.5 Re-vitalization of Economic Activities

- The FMC should persuade government to start some gainful activities in the flood affected areas such as mat making from local raw materials, making of soft toys and handicraft items. This will keep the work force occupied and provide livelihood opportunities to them at a time when most other economic activities remain suspended.
  > It may seek the help of KVIB/KVIC to take up some of its small scale and cottage activities in the flood affected areas.
  > The DRDA may also be persuaded by the Panchayat to start a few feasible income generating activities under poverty alleviation programme of the government in the marooned villages.
  > The FMC may facilitate bank finance for purchase of nets and boats to individuals which may provide income to them at the time of flood.
  > The FMC may approach higher authorities and other agencies for proper arrangement for supply of raw materials to households and marketing of craft items produced by local artisans in these villages.
  > The FMC may encourage fish farming, duck & poultry rearing among weaker section households which may provide earning of livelihood for them.

5.2.3.6 Promotion of Self-help Groups (SHG)

- The FMC may help in the formation and strengthening of self-help groups preferably among women to keep them busy in pursuing some gainful activities.
- It may establish liaison with concerned agencies and arrange micro-credit from local commercial and cooperative banks and undertake guarantee against SHG members availing such facilities (loan) wherever required.

5.2.3.7 Miscellaneous Activities

- With the restoration of normalcy when flood shelters are vacated, the premises should be cleaned properly with the help of disinfectants so as to make the place habitable in future.
- The FMC will undertake necessary repair and restoration of infrastructure, wherever required. It should utilize the services of village youth to the maximum extent possible.
- Debris of dead bodies of cattle and other animals including missing persons lying around must be removed quickly to avoid spread of epidemics in the areas. These bodies may be burnt or buried far away from the village.

5.2.3.8 Identification of Resources and Services available at Local Level

- It is necessary to keep track of resources required to fight flood and their availability at the community level and outside. The community should make a note of
  - > where to find resources
  - > whom to contact for which resources
  - > specific location of various support services
  - > officers or agencies where flood forecasts/warnings are available
  - > availability of the experienced flood managers etc.

5.2.3.9 Credit for Renewal of Crop Activities

- The FMC should encourage promotion/re-vitalization of primary agricultural credit societies, regional rural banks or ask for opening of a branch of a scheduled bank (if not already in existence). This will enable small and marginal farmers to take the advantage of short and medium term loan facilities for raising crops, purchase of livestock and investing in allied activities.

5.3 Government-FMC Interface

5.3.1 District Flood Committee

- There will be a district level flood management committee headed by the District Magistrate. Other members of the committee will include Superintendent of Police, one member each from Irrigation and Flood Control Department, Public Works Department, Public Health Engineering Department, Health Department, Agriculture Department, Railways, ADM Incharge of Relief, two nominees of Zila Parishad, one member from each Panchayat Samiti at block level, three to five members from among Panchayats who shall be selected by rotation in alphabetical order for a period of two years, one or two members from socio-political organizations, one member from Krishi Vigyan Kendra and some representatives of NGOs.
- The ADM (Relief) will be the Secretary of this Committee.
- The main function of this committee would be to assist the FMCs to become as much self reliant as possible.
- The role of the government will be one of facilitator and not that of controller. This role should decline gradually as FMCs become more experienced and resourceful with the passage of time.
- The District Administration would continue to be responsible for flood management and should swing into action whenever a major calamity strikes.

5.3.2 Fields of Interfacing

The interfacing may be in the following manner in the three periods: pre-flood, during flood and post-flood.

5.3.2.1 Pre-Flood Preparedness

- The district administration (DA) should convene a meeting of the district level flood management committee at least two months before the onset of the flood period to review preceding year's successes and failures in flood management in order to ensure that arrangements for the ensuing floods are smooth. Representatives of FMCs of sensitive villages panchayats requiring special attention may also be invited to such meetings.
- DA may provide funds to FMC for construction of multipurpose flood shelters and cattlesheds on uplands.
- It should repair major breaches in the embankments of rivers, rivulets, canals, roads and bridges as recommended by FMCs. In case of its inability to do so for procedural or other reasons, it must reimburse the cost of the work, if done by the FMCs.
- The administration should quickly relay flood forecasts and warning to the Control Rooms operated by the FMCs in each flood affected Panchayat. Regular announcement should be made through electronic and print media about weather conditions, probability and likely time of flooding.
- DA should be ready to deploy motor boats if required by the FMCs or provide funds to the FMCs for acquiring the same depending on anticipated flood intensity, height and duration.
- It should ensure effective functioning of land line telephones and other communication links, mobile/roaming phones, walkie-talkie sets, HF/VHF wireless sets in the area.
- It should ensure that rain gauge installations are kept in working conditions.
- It should arrange suitable vehicles, including ambulances, jeeps and tractors in advance at the linking roads for evacuating flood victims. During emergencies, it should also supply safe drinking water through tankers, or portable containers as the case may be.
- It should arrange bamboo poles, wooden logs, fuels, mats, carpets, jute bags, tents in advance for temporary shelters of flood victims and place them at the disposal of the FMCs.
- It should store foodgrains, milk powder, and emergency rations on a predetermined scale, in godowns near sensitive and vulnerable areas and hand over the same to the FMCs for distribution to affected people at the time of need.
- It should have sufficient reserve of Kerosene, Dung Cake and LPG for flood victims at least one month in advance of the flood season and hand over the same to the FMCs as per requirement.
- It should arrange bleaching powder, toiletries, common medicines near the sensitive areas preferably at block headquarter, for distribution through the FMCs.
- It should plan for deployment of doctors, and paramedical staff at key locations for treatment of patients. Medicines for first-aid and common diseases like diarrhoea should be adequately stocked.

- It should arrange fodder, medicines and veterinary doctors for treatment of ailing cattle.
- It should also maintain liaison with army authorities to call them for help in times, if needed along with helicopter and other equipments for searching of missing persons etc. and lifting of relief materials when required.
- It should make a contingency plan to assist FMCs in rescue, relief and rehabilitation and should seek a report on the same from FMCs.
- The FMC, through block/district administration, should interact with the concerned State/Central Departments like Railways, P&T, National Highways, Electricity and other agencies to promote planting of suitable trees which can assist bio-drainage in low lying areas in order to minimize the incidence of waterlogging.

5.3.2.2 Response During Floods

- The Government should frequently broadcast/telecast and disseminate information on extent, intensity and duration of flood through all communication links in local languages.
- It should assist the FMCs in providing shelter to distressed and needy persons and cattle sheds in the most efficient manner.
- It should arrange to distribute necessary items collected during pre flood period to the needy people preferably in an equitable manner through FMCs.
- It should distribute relief items in cash/kind through the FMCs.

5.3.2.3 Post Flood Rehabilitation

- DA should monitor relief measures, relief camps, provision of basic amenities, water, sanitation, health care, rural communication links, community kitchen, cattle camp, veterinary care and power boats.
- It should make periodical review of the progress relating to rescue and rehabilitation of the homeless.
- It should assist the FMCs in arranging seeds for resowing, desiltation and repair of physical infrastructure.
- It should take up repair of major roads, bridges, culverts, public utilities such as schools/govt. buildings, telephone lines etc. in order to restore normalcy.
- It should help in re-generation of agricultural activities through distribution of seeds, fertilizers, pesticides, seedlings and extension of soft-term credits.
- It should assist in the generation of income through small scale/cottage enterprises including poultry rearing, horticultural and agro-forestry based activities such as raising nurseries etc.
- It should help villagers in filing claims for insurance and getting payments, wherever necessary.

Annxure – 5.1
Ref. : Para 5.2.1.13 and 5.2.3.4

Monthly Calendar of Crop Operations

ASSAM

April

- Prepare the land for planting of jute (Brahmaputra Valley).
- Transplantating of ahu (autumn paddy).
- Top dressing of 'N' in ahu paddy.
- Harvesting of summer pulses/boro paddy.

May

- Sowing of jute.
- Preparation of land for sali (winter paddy).
- Interculture and weeding of ahu paddy/summer vegetables.
- Application of fertilizers by top dressing in ahu paddy.
- Harvesting of 'boro' (summer paddy) and summer pulses/ vegetables.

June

- Direct seeding of sali paddy*
- Raising of seedlings for sali paddy.
- Weeding, interculture and thinning of paddy, pulses and jute.
- Top dressing of 'N' fertilizer.
- Harvesting of 'boro' (summer paddy) and summer pulses.

July

- Transplanting of sali paddy.
- Interculture and weeding of paddy, jute and maize.

August

- Weeding of paddy.
- Top dressing of 'N' fertilizer in paddy.
- Water management in paddy fields.

September

- Preparation of fields for early rabi pulses and oilseeds.
- Planting utera crop of linseed and lathyrus.
- Management of water in paddy.
- Control measures for insects, pests and diseases in paddy.
- Harvesting and retting of jute.

October

- Preparation of field for sowing of rabi maize, pulses and potato.
- Nursery raising of 'boro' (summer paddy).
- Planting of rabi pulses and maize.
- Harvesting and retting of jute.
- Harvesting of kharif pulses.

November

- Preparation of field for transplanting of 'boro' paddy.
- Harvesting of winter paddy, hybrid maize and late pulse crops.

December

- Transplanting of 'boro' paddy.
- Harvesting and threshing of winter paddy*.
- Sowing of wheat.

January

- Preparation of land for summer vegetables.
- Weeding and interculture of boro paddy.
- Application of 'N' by top dressing in boro paddy.

February

- Field preparation for ahu/boro paddy.
- Harvesting of rabi oilseed, potato and pulses.
- Weeding and water management of boro paddy.
- Adoption of early ahu paddy varieties like luit, kapilee etc. To harvest before flood.

March

- Water management in 'boro' paddy.
- Top dressing of 2nd dose of 'N' in boro paddy.
- Harvesting of wheat.
- Threshing of rabi maize and pulses.
- Raising seedlings for early ahu paddy.

Note : (i) Some of the agricultural operations may overlap for a few weeks in the subsequent month. (ii) *denotes the paddy crop of flood prone/water logged areas. (varieties are ARC353-148, Nazheri Bao, Changri Bao, EB-1, EB-2, Amena Bao, Maguri Bao, Pani Bhanga.

BIHAR

April

- Preparation of land and sowing of green gram, cowpea, urad and jute.
- Raise nursery for autumn paddy to be transplanted in may/june.
- Harvesting of wheat, barley, rabi maize, tobacco, sweet potato and picking of chilly.
- Wheat threshing.
- Sowing of summer cucurbits/vegetables.

May

- Prepare main field for sowing/transplanting paddy and kharif maize.
- Harvest summer pulses and thresh wheat.
- Harvest rabi maize.

June

- Raising community nursery of paddy.
- Direct seeding of paddy*

July

- Organize interculture and weeding of paddy and other kharif crops.
- Top-dress 'N' fertilizers.
- Complete thinning of paddy, maize and other kharif crops.
- Bushening of direct sown paddy.*

August

- Interculture of kharif crops and paddy.
- Top dress 'N' fertilizers.
- Implement disease/pest control measures.
- Adopt good water management in paddy/maize.

September

- Harvest kharif maize, pulses and early paddy.
- Adopt water management for winter paddy.
- Harvesting and retting of jute/sunhemps.
- Preparation of land for rabi oilseeds/pulses, potato
- Planting of utera crops of linseed, lathyrus.

October

- Harvesting of autumn paddy and its threshing.
- Insect, a pest control in winter paddy.
- Planting of mustard, chickpea, rabi maize and potato.
- Harvesting of late kharif crops.
- Transplantation of boro paddy (if irrigation facility is assured).

November

- Field preparation for sowing wheat, barley, pulses and chilly.
- Sowing of wheat crop.
- Harvesting of winter paddy and sugarcane.

December

- Harvesting and threshing of winter paddy and sugarcane, sowing of wheat crop.

- Weeding and interculture of wheat/maize, pulses etc.
- Water management/irrigation in boro paddy.
- Wheat sowing by zero tillage/direct seeding technique.

January

- Insect, pest and diseases control in crops.
- Irrigation/water management in wheat/maize.
- Wheat sowing by zero tillage/direct seeding technique.

February

- Irrigation/water management in wheat/maize.
- Harvesting of mustard crop.
- Field preparation for planting maize and summer pulses.

March

- Preparation of land for summer pulses.
- Sowing of summer pulses.
- Harvesting of potato, chickpea, wheat.
- Harvesting chickling pea (lathyrus) and linseed grown as utera crop in paddy field.
- Sowing of cucurbits/vegetables.

Note : (i) Some of the agricultural operations may overlap for a few weeks in the subsequent month. (ii) *Denotes the paddy crop of flood prone/water logged areas. (Varieties are BR-8, BR-9, BR-10, BR-13, BR-14, BR-46, BR-49, Jassaria).

WEST BENGAL

April

- Transplanting/direct seeding of pre-kharif paddy (aus) and jute.
- Harvesting of early pulses (green gram), potato and other rabi crops.

May

- Harvesting and threshing of boro paddy.
- Land preparation for kharif crops namely aus paddy, maize and pulses.
- Planting of paddy, jute and other kharif crops. (direct seeded paddy)
- Harvesting of black gram and other pulses.

June

- Harvesting and threshing of boro paddy.
- Planting/transplanting of kharif paddy.*
- Thinning and weeding of aus paddy.

July

- Harvesting of jute.
- Sowing of kharif crops including aman paddy.
- Top dressing of 'N' fertilizers.
- Sowing of chilly, black gram, sesamum.

August

- Harvesting of autumn paddy.
- Weeding and interculture of winter paddy.
- Top dressing of fertilizer 'N'.
- Spray of zinc sulphate on paddy planted on deficient soils.
- Control measures of insects/pests, if any.

September

- Harvesting of aus paddy.
- Harvesting and retting of jute.
- Planting of chickling pea (lathyrus) by utera method in standing crop of aus paddy.

October

- Field preparation and planting of mustard, black gram, green gram.
- Harvesting and threshing of aus paddy.
- Harvesting and retting of jute.
- Planting of potato and other vegetables.

November

- Planting of vegetables, pulses, oilseeds.
- Preparation of land for sowing rabi crops including rabi maize, wheat.
- Sowing of potato, toria (mustard).

December

- Harvesting of aman paddy.
- Inter culture and weeding of rabi crops.
- Nursery raising of boro paddy.

- Sowing of late variety of wheat.

January

- Transplanting of boro paddy.
- Harvesting and threshing of aman paddy.
- Planting of late variety of wheat, maize and gram.

February

- Weeding and interculture of boro paddy.
- Top dressing of fertilizer in boro paddy.
- Harvesting of mustard and rabi pulses.
- Irrigation management in boro paddy.
- Planting of vegetables (brinjal, ladies finger), sun flower etc.

March

- Harvesting of rabi oilseeds, pulses and other crops like potato, wheat, maize.
- Irrigation management in boro paddy.
- Field preparation for aus paddy and jute.

Note : (i) Some of the agricultural operations may overlap for a few weeks in the subsequent month. (ii) *denotes paddy in flood prone/water logged areas. (Varieties are Jaladhi-1 and Jaladhi-2).

Annexure – 5.2
Ref. : Para 5.1.15

Some of the Common Animal Diseases in Flood Prone Areas

Animal Diseases	Symptoms	Control/Prevention Measures
i) Foot and Mouth (FMD)	i) Limping. ii) Low or no feed intake iii) High fever. iv) Appearance of boils on lower part of tongue.	i) Isolation of diseased animals. ii) Left over feed not to be given to healthy animals. iii) Cleaning of mouth with dis-infectant like alum (1 gram in 1000 ml water) or (potassium permanganate (10-15 grains/1000 ml water). iv) Feed the affected animal molasses to improve appetite. v) Follow vaccination schedules suggested by Veterinary Officer (V.O.) **Schedule of vaccination for FMD** 1st vaccination from birth to 1 month of age. 2nd vaccination after 21 days of the 1st one. 3rd vaccination at the age of 6 months. Thereafter, yearly vaccination in February-March, September-October.
2. Diarrhea	i) High fever. ii) Frequent water discharge from mouth. iii) Stoppage of feed and water intake. iv) Red eyes and nasal water discharge. v) Small boils inside the mouth.	i) Isolate the sick animal and keep it in open area. ii) Spray phenyl in the entire shed. iii) Follow vaccination schedule suggested by VO.
3. H.S. (Haemorrhagic Septicaemia)	i) High fever. ii) Stoppage of feed and water intake. iii) Swelling of throat. iv) Difficulty in respiration. v) Feel slack and sleepy.	i) Immediate isolation. ii) Wash the throat with warm water slowly. iii) Get the animal vaccinated before rainy season. iv) Follow the vaccination schedule suggested by VO.

4. Anthrax	i) Fast spreading disease in the rainy season. ii) Animal dies without prior symptoms. iii) Oozing of blood from ear, nose, mouth and face of the diseased animals which does not clot. iv) High fever.	i) Isolation of the diseased animal. ii) Blood, urine etc. of the diseased animal should be buried 9-10 ft. deep with adequate quantity of lime, outside the village. iii) Consult VO.
5. Gedua disease	i) Causal parasite found in intestine of animal. ii) It is 10-12 inch long and thick like a pencil. iii) Colour is yellow-white and feed on animal body. iv) Frequent faecal discharge is first symptom.	i) Pipraziac (Pipnax). ii) Thio bendzol (Thio bendol). iii) Nilworm, Heltake, Banminth. iv) Feed the diseased animal one egg of local hen daily for three days.
6. Parasitic diseases	i) Blood sucking from outside like ticks, mosquitos, flies etc. ii) Help in spread of disease like bebesiosis, anapeasmosis which are found in the host animals. iii) Transmitted to healthy animals.	i) Keep animal clean. ii) Dump feed residue etc. in covered pit. iii) If parasites are less clean/remove by hand. iv) If more, use chemicals. v) Massaging of diseased animal by coconut oil mixed with camphor.
7. Coccidiosis	i) Discharge of faecal matter mixed with blood. ii) Lack of blood and water in animals. iii) Weakness. iv) Death.	i) Can be vaccinated any time after the age of 6 months. ii) Best time March-April.

Annexure-5.3
Ref. : Para 5.2.1.16

Suggested Methods for Purifying Water, Preparation of ORS and Dealing with Insect Bites

1 Disinfection of Ring Well Water

- All sources of well water should be disinfected thoroughly during and after flood. (Approximate volume of water in a ring well = 785x D2xH x1000 lit. Where D and H represent diameter of well and depth of water in meter respectively).
- Bleaching powder should be the preferred disinfectant and used @ 4-6 mg/l to get residual chlorine @ 0.32-0.4 mg/l for which some trials may be necessary with the dose of chemical.
- Bleaching powder should be added only in the form of a solution. The powder is first dissolved in a small quantity of water to form a paste and then diluted suitably. This should be poured in water and spread evenly into the well. For this purpose, the water in the well should be stirred by repeated dropping of an empty bucket.
- After the disinfection, a double pot chlorinator should be hung immersed in the water to provide residual chlorine @ 0.2-0.4 mg/l continuously. This will last for 2-4 weeks before recharging depending on the use.

2 Pond Disinfection

- During flood, pond water gets muddy and might contain germs. Hence, it is important to clean water of mud and kill germs by removing suspended and colloidal solids. In order to find out the quantity of chemicals needed for a pond, one should first estimate the volume and quantity of water. (Volume of water = 1/3 x length x breadth x deepest depth of water. Quantity of water = m3x1000 litrs).
- For cleaning, alum should be used for better floc formation often with lime. As a thumb rule, 40mg/l and 20mg/l of alum and lime respectively should do. (One mg/l dose of a chemical means .1 gm/1000 litre of water). The dose may be varied after some trial run with 1 litre of water. (Flocs can be clearly seen in water after mixing with chemicals in a clean 250 ml beaker against a source of light).
- The alum slab should be broken into small pieces of 3-5cm size and put into jute sack and hung from bamboo/banana plant raft into water.
- Lime pieces to be kept similarly in another sack hanging from the same raft.
- The raft should be pulled to criss cross the pond till chemical is mixed thoroughly with water with bamboo pole. After 4-5 hours when water is sufficiently clean, apply disinfectant like chlorine in the form of bleaching powder for making water germ free.

- Chlorine is the best available disinfectant derived from bleaching powder (B.P.). To determine the dose of chlorine, assume 20 per cent strength of B.P. after prolonged storage and 30 per cent for fresh B.P. Quantity of B.P. will depend on quality of water. Use 10mg/l B.P. to start with. Measure residual chlorine in water after 30 minutes. If it is around 0.4 mg/l, it is acceptable. Otherwise use less or more dose of B.P. till we get 0.4 mg/l chorine after 30 minutes.
- Avoid local concentration of B.P. solution to take care of fish and aquatic life; dissolve ½ kg of B.P in a 10 lit. plastic bucket and sprinkle the solution in water thoroughly; mix with bamboo pole; repeat this process till the entire quantity of B.P. is used. It is not possible to maintain the residual chlorine at this level for long. Therefore, it is better to put two pot double pot chlorinators into water hung from a bamboo pole after disinfecting the whole water body once near the water draw off point (ghat). The pots will diffuse chlorine into water continuously.
- Add bleaching powder after 7-15 days (after checking the residual chlorine for 0.2-0.4 mg/l strength) to replenish chlorine. (To determine quantity of chemicals take 1mg/l dose).

3 Water Purifier Packets

- For flood water or heavily contaminated muddy water halogen tablets or any other disinfectant cannot work. Water purifier packets are best suited and cost effective means of water treatment.
- The packets can be prepared by the volunteers of the FMC in the village itself. In this method Lime, Alum and Bleaching Powder are used.
- Powdered alum (30 gms) is kept in a small plastic heat sealed packet. Lime 15 gm and B.P. 2 gm are mixed and kept in another small plastic heat sealed packet along with the alum packet inside. A leaflet describing the use is also kept. 1/2 tea spoon full of alum and ½ tea spoon full lime and B.P. mix are poured in 10-12 lts of water in a bucket. Water is stirred vigorously for a minute and gently for 5-10 minutes and kept to settle the flocs for 2-3 hours. The clean disinfected supernatant water is strained through a clean cloth into a bucket.
- The water is ready for drinking. One packet can treat 300 litres of flood water. The water purifier packet is the cheapest disinfectant and very popular during flood situation among the flood affected villagers.

4 Mobile Package Water Treatment Plant (PWTP)

- The mobile package water treatment plant (PWTP) is a wheel and trailer mounted low cost plant which can be towed over rugged terrain to treat and disinfect flood water itself thus solving the problem of raw water source as well as potable water.
- A plant of size 2x1.8x2.2 m can treat 3-cubic metres / hr. and serve 2,000 persons in two shift run.

- It can treat all kinds of water contaminated with disease causing (pathogenic) bacteria as well as toxic chemicals like fluoride, arsenic and iron. It uses common chemicals like alum, lime, bleaching powder along with polyelectrolite (if required).
- One semi skilled person can run the plant.
- It is compact and does not require power except for lifting water in to the plant.
- In another version, no chemicals are necessary to be added– Electrolytic process using aluminum /graphite electrodes in water can clean as well as disinfect the contaminated water.
- W.H.O. recommends 4 plants per 10,000 persons.

5 Other Methods of Disinfecting Water

- Boiling: It is a good practice. The water must be brought to rolling boil. 1 kg of fuel wood is required per liter of water.
- Sodium hypochlorite (NaOCL) which contains 5-10 per cent of chlorine, is easily mixed with water.
- Chlorine tablets: Also known as halogen tablets, work well if water is clean but only with bacteriological contamination. Each 2.5 gm tablet can disinfect 240 liters water. But in raw flood water, it is useless.

6 Preparation of ORS

- Popularize the use of ORS to take care of dehydration.
- Four finger scoop of sugar / jaggery and 3- finger pinch of salt added to 1 lit. of boiled and cooled water.
- Give the dehydrated person sips of this drink every 5 minutes,-even if he is vomiting- day and night, till he begins to urinate normally.
  - A large person needs 3 litres or more a day.
  - A small child at least 1 litre a day.
  - If a person cannot drink enough, then seek medical help to give intraveinous solution immediately.

7 Snake Bites

First aid tips on bites of poisonous snakes:

- Stay quiet: person who has been bitten on foot should not walk even one step if it can be avoided. Carry him/her on a stretcher.
- Tie a cloth around the limb just above the bite. Do not tie it very tight, and loosen it for a moment every half an hour to allow flow of blood.
- With a clean knife (sterilized in a flame) make a cut in to each fang mark: about 1 cm long and ½ cm. deep.
- Then suck (and spit out) the poison –for a quarter hour. (See that there should not be any wound cut in the mouth of the person sucking).

8 Scorpion Bites

- If it is for the first time in an adult, do the following:

Give aspirin and if possible, put ice on the sting.

- If the sting is for the second time in an adult or in a child under five – get medical help fast.

9 Control of House Flies

- Cleanliness is the only natural way of control.
- Use deltamethrin dose 0.0075-0.015 g of a.i. per m2.
- Permethrin dose 0.0625.
- Pirimiphosmethyl 1.0-2.0.

Appendix 1.1

Profile of Participants in Workshops and Training Programmes

During second phase of the study, the Institute organized a number of workshops and training programmes in the selected areas of Assam, Bihar and West Bengal. The basic objective of workshops was to discuss the Manual in detail with knowledgeable groups in respective districts consisting of officials from district administration such as those in charge of Relief & Rehabilitation, Health Care, Animal Husbandry, Public Health, Agriculture, Irrigation and Flood Control departments, elected members of the Panchayati Raj Institutions (PRI) at district block and Panchayat levels, representatives of NGOs etc. so as to receive their comments and suggestions with particular reference to the applicability of the Manual under actual flood conditions. The idea behind the training programme was to enhance the capabilities of the panchayat functionaries as well as a large chunk of villagers (both male and female) of the study areas with respect to flood management specially in the fields of Agriculture. Heath care and Sanitation, Veterinary care, Rescue and Relief operations.

The workshop in Assam was attended by 48 persons of whom half were elected representatives from Panchayati Raj Institutions. In Bihar, 30 out the 53 participants in the workshop, were elected members of PRIs. Besides, a number of experts in the field of Agronomy, Plant Pathology, Animal Sciences etc. from Rajendra Agricultural University, Pusa, also participated in the workshop. In West Bengal, the number of participants in workshop was 37 of whom 15 were elected representatives of district, block and village Panchayats. Among the participants, there were 10 females, of whom seven were from Assam, two from West Bengal and one from Bihar.

The capacity development training for villagers including elected members of Panchayats was imparted to 313 persons (both male and female) in selected study areas of the three states. In Assam, 45 panchayat members out of 114, in Bihar 19 out of 80 and in West Bengal 22 out of 119, were given orientation training. As expected, there was preponderance of males as compared to females. This was more so in Bihar. The proportion of female attendance was the highest in West Bengal, i.e. 21 per cent compared to 15 per cent in Assam and about 9 per cent in Bihar. Besides the villagers and elected panchayat members, a few public health engineering department officials, social workers, representatives of SHGs, NGOs also took part in the training.

Appendix 1.2

Background Information on Selected Areas

Assam

Assam is one of the oldest and largest north eastern states in respect of geographical area and population compared to the other six states of the North East. It is surrounded by Bhutan and Arunachal Pradesh in the North, Meghalaya and Manipur in the South, Nagaland and Arunachal Pradesh in the East and West Bengal in the west. The total geographical area of the state is 78,438 sq. km. The state comprises of two river valleys namely Brahmaputra and Barak. Brahmaputra is one of the largest rivers in the world. It divides the state into south and north. Brahmaputra in the north bank has as many as 26 tributories while in the south, it has 12 tributories. Barak the second largest river in the north eastern region, has 7 tributories in the north and 3 tributories in the south. The two villages selected for this study lie in Cachar district, which covers an area of 3,786 sq. km., out of 22,244 sq. km. in the Barak valley

The two villages are (i) Dakhinmohanpur Part VII under Swadin Bazar Gram panchayat and (ii) Gargaripar under Rangirghat Gram Panchayat. These villages come under Sonai block which is about 26 km. away from Silchar and about 380 km. from Guwahati.

The village Dakhinmohanpur part VII is located at a distance of 0.5 km. from the panchayat office, 7 km. from block headquarter (Sonai), 23 km. from the district headquarter (Silchar). The Village Gargaripar is 2 km. away from the panchayat office, 5 km. from block headquarter, 19 km. from district headquarter.

The prominent rivers causing flood in both the villages are **Sonai, Rukni and Amjor**. Both the villages are surrounded by river Amjor, a tributary of river Sonai which in turn is a tributary of river Barak, the main river of the district. Flood in the area is mainly due to overbank spilling of huge quantity of river water from upstream Bhutan hills as well as from the adjacent state of Mizoram. Nearly 90 per cent of the area of Dakhinmohanpur Part VII is in the flood plain of river Amjor and for village Gargaripar, it is 95 per cent.

Bihar

Bihar, one of the most populous states in India, is surrounded by Nepal in the North, Jharkhand in the South, Uttar Pradesh in the West and West Bengal in the East. The total geographical area of the state is 94,163 sq. km. The most prominent river passing through the state is Ganga which divides the state into two parts, north and south. It has a number of big tributories such as Sone, Falgu, Kosi, Gandak and Bagmati which cause frequent floods in the state. All of these rivers are perennial.

District Samastipur selected for the study is one of the backward districts of the state. It is a bordering district to Nepal and is surrounded by Burhi Gandak, Bagmati and Karhe rivers in the north, Kosi river in the east, Noon river in the west and Ganga river in the south. The district has a flat, low lying terrain intersperse with rivers and is flood prone. The geographical area of the district is 2,904 sq. km. It is well

connected by road with the state headquarter and other parts of Bihar. It is also connected by rail with other cities of India such as Delhi, Guwahati, Kolkata etc.

The Pilot study in Samastipur district covers two villages of (i) Sajanpur and (ii) Purnahi. Both these villages, which lie about 7 to 8 km. apart, are panchayat headquarter villages of two different panchayats under Warisnagar block and are frequently flooded as these are located in low lying areas. The village Purnahi is located at a distance of about 4 km. from the block headquarter (Warisnagar), 15 km. from district headquarter. The village Sajanpur is located a distance of 6 km. from Warisnagar, 16 km. from Samastipur. The main rivers causing floods in both the villages are Burhi Gandak and Karhe. In between the two rivers, there is a canal which overflows during the monsoon and causes floods.

West Bengal

West Bengal, one of the major flood prone states of the country, is bounded by Bay of Bengal in the south, Orissa in south-west, Jharkhand and Bihar in the west and Assam and Bangladesh in the east and Bhutan in the north. The geographical area of the state is 86,867 sq. km.

The district Murshidabad, under which the two villages selected for the study lie, has a geographical area of 5,324 sq. km. The headquarter of the district at Behrampore is located at a distance of about 180 km. from state headquarter, i.e. Kolkata. It is connected by road and rail from Kolkata. It is one of the top ten districts in India by size of population as per 2001 census.

The pilot study in West Bengal covered two villages in this district. These villages (i) Shivnagar under Akhyrganj gram panchayat and (ii) Nazirpur under Khairbana gram panchayat are under the jurisdiction of Bhagwangola Block-II. It is 40 km. away from the district head quarter (Behrampore).

Village Shivnagar under Akhyrganj GP is located along the river Padma flowing between India and Bangladesh, at a distance of 0.5 km. from panchayat office, 4 km. from block headquarter, 43 km. from district headquarter. Village Nazirpur under Khairbana GP is located at a distance of 1.5 km. from panchayat office, 31 km. from block, 42 km. from district headquarter.

Appendix 2.1

Damages due to Floods/Heavy Rains during 1953 to 2002 (India)

Year	Population Affected (in Million no.)	Area Affected (in Million hectare)	Damage to Crops		Damage to Houses (in Million Rs.)	Cattle Lost (No.)	Human Live Lost (No.)	Damage to Public Utilities (in Million Rs.)	Total Damages Crops, Houses, Public Utilities (in Million Rs.) (Col. 5+ 6+9)
			Area Affected (in Million hectare)	Value (In Million Rs.)					
1	2	3	4	5	6	7	8	9	10
1953	24.280	2.290	0.930	421	74	47034	37	29	524
1954	12.920	7.490	2.610	405	66	22552	279	102	573
1955	25.270	9.440	5.310	778	209	72010	865	40	1027
1956	14.570	9.240	1.110	444	80	16108	462	11	535
1957	6.760	4.860	0.450	141	50	7433	352	43	234
1958	10.980	6.260	1.400	383	39	18439	389	18	440
1959	14.520	5.770	1.540	568	94	72691	619	200	862
1960	8.350	7.530	2.270	426	143	13908	510	63	632
1961	9.260	6.560	1.970	240	9	15916	1374	64	313
1962	15.460	6.120	3.390	832	107	37633	348	11	950
1963	10.930	3.490	2.050	302	37	4572	432	27	366
1964	13.780	4.900	2.490	569	46	4956	690	51	666
1965	3.610	1.460	0.270	59	2	7286	79	11	72
1966	14.400	4.740	2.160	802	25	9071	180	57	884
1967	20.460	7.120	3.270	1333	143	5827	355	79	1555
1968	21.170	7.150	2.620	1446	411	130305	3497	254	2111
1969	33.220	6.200	2.910	2819	544	270328	1408	681	4044
1970	31.830	8.460	4.910	1628	486	19198	1076	764	2878
1971	59.740	13.250	6.240	4231	802	12866	994	1291	6324
1972	26.690	4.100	2.450	986	125	58231	544	472	1583
1973	64.080	11.790	3.730	4280	525	261016	1349	885	5690
1974	29.450	6.700	3.330	4116	724	16846	387	849	5689
1975	31.360	6.170	3.850	2715	341	17345	686	1661	4717
1976	50.460	11.910	6.040	5950	922	80062	1373	2015	8887
1977	49.430	11.460	6.840	7206	1523	556326	11316	3290	12019
1978	70.450	17.500	9.960	9111	1676	239174	3396	3761	14548
1979	19.520	3.990	2.170	1700	2106	618248	3637	2336	6142
1980	54.120	11.460	5.550	3664	1709	59173	1913	3033	8406
1981	32.490	6.120	3.270	5246	1596	82248	1376	5123	11965
1982	56.010	8.870	5.000	5894	3839	246750	1573	6716	16449
1983	61.030	9.020	3.290	12859	3323	153095	2378	8734	24916
1984	54.550	10.710	5.190	9061	1813	141314	1661	8182	19056

Table 2.2 contd.

1985	59.590	8.380	4.650	14254	5839	43008	1804	20500	40593
1986	55.500	8.810	4.580	12316	5344	60450	1200	19825	37485
1987	48.340	8.890	4.940	11546	4645	128638	1835	9506	25697
1988	59.550	16.290	10.150	25109	7416	150996	4252	13778	46303
1989	34.150	8.060	3.010	9567	1498	75176	1718	12988	24053
1990	40.259	9.303	3.179	6956	2137	134154	1855	4553	13646
1991	33.889	6.357	2.698	5790	1804	41090	1187	7289	14883
1992	19.256	2.645	1.748	10276	3063	78669	1533	20107	33446
1993	30.409	11.439	3.206	13086	5283	211193	2864	14455	32824
1994	27.548	4.805	3.963	8886	1652	52315	2078	7408	17946
1995	35.932	5.245	3.245	17148	13079	62438	1814	6796	37023
1996	44.729	8.049	3.827	11245	1766	73208	1803	8614	21625
1997	29.663	4.569	2.258	6927	1525	27754	1402	19859	28311
1998	68.718	9.133	5.872	23725	3020	105828	2758	31714	58459
1999*	25.659	3.978	1.762	16632	1745	8852	576	2687	21064
2000*	40.063	4.940	2.880	4467	3017	39144	2345	9118	16602
2001*	22.444	3.008	1.911	4467	3577	25025	811	18203	26247
2002*	22.411	2.866	1.266	5471	4552	3647	640	4865	14888
Avg.	**32.985**	**7.378**	**3.474**	**5970**	**1891**	**92791**	**1560**	**5662**	**13523**

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