



Paper 10

Disaster Prevention, Preparedness and Management and Linkages with Climate Change Adaptation

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The BASIC Project is a capacity strengthening project – funded by the European Commission – that supports the institutional capacity of Brazil, India, China and South Africa to undertake analytical work to determine what kind of climate change actions best fit within their current and future national circumstances, interests and priorities. Additional funding for BASIC has also been kindly provided by the UK, Department for Environment, Food and Rural Affairs and Australian Greenhouse Office. For further information about BASIC go to <http://www.basic-project.net/>

About BASIC

The BASIC Project supports the institutional capacity of Brazil, India, China and South Africa to undertake analytical work to determine what kind of national and international climate change actions best fit within their current and future circumstances, interests and priorities. BASIC has created a multi-national project team linking over 40 individuals from 25 research and policy institutions, the majority based in BASIC countries. Project activities comprise a mix of policy analysis, briefings, workshops, conferences, mentoring and training clustered around five tasks lead by teams as follows:

- Task 1 – Mitigation and sustainable development (China Team);
- Task 2 – Adaptation, vulnerability and finance (India Team);
- Task 3 – Carbon markets, policy coherence and institutional coordination (South Africa Team);
- Task 4 – Designing international climate change policy and enhancing negotiations skills (Brazil Team); and
- Task 5 – Creation of developing country expert group/mechanism on a long term basis (All Teams).

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About this Paper

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Other papers produced by BASIC Task Team 2 include:

- Handbook of Current and Next Generation Vulnerability and Adaptation Assessment Tools, Amit Garg, Ashish Rana and P.R. Shukla, Energy Environment Analytics Limited India, Manmohan Kapshe, Maulana Azad National Institute of Technology, India, K. Narayanan, D. Parthasarathy, and Unmesh Patnaik, Indian Institute of Technology, Bombay, India.
- Vulnerability to Drought, Cyclone and Floods in India, Sumana Bhattacharya and Aditi Das, Winrock International, India
- Lessons Learnt for Vulnerability and Adaptation Assessment from India's First National Communication, Sumana Bhattacharya, Winrock International, India
- Proceedings of the BASIC India Workshop, Vulnerability and Adaptation to Climate Change: From Practice to Policy, May 2006, Winrock International, India

Abstract

The IPCC has confirmed that climate change will increase the frequency and intensity of some extreme climate events. From being viewed as a response mechanism at the end of the impact cycle, adaptation is now identified as a process that builds the resilience of communities to the impacts of climate change and variability and thus enhances the process of sustainable development. This has strengthened the rationale for "mainstreaming" adaptation into development processes. This paper develops an approach that looks at institutional structures and interfaces as a way of identifying the possibilities and actions for mainstreaming climate change adaptation in the disaster management context. It argues that climate change adaptation and disaster management frameworks have thematic as well as institutional linkages. Both domains address similar issues and similar sets of actors, yet currently disaster management is further evolved and has a stronger legislative base. One approach to mainstreaming climate adaptation would be through integrated institutional frameworks. Yet in India, as in many other countries, parallel structures exist for climate adaptation and for disaster management and mean similar sets of stakeholders remain in isolation. By mapping out institutional structures and interfaces, the paper highlights possible entry points for climate adaptation into disaster management structures in India.

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1 Introduction

Adaptation to climate change has experienced a significant shift in emphasis. From being viewed as a response mechanism at the end of the impact cycle, it is now identified as a process that builds the resilience of communities to the impacts of climate change and variability and also enhances the process of sustainable development. The research ideas in climate change adaptation now focus on mainstreaming it in ongoing development programmes. While the concept of adaptation is not new, the idea of mainstreaming it in development programmes is a recent emergence (UNDP, 2005). It has been a common practice to take into account development scenarios while constructing emission projection, but the explicit linkages between development pathways and adaptation are still being fully explicated. It is now understood that climate change adaptation policies need to be incorporated into other policies from relevant sectors that are likely to be impacted by the changes in climate (Burton et.al., 2002). Two questions that are being addressed broadly are – ‘why mainstream’ and ‘how to mainstream’. This paper develops an approach that looks at institutional structure and interfaces as a way of identifying the possibilities and actions for mainstreaming climate change adaptation in the disaster prevention, preparedness and management context (disaster management for short).

2 Review of literature and conceptual background

The conceptual background of the paper is based on contemporary research ideas and approaches for mainstreaming climate change adaptation in development. Mainstreaming adaptation refers to effective and efficient utilization of financial and human resources to enhance adaptive capacity, instead of designing and implementing climate change policy separately from the ongoing activities (Klein et. al. 2003, Yamin and Huq, 2005). This involves incorporation of adaptation interventions in the existing policies, processes and structures and making climate change adaptation part of the process of sustainable development (TERI, 2006). The idea of mainstreaming is rooted in the links between impacts of climate change, development processes and the adaptive capacities of the sectors at the impacts end. Climate, being a resource itself, is closely linked with development. Further, the impacts of climate change are understood to be critical in achieving the development goals (OECD, 2006). Recognition of the impact that climate change will have on development issues such as water supply, food security, health and natural resources has brought adaptation within the broader context of sustainable development (Klein et. al., 2003).

There exists a two-way relationship between development and adaptation to climate change. On the one hand, sustainable development enhances the adaptive capacity of the sectors, regions or communities; lack of adaptive capacity at the other hand, increases the vulnerability of the relevant sectors or regions and communities to the impacts of climate change, thereby impeding the process of development (TERI, 2005). Adaptation interventions supplement sustainable development initiatives. That is, adaptation interventions are 'good practices' by themselves, which enhance the resilience of communities to climate change and variability and also reduce their vulnerability and enhance sustainability (IPCC, 2001, TERI, 2006). The links between adaptation and development are further strengthened as both processes are governed by similar sets of institutions and draw from the same pool of resources and infrastructure. Thus, the role of effective policies and frameworks becomes relevant in addressing the links between development and adaptation to climate change. Institutional frameworks and policies related to key sectors such as disaster management, coastal zone planning, land use planning and resource management can "either contribute to or detract from the adaptive capacity" of a community or a sector, while also determining the degree of exposure to climatic risks (Smith et.al., 2003, Easterling et.al., 2004).

Mainstreaming adaptation concerns in process of development could be done through various routes. Huq (2005) identifies that integration of adaptation in development can be achieved through infrastructure investments that take into account climatic risks and by factoring the climate change needs into development policies relating to water, agriculture, poverty alleviation and disaster and coastal zone management. This integration could be taken up at four levels – local, sectoral, national and global (TERI, 2006). Information regarding climate change adaptation, impacts and vulnerabilities needs to find suitable entry points within the policies and programmes of these relevant sectors. Further, climate screening tools in each sector need to be developed (IDS/IISD/World Bank, 2007) and focus should rest on implementation rather than developing new plans for adaptation (adapted from OECD, 2006).

Designing effective adaptation interventions requires sound understanding of impacts of climate change (Scheraga et.al., 1998). It is understood that the impacts of climate change will manifest themselves at three levels – long term changes in global means, increased climatic variability over shorter time spans and increased occurrence and intensity of extreme climatic events. IPCC (2001) reports that increased temperatures as a result of climate change will lead to frequent and intense heat waves across the globe. In addition, climate change will result in more intense precipitation, causing a higher probability of floods, landslides, avalanches and soil erosion. Anderson (2006) exemplifies this relationship between climate change and

disasters with the help of case studies in Europe. The studies reveals that climate change has an evident impact on certain weather phenomena such as heat waves, cold waves and intense rainfall and that there are emerging similar evidences for events like hurricanes.

Considering that many impacts of climate change will be manifested through increased occurrence and intensity of extreme events, disaster management becomes a natural context for exploring the possibilities of mainstreaming climate change adaptation. Mainstreaming climate change adaptation into disaster management has relevance to both these domains. Climate change is an *additional threat* for the “disaster community” that will increase variability and cause frequent extreme events. Long-term changes in climate and the increased climate variability will also have an adverse impact on the resistance and resilience of the communities to cope with the impact of extreme events, and thus increasing the vulnerability of communities or systems (Burton, 2002, Sperling et.al., 2005, Tompkins et.al., 2005). For the climate change domain, increased frequency of extreme events dramatizes the impact of climate change, thus putting forth the need for immediate action for the process (Burton, 2002). Adaptation to short term climate variability and extreme events will lead to reduced vulnerability to long term climate change (UNDP, 2005). The need to enhance coping capacity for more intense and increased extreme events will make disaster risk management an important instrument for climate change adaptation (Challenger, 2002, Yamin and Huq, 2005).

Disaster management and adaptation to climate change take an overlapping course. Both the processes address underlying vulnerabilities of natural and human systems that put these at risk from natural hazard and climate change. Therefore, both evaluate risks and vulnerabilities and look into possible measures to reduce them. (Sperling et.al., 2005 and Wisner et.al., 2006). Climate change takes into account future climate scenarios and future risks and vulnerability, while disaster management addresses the current risks and vulnerability to the immediate threats in for of extreme events. Climate change domain has extensive information on methodologies and tools for assessing risk, vulnerabilities and adaptation measures. Integrating the knowledge on future scenarios and vulnerability with the current understanding of disaster risks and practical experiences of dealing with such risks will produce synergies for sustainable development. Making the key stakeholders identify that climate change and disasters both impede the process of sustainable development and that an integrated disaster risk management and planned and proactive adaptation will lead to the most effective modality for risk management (Sperling, 2005, Hay, 2002).

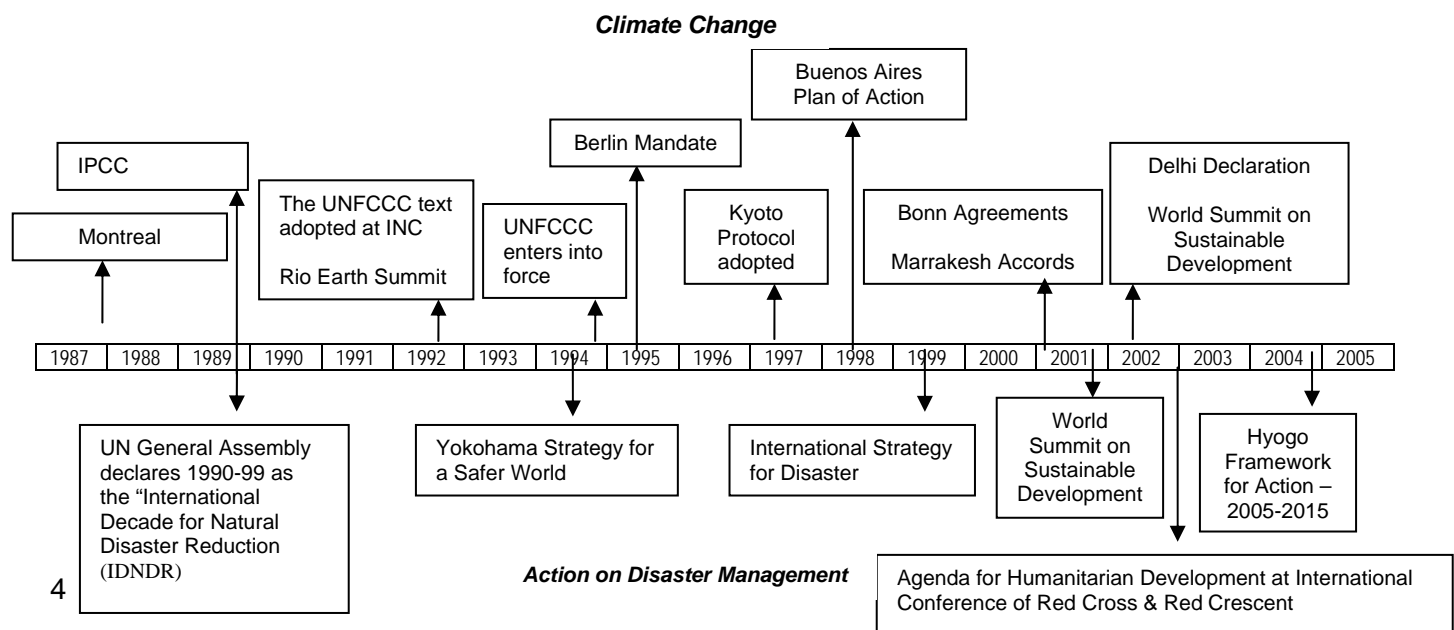
However, designing an integrated framework for adaptation to climate change and disaster management faces certain challenges. Firstly, climate change adaptation does not

focus only on extreme events, but also addresses changes in average climatic conditions and climate variability, which may affect vulnerabilities to natural hazards. Thus, climate change response will also take into account longer periods of impact and response scenarios. Secondly, disaster management also includes hydro-meteorological and geological hazards. Hence, disaster management would take a multi-hazard approach. Thirdly, there exists a marked institutional fragmentation and resulting communication barriers because of parallel but distinct developments in the two themes (Sperling, 2005). While the theoretical differences between the two themes can be addressed by an appropriate policy framework, there is a need to attend to the issue of the institutional gaps that exist in the two themes. It is within a coherent institutional structure that an integrated policy framework for action on climate change adaptation and disaster management can be developed.

3 Evolution of policies for responding to climate change and managing disasters

Action for responding to climate change and disaster management initiatives began simultaneously on the international front as set out in Figure 1. Parallels can also be drawn in the shifting emphasis of policy action in both these fields. Adaptation, as a response to climate change, was recognised in the early statements on the issue; however it has been emphasized only recently in the international UNFCCC discussions with stress being placed on facilitating adaptation in developing countries and new funds being mobilised to finance adaptation interventions. A similar shift in the focus of disaster management policies is observed. The initial action on disaster management focussed on relief and response, gradually shifting to the theme of vulnerability reduction.

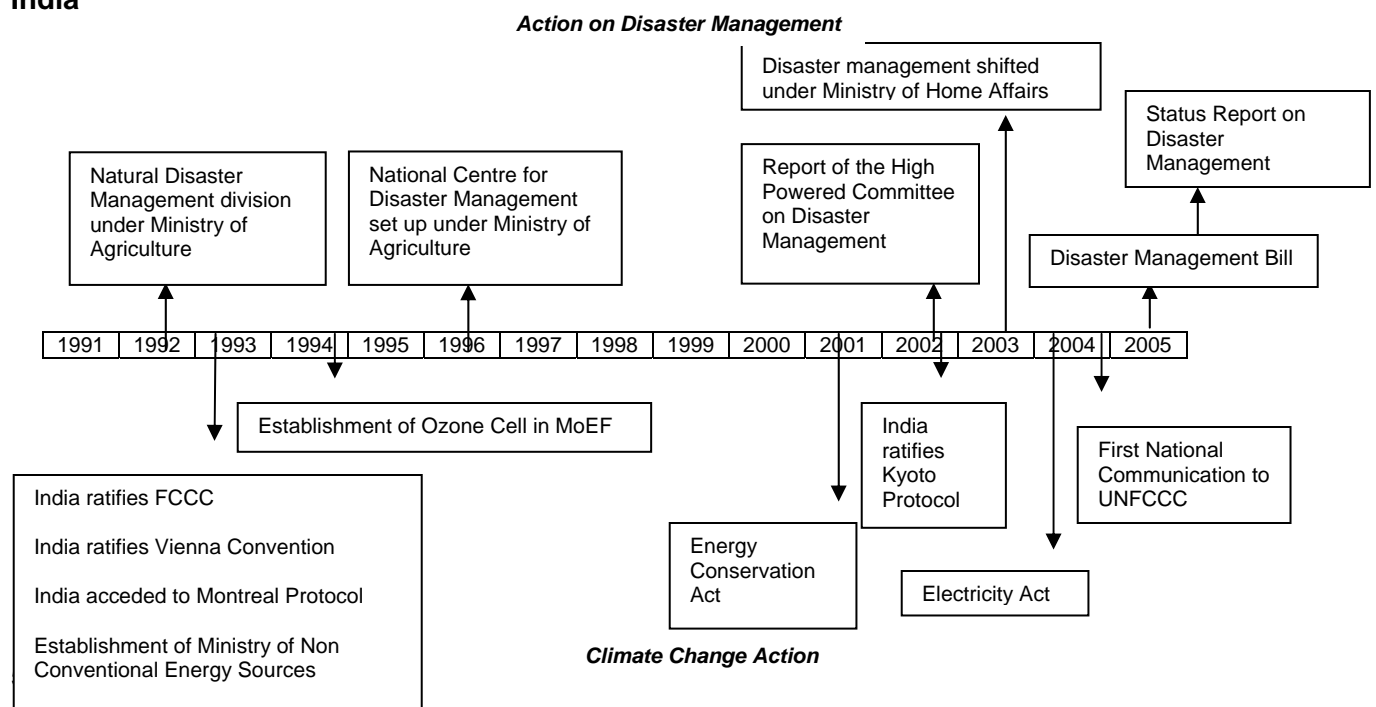
Figure 1: Timeline of developments in climate change action and disaster management



Recent developments in both these fields have addressed the need for and possibilities of integrating adaptation to climate change and disaster management. The IPCC Third Assessment Report (2001) states that adaptation to climate change needs to address climate variability and extremes as well and not only the long-term changes in average conditions. Therefore the approach to adaptation should focus on reducing vulnerability of regions and sectors to climate change, including climate variability and extremes. Integrating climate change adaptation with the disaster risk reduction strategies has also been put forth by the Hyogo Framework for Action 2005. In the action plan for risk reduction, the Framework identifies that the impacts of geological, hydro-meteorological hazards and those resulting from climate change and variability need to be addressed in sector development planning and programmes, as well as in post-disaster situation.

India presents an interesting case for identifying linkages between disaster management and climate change. The country has been prone to climatic risks such as monsoon failures, delayed or excessive rainfall and severe storms, which resulted in droughts, floods and famines. Consequently, disaster management in India evolved from the initiatives taken for dealing with climatic variability and resultant extreme events. However, in its recent incarnation, climate change has been looked at as an 'environmental problem', therefore featuring under the domain of a different institutional setup. The development of formal structures addressing action on climate change and for disaster management came in the decade of 1990's. The timeline, for India, similar to global developments, suggests parallel but disconnected evolution of the two frameworks.

Figure 2: Timeline of developments in climate change action and disaster management in India



The following section studies in detail the evolution of institutional frameworks for disaster management and climate change in India and looks at the interfaces between the stakeholders in both the frameworks as a possible point of integration and linkage.

4 Institutional Setup for Disaster Management in India

4.1 Evolution of Disaster Management in India

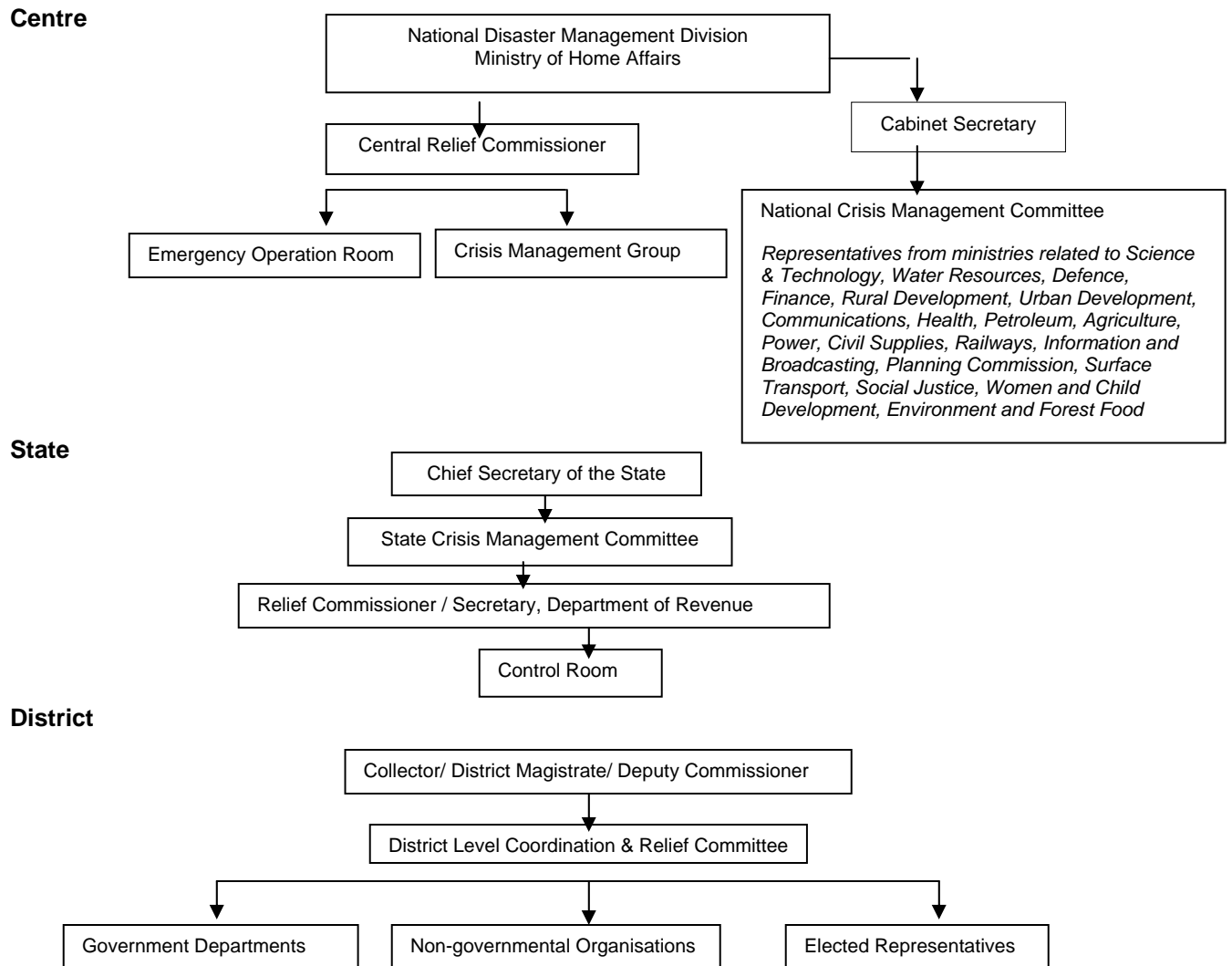
Disaster management in India has evolved from an activity-based setup to an institutionalised structure; from single faculty domain to a multi-stakeholder setup; and from a relief-based approach to a 'multi-dimensional approach for reducing risk'. The beginnings of an institutional structure for disaster management came during British period following the series of disasters that hit the country. These were the Famines of 1900, 1905, 1907 & 1943, and the Bihar-Nepal Earthquake of 1937. Over the past century, the structure for managing disasters in India has undergone substantive changes in its composition, nature and policy.

The British administration chose a reactive approach for managing disasters and set up relief departments which provided emergency relief during disasters. This was an activity-based setup which was functional only in the post-disaster scenarios. The policy was relief-oriented and activities that were initialized as part of this setup included designing the relief codes and initializing food for work programmes. Post independence, the task for managing disasters continued to rest with the Relief Commissioners in each state, who functioned under the Central Relief Commissioner, with their role limited to delegation of relief material and money in the affected area. Frequent occurrence of floods and droughts in the country further limited the scope of disaster issues in India to the two hazards. Since both floods and droughts had a direct impact on the agriculture sector, disaster management in India came to be associated with agriculture and related issues. Every five-year plan addressed flood disasters under "Irrigation, Command Area Development and Flood Control". Till this stage, the disaster management structure was activity-based, functioning under the relief departments, therefore a single-faculty domain setup, and receiving weight only in terms of *'financing relief'*.

The emergence of a permanent and institutionalised setup began in the decade of 1990s. The disaster management cell was established under the Ministry of Agriculture, following the declaration of the decade of 1990 as the 'International Decade for Natural Disaster Reduction' (IDNDR) by the UN General Assembly. Further, India witnessed series of disasters such as Latur Earthquake (1993), Malpa Landslide (1994), Orissa Super Cyclone (1999) and Bhuj Earthquake (2002) which reoriented the policy action and led to the shift from financing

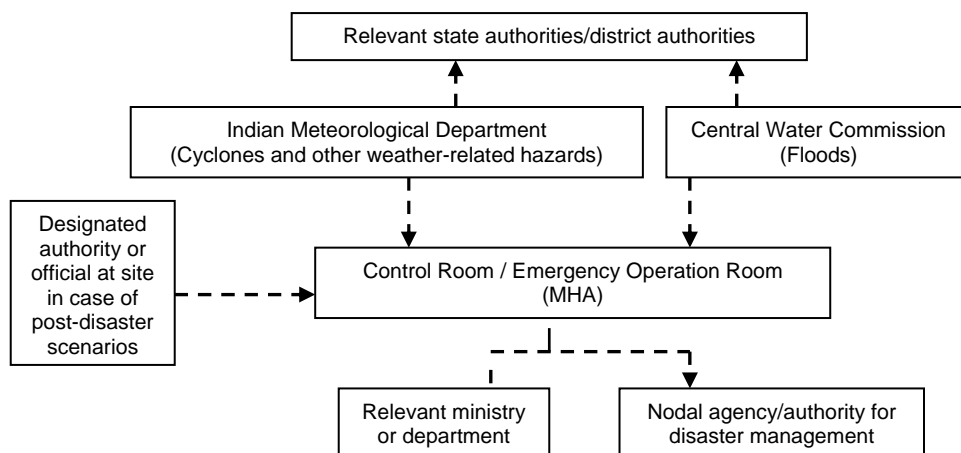
relief to a holistic approach for addressing disaster management. Consequently, the disaster management division was shifted under the Ministry of Home Affairs in 2003 and a hierarchical structure for disaster management evolved in India.

Figure 3: Institutional structure for disaster management in India



Shifting from relief and response, disaster management in India started to address the issues of early warning systems and forecasting and monitoring setup for various weather-related hazards. Consequently, a structure for flow of information, in the form of warnings, alerts and updates about the oncoming hazard, also emerged within this framework.

Figure 4: Flow of information in the disaster management framework



The structure has also become a multi-stakeholder setup involving representatives from different ministries and departments. Some of these ministries were also designated as the nodal authorities for specific disaster types. This has led to emergence of multi-level links between these ministries and the disaster management framework.

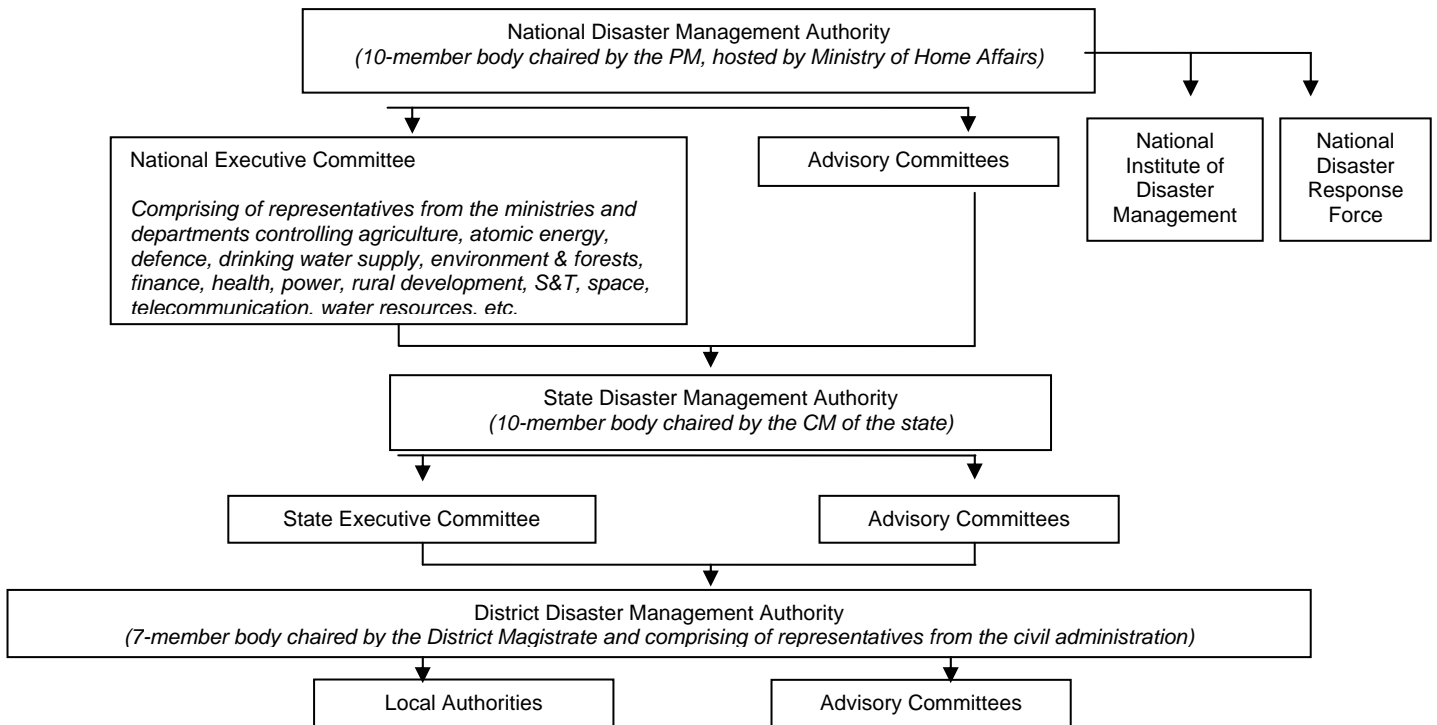
Table 1: Nodal Ministries in India for various disasters

Nodal Ministry	Type of disaster
Ministry of Home Affairs	All natural disasters except drought
Ministry of Agriculture	Drought
Ministry of Health & Family Welfare	Biological disasters
Ministry of Civil Aviation	Air accidents
Ministry of Railways	Railway accidents
Ministry of Environment & Forests	Chemical disasters
Department of Atomic Energy	Nuclear disasters

In 2002, a High Powered Committee Report on Disaster Management recommended establishment of a separate institutional structure for addressing disasters and enactment of a suitable law institutionalising disaster management. Further, the 10th Five Year Plan of India (2002-2007) identified the need for disaster management interventions beyond merely financing relief. The plan stressed on the need for integrating disaster management with development process. The Status Report on Disaster Management (2004) also identified that development, to be sustainable, has to take into account the disaster mitigation needs.

These developments necessitated institutionalization of disaster management framework in India and consequently, the Disaster Management Bill was presented in the Parliament in 2004. The Bill was adopted in August 2005. Following the implementation of the Bill, the National Disaster Management Authority was set up in 2005. Disaster management came to be identified as “*continuous and integrated process of planning, organising, coordinating and implementing measures required for preventing disasters, mitigating the risk, capacity building, increasing the preparedness levels, response actions, disaster assessments, evacuation, rescue and relief and rehabilitation*”. The Disaster Management Bill facilitated mainstreaming disaster management in many ways; firstly, by mandating the involvement of various development-related sectors in the disaster management framework, and secondly, by directing them to prepare and execute disaster management plans in their respective sectors of functioning, thirdly, by making provisions for separate resource allocation for managing disasters, in form of the Disaster Mitigation Funds, and fourthly by facilitating training of persons for disaster management through the National Institute for Disaster Management.

Figure 5: Disaster Management Structure in India following the implementation of Bill



Based on Disaster Management Bill, 2005

In this structure, National Disaster Management Authority is the nodal authority for all disaster management actions in the country. It is the policy making body that frames broad

guidelines for the other ministries at the centre and authorities at the state level. The state authorities further lay down the guidelines for ministries and departments at the state level and the districts falling in their respective jurisdictions. Similarly, district authorities direct the civil administration, departments and local authorities such as the municipalities, police department and civil administration. The Executive Committees at each level are responsible for execution of the tasks envisaged by the Authorities.

4.2 Present structure for disaster management in India

The institutional structure for disaster management in India is in a state of transition. The new setup, following the implementation of the Bill, is evolving; while the previous structure also continues. Thus, the two structures co-exist in the present phase. The National Disaster Management Authority has been established at the centre, and the state and district authorities are gradually being formalized. In addition to this, the National Crisis Management Committee, part of the earlier setup, also functions at the Centre. The nodal ministries, as identified for different disaster types function under the overall guidance of the Ministry of Home Affairs (nodal ministry for disaster management). The stakeholders involved however, remain largely the same. This makes the stakeholders interact at different levels with the disaster management framework.

Within this transitional and evolving setup two distinct features of the institutional structure for disaster management can be identified. Firstly, the structure is hierarchical and functions at four levels – Centre, State, District and Local. In both the setups – one that existed prior to the implementation of the bill, and other that is being formalised post-implementation of the bill, there have existed institutionalised structures at the Centre, State, District and local levels. Each preceding level guides the activities and decision making at the next level in hierarchy. Secondly, it is a multi-stakeholder setup, i.e., the structure draws involvement of various relevant ministries, government departments and administrative bodies (Refer figures 3&4).

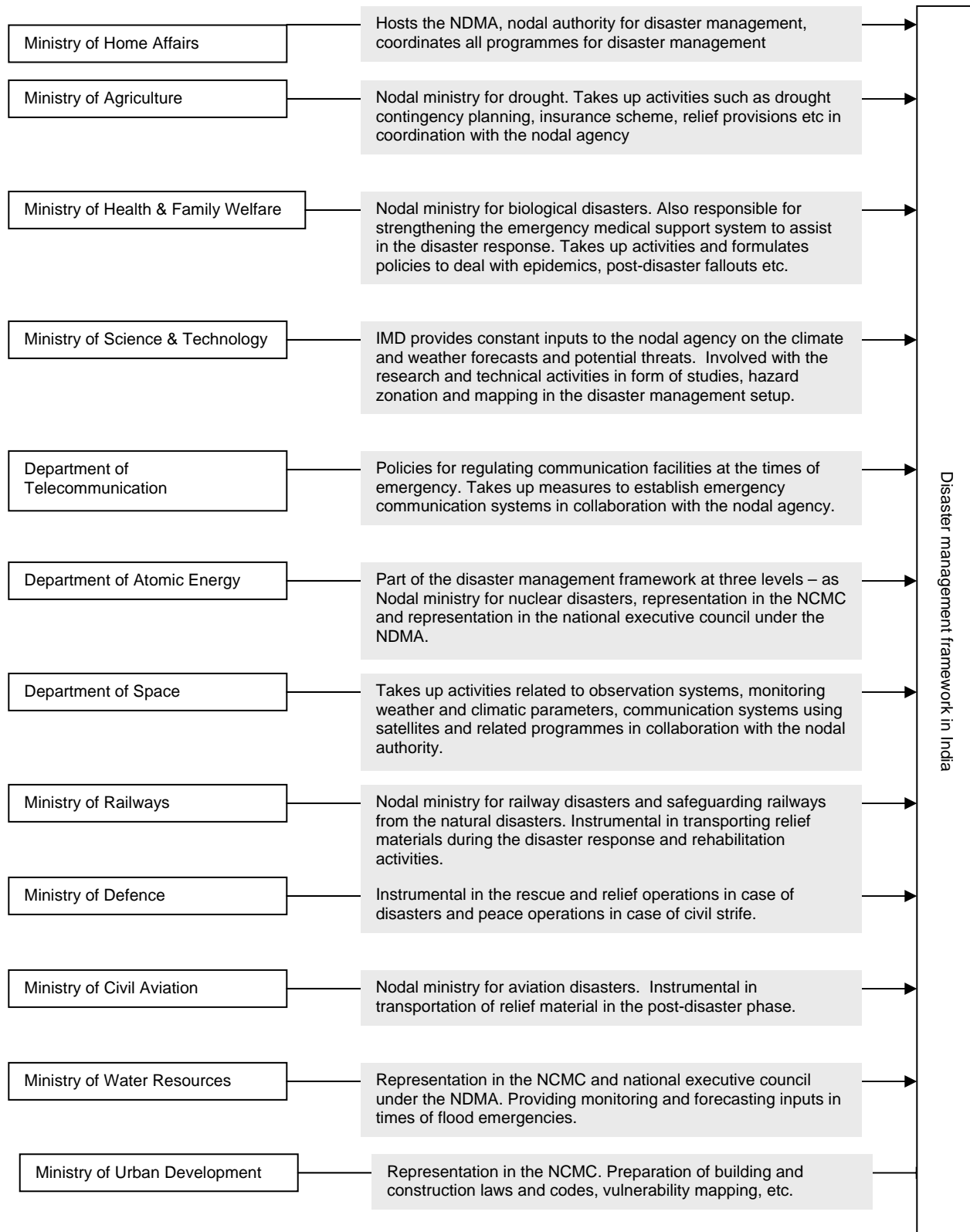
4.3 Interface between the stakeholders

The interface between stakeholders and the disaster management framework is permanent, backed by legislative measures (*Disaster Management Bill*), decisions, such as those taken for establishment of the bodies/committees for managing disasters and the government orders taken out to execute these decisions. These decisions or measures direct the composition of the structure by identifying the stakeholders to be involved in the disaster management

framework. However, these do not define the role to be performed by each stakeholder. Thus, while the involvement of stakeholders in the interface is mandated and permanent, the nature of interface is guided by the expertise or relevance of the stakeholder to the disaster management framework.

The expertise based interfaces emerge when the stakeholders serve as 'service providers' to the disaster management framework. For instance, the institutions under Ministry of Science & Technology and Ministry of Water Resources, that is, Indian Meteorological Department (IMD) and Central Water Commission (CWC) respectively, provide information on the weather and climatic parameters and the potential hazards and threats to the nodal authority. Further, these organisations are involved with disaster planning activities – flood zonation and flood plain management in case of CWC, and hazard mapping and database generation in case of IMD. The organisations and institutions under the Department of Space provide research and technical support by monitoring the weather elements and facilitating satellite based communication, and also undertaking activities such as land use mapping and hazard zoning.

Figure 6: Interface between the key ministries and the disaster management framework



The relevance based interface emerges when stakeholders lie at the impact end of the disaster and therefore are required to undertake policy measures to deal with those impacts. For instance, Ministry of Agriculture undertakes activities for dealing with droughts and its impact on agricultural productivity and farmers and their livelihoods. The ministries related to railways, aviation, atomic energy take up measure to strengthen the resilience of the respective sectors to disasters such as railway accidents, air accidents and nuclear disasters.

Mapping the evolution of the disaster management framework in India reveals that it has evolved from an activity-based structure that dealt with relief and response in the post-disaster scenarios, to an institutionalised structure working through permanent interfaces with stakeholders. Backed by parliamentary and legislative decisions, the structure is full-bodied and developed. The very hierarchical and multi-stakeholder nature of the framework that has been facilitated by the legislative actions makes it possible for disaster management initiatives to be taken up at different scales and also provides an opportunity for integration with development activities at each level. For instance, urban development planning undertaken by the Ministry of Urban Development, which is the part of disaster management framework, also takes into account disaster management concerns while preparing the city development / landuse plans at the city level, and setting policy directives at state and central levels. However, such integration needs to be taken up at a wider scale and newer linkages should be explored. Exploring integration would require the disaster management framework to build its research capacity, in terms of specialised research institutions and enhanced expertise in the field of disaster management, which can provide substantive inputs to various development sectors.

5 Institutional Setup for Climate Change Action in India

5.1 Evolution of climate change setup in India

Climate change action in India has developed and emerged as a priority in keeping with international action on the issue. The First World Climate Conference in 1979 recognised climate change as an issue of international importance. The Conference issued a declaration calling on international action “to foresee and prevent potential man-made changes in climate that might be adverse to the well-being of humanity.” This saw a spur for action on climate change in all countries, and measures to reduce anthropogenic emissions began. One may draw a parallel between these developments on international front with the timing of some legislative actions that were taken in India. These acts, though not addressing climate change at the core of issues, facilitated some degree of climate change mitigation.

Table 2: Legislations related to climate change action in India

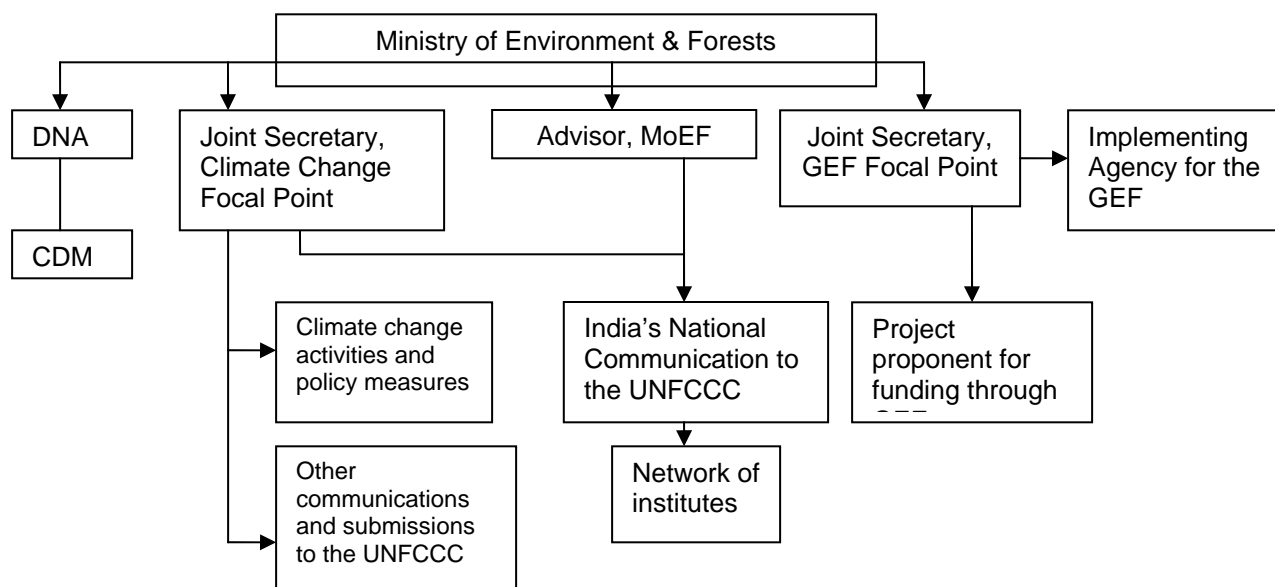
Area	Acts
Air pollution	1. The Air (Prevention and Control of Pollution) Act 1981, amended 1987
Environmental protection	2. The Environment (Protection) Act, 1986, amended 1991
Forest protection	3. Forest (Conservation) Act, 1980, amended 1988

Focused action on climate change in India, however, only came with the ratification to various international treaties and conventions. These were 1985 Vienna Convention and its 1987 Montreal Protocol, 1992 United Nations Framework Convention on Climate Change and its 1997 Kyoto Protocol. The design of the institutional structure for addressing action on climate change in India has been guided by the needs of these international commitments. Accordingly, India needed a structure that could perform a five-fold function. Firstly, represent India in international deliberations, secondly, formulate policies and measures to mitigate climate change and adapt to the impact of climate change, thirdly, publish the inventory of GHG emissions and prepares the report to the Convention on the measures taken to mitigate and adapt to climate change, fourthly, facilitate GEF funded activities for responding to climate change in India, and fifthly, formulate activities under the Clean Development Mechanism. With this, a need-based and activity-oriented structure for climate change action evolved in India.

5.2 Institutional setup for climate change action

The initial framing of climate change as a pollution and environmental degradation issue led to climate change coming under the domain of the Ministry of Environment & Forests (MoEF). It is the nodal authority for all climate change related activities in the country. A number of parallel structures exist within MoEF to look after different set of activities related to the main actions under the UNFCCC with each issues involving different kinds of networks of stakeholders from relevant ministries, government departments, research institutions and organisations. The institutional structures for these issues is determined by the length of the activity which guides them. While the structure for CDM and for the GEF funded projects will stay for as long as the relevant mechanisms and decisions persist, the structure that was created to produce India's first national communication was more ad hoc and thus continued only for the duration in which the information was compiled and formalised in form of a report.

Figure 7: Institutional structure for climate change action in India



5.3 Stakeholders and interfaces in the institutional setup

The three major activities that drive climate change action in India are, submission of national communications to the UNFCCC, Clean Development Mechanism and GEF funded projects. In addition to these, there is a structure for dealing with the international negotiations on climate change action and guiding the national policy for these. These activities entail different networks of government departments, organisations and institutions. The choice of stakeholders in these networks is based on the expertise and involvement of the stakeholder in the select sector or the activity being pursued. A detailed look at the respective networks reveals that a multi-stakeholder setup exists for addressing climate change issues in India.

The Clean Development Mechanism in India is operated through a Designated National Authority (DNA), which receives project proposals for approval and evaluates them according to the guidelines provided. The DNA was established in 2001, in accordance with CMD rules adopted at the Seventh Conference of Parties to the Convention. The DNA is chaired by the Secretary, MoEF and comprises representatives from ministries and departments related to Foreign Affairs, Finance, Industrial Policy & Promotion, Non-Conventional Energy Sources, Power, Planning Commission and Environment & Forests. Thus the composition of DNA includes all relevant sectors that have the potential to take up activities related to low emission interventions and energy efficiency issues that form the core of activities to be undertaken in CDM.

The incremental cost of action taken to respond to climate change under the UNFCCC is covered by the GEF, the entity that operates the financial mechanism of the Convention. A separate section, GEF Cell, functions in the MoEF to deal with GEF project activities ranging from receiving proposals, to evaluating them and sending them across to the Implementing Agencies. This cell is looked after by the GEF focal point in the ministry. This is a three-tiered structure, with project proponents at the base, and the Implementing agency at the top of the structure. In the middle is the GEF cell which evaluates the proposal and approves it so that it can be forwarded to the Implementing Agency as a nationally approved project.

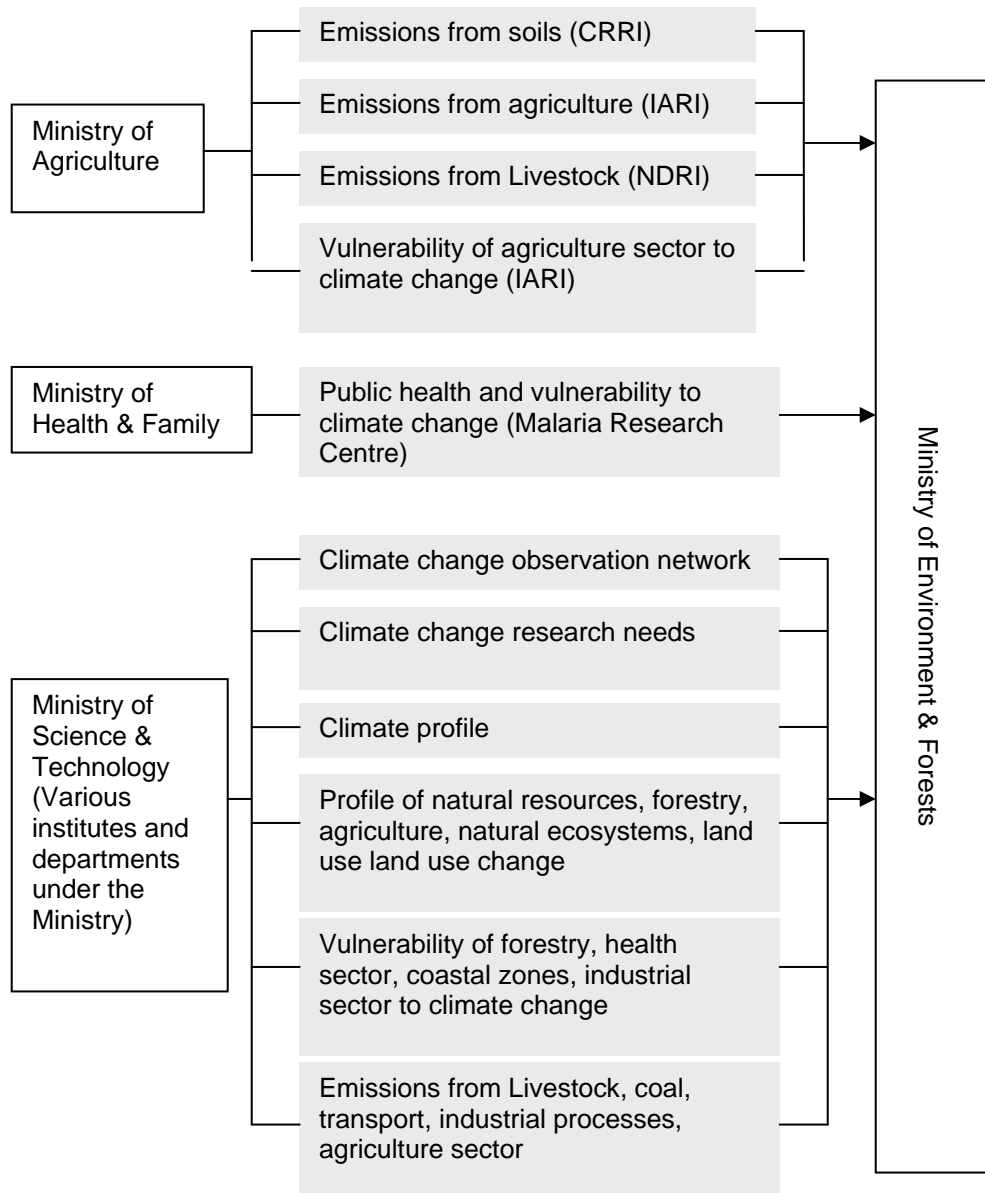
The institutional structure adopted for producing India's first national communication (NATCOM) draws relevance to the present study, being the only activity which addressed adaptation to climate change. CDM and GEF funded projects have taken into account activities related to energy efficiency, low emissions technologies, and use of non-renewable energy sources. Clean Development Mechanism supports activities that lead to reduction in GHG emissions, thereby facilitating mitigation. GEF, on the other hand, provides funding for mitigation as well as adaptation interventions. However, a glance at the projects taken up in India under the GEF reveals that these have been related to energy efficient technology, renewable energy, reduction of emissions from the transport sector, and development of alternate energy options. Adaptation interventions have not been taken up under the GEF funded projects in India.

Adaptation, as the first step, requires climate change modelling and assessment of impacts on various sectors, based on which the vulnerability profile can be drawn and adaptation interventions can be identified. This exercise was facilitated by the NATCOM. Requirements of the national communication included assessment of impacts of climate change on various sectors and vulnerability of each sector to climate change. This also included identification of adaptation interventions that have been taken up in certain sectors, and the future research needs for climate change research. The NATCOM process thus provided the basis on which adaptation interventions could be initiated in various sectors.

The NATCOM process entailed nearly 130 research teams drawn from government departments, ministries, research institutes, non-governmental organisations and universities (for details see Bhattacharya, 2007). The interface between NATCOM participants and the MoEF was important for building a network but had limitations as interactions were adhoc and based on specific inputs. While some institutions were involved in a single component of the exercise, ministries such as science & technology, health and family welfare and agriculture had multiple roles to play in the process. This led to development of multi-faceted interfaces between MoEF and these ministries during the process of information collection and its

formalisation for communication to the UNFCCC. The interface was formally active temporarily and the stakeholders participated actively only for the duration of the exercise. It was unique in terms of its content, as the inputs provided by the stakeholders were scientific and research based in nature. The actors involved were the R&D institutes and S&T wings that function under various ministries.

Figure 8: Research based interface between various ministries and MoEF during Natcom



Climate change structure in India functions through a large network of institutions working on climate change and related themes. Owing to the obligations under the international commitments, there are vibrant international links established on climate issues. However, there

is a lack of coordination among different setups and the stakeholders to address climate change issues, leading to fragmented approach. There is no structured administrative/hierarchical framework that streamlines the activities to be taken up at different levels. The future action for climate change therefore would need to integrate adaptation to climate change with sustainable development programme, establish an organised structure to address the themes related to climate change adaptation and create links among the various stakeholders over a sustained timeframe, rather than on an ad hoc basis.

6 Mainstreaming climate change adaptation in disaster management

The idea of mainstreaming climate change adaptation into the disaster management framework offers advantages to both structures. Disaster management structures in India have a highly evolved and institutionalised setup functioning through a permanent interface with stakeholders. The structure draws its presence from legislative measures, policies, decisions and government orders taken over a period of more than hundred years. Further, the structure is functional at all levels of administrative hierarchy. This structure can provide a ready mechanism for the climate change adaptation interventions to initiate at local, regional and national levels. The climate change network, on the other hand, has a strengthened base of scientific community, both institutional and individual, which can provide insights into new approaches for vulnerability assessments to the disaster management community. It can also provide a strong research support to the disaster management framework.

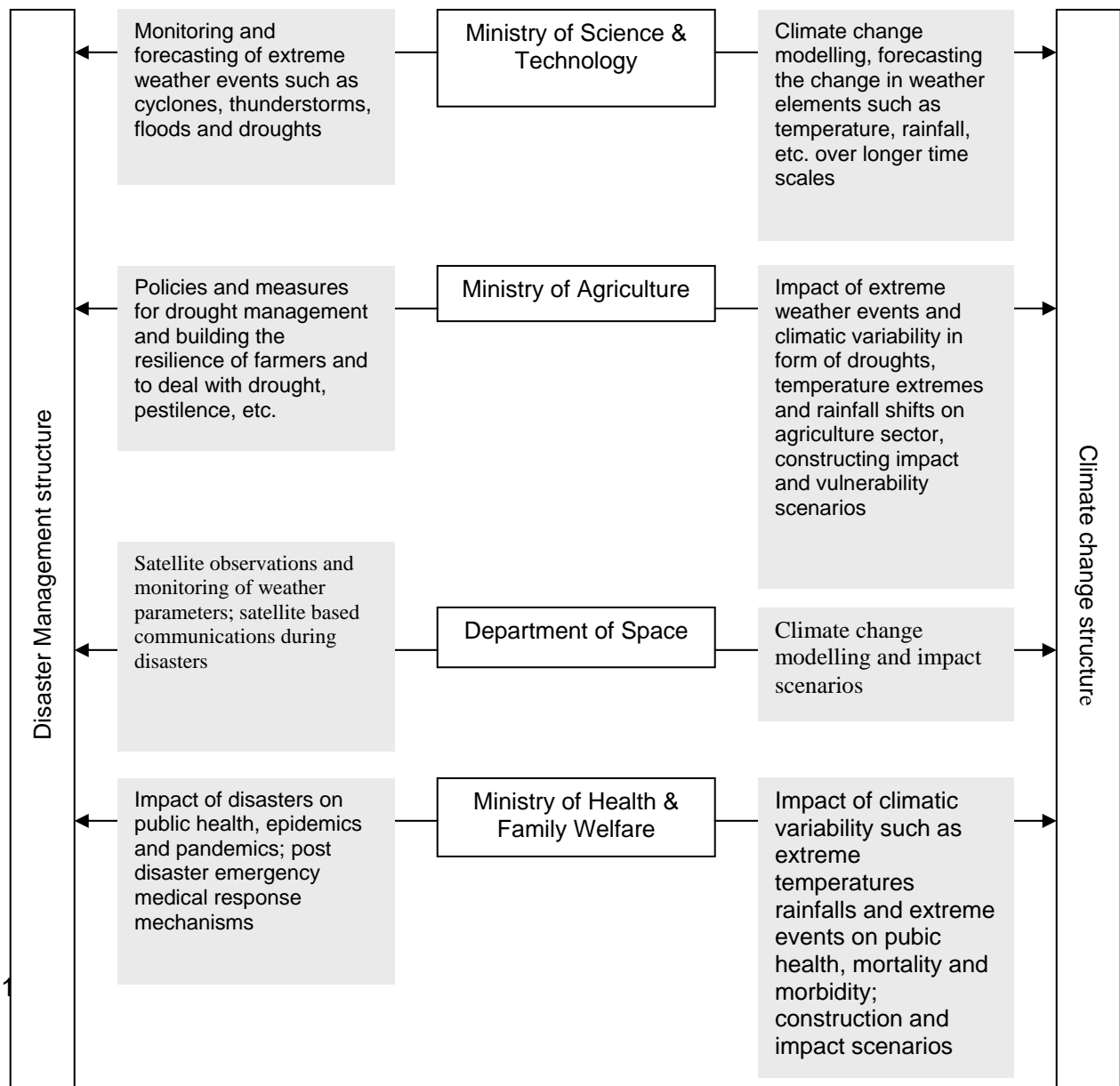
One approach for mainstreaming adaptation in disaster management in India could be through the common stakeholders and their parallel yet similar interfaces with the two structures. The ministries related to science & technology, health & family welfare, agriculture, water resources and space are part of both the structures but they share different interfaces with the nodal authorities for both climate change and disaster management. The differences exist at three levels.

- *'Weather' vs. 'Climate'*: The time scale being addressed in both the frameworks differs. The disaster management structure looks at the extreme '*weather*' events and the immediate threats posed by the weather and geophysical elements, while climate change network functions according to the long term '*climate*' scenarios and impact modelling.
- *Regular vs. Adhoc*: The regularity or frequency of interaction of the stakeholders and the framework varies as the actors in disaster management framework provide frequent or, in some cases, constant inputs to the framework and they are a

permanent part of the structure. The interface in the climate change framework to date, however, has been temporary lasting only for the duration of the specific activity.

- Operational Vs. Research-based:* The character of interface differs in terms of the content of inputs by the stakeholders. The disaster management structure works through an operational interface with its stakeholders. The specific actors that represent the ministry or organisation in this framework are decision makers and the inputs are in form of some service or real-time action. The climate change network, in contrast, functions in a research-based interface with its stakeholders. Consequently, the actors involved here are research institutes or the scientists under the ministries.

Figure 9: Common stakeholders and parallel interfaces with the disaster management and climate change frameworks



These differences in the institutional interfaces can be understood by examining the process and nature of interaction of some key stakeholder organisations with the two frameworks.

The Ministry of Health & Family Welfare for instance, works through separate interfaces with the two systems. In the disaster management setup, the ministry works with the national authority on immediate threats that are fallouts of disaster events – such as cholera, malaria, post disaster epidemics and medical response systems during disasters. The ministry looks into issues such as preparedness of medical services to deal with disaster situation, designing an emergency management plan for medical service units at all levels, and training the personnel on the issues and interventions required during the times of emergency. These activities are taken up regularly, irrespective of occurrence of any disaster event. The interface of the ministry with the disaster management framework is through its Emergency Relief Division. On the other hand, the interface with the climate change structure was activity based and involved research institutes such as Malaria Research Centre which provided research inputs on potential and actual impacts of climate change on human health, vulnerability assessments and adaptive capacities of respective regions or communities. Moreover, this interface was active only during the period of the first national communication to the UNFCCC. Similarly, the Ministry of Science & Technology exercises different interfaces with the disaster management and climate change structures. The interface of the ministry with both the frameworks is through its research organisations and scientific services. Both disaster management and climate change frameworks receive inputs from these services in form of climate observations, forecasts and monitoring of weather elements. In the disaster management setup, there is constant or regular flow of information on the immediate threats in form of extreme weather event, while in the climate change network the forecasts are based on longer time scales, undertaken only for specific activity, after which the organisation plays a passive role in the setup focusing only on data recording.

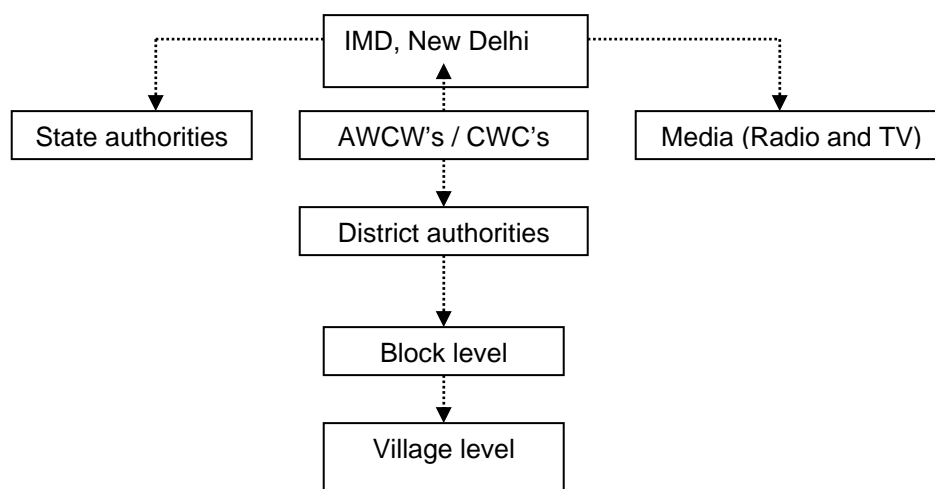
These functional differences are widened by the fragmentation in the common stakeholder organisation between the two frameworks. The common stakeholder organisations in both the frameworks have a dual accountability function to perform which runs from disjointed structures within the same organisation – one catering to the requirements of the disaster management framework which are operational in nature, and the other providing research

inputs to the climate change network. However, these two structures within the same organisation do not interact with each other. The stakeholders are thus characterized by missing links between their operational or function-based organ and the research-based organ. For instance, the Department of Agriculture & Cooperation under the Ministry of Agriculture, which interfaces with the disaster management structure, does not link with the Indian Agriculture Research Institute, research institute under the MoA, that was part of the network created to produce India's first national communication to the UNFCCC. Similar fragmentation is seen in the health ministry, where the Emergency Relief Division functions separately from the research institutes under the ministry. A different case of fragmentation is presented by the Indian Meteorological Department under the Ministry of Science & technology. The organisation functions in both the interfaces, but an identification of the overlaps in the knowledge being generated and information being supplied to both the frameworks is lacking, which leads to fragmented functioning within the organisation.

The two functions within the same organisation also differ in the reach of the information generated or services provided by them. While the information generated or activities taken under the disaster management framework reach different levels of administrative hierarchy and from policy makers to the relevant users and potential victims. By contrast, user engagement with climate change related research inputs is low as research inputs largely remain within the scientific community. This hinders the implementation of action for climate change at regional and local levels and at smaller scales. Thus, for climate change adaptation interventions to be initiated effectively at local levels, these need to be filtered through disaster management structures. The varying reach of the two frameworks can be understood by looking at the case of IMD and the nature of its contribution to the two frameworks.

The IMD has a structured flow of information for the disaster management framework through which it provides information and warnings based on its monitoring and forecasting services. This structured process is best seen in the cyclone warning system of the organisation. The flow of information starts at the Area Cyclone Warning Centres or the Cyclone Warning Centres, which are constantly observing the formations and paths of the tropical cyclones, and goes up to the cyclone monitoring and forecasting unit at the IMD, New Delhi and further to the state, district and village level down in the hierarchy. In case of emergency, the warnings flow through the network reaching all relevant users.

Figure 10: Network for communication of Cyclone Warning



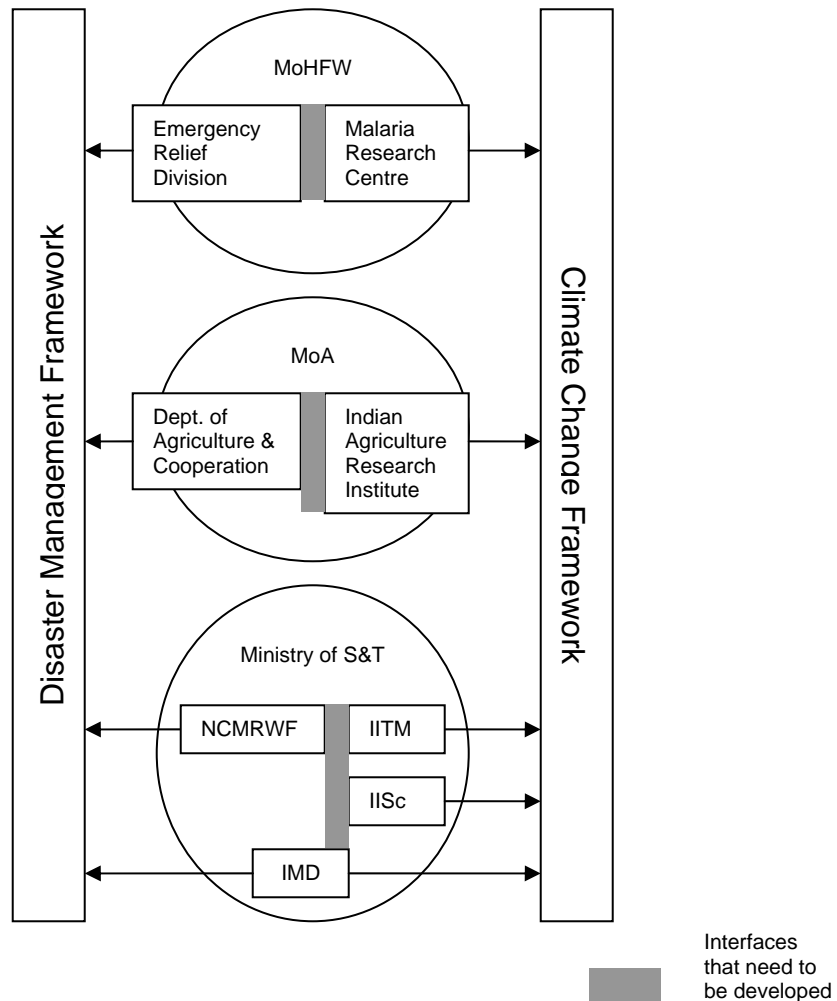
Various services under the IMD provide climate change observations and modelling information. The Ozone Observation Centre, which is also the Regional Ozone Centre for Asia region as designated by the World Meteorological Organisation, collects data and sends it over to the World Ozone Data Centre for archival. The National Centre for Medium Range Weather Forecasting (NCMRWF) under the IMD provides model based medium-range weather forecast for various purposes. This information is used by IMD for its rainfall analysis, the air force and navy, and few other scientific organisations.

As compared with the flow of information in IMD for disaster management framework, the information on climate change does not have a proper dissemination channel. This information stays with the research and scientific organisations and does not reach the levels where adaptation interventions will be required. Often, the information is generated and simply recorded and communicated as data observations, thus lacking practical applications. In a few isolated cases, such as for the compilation of the report for India's first national communication, the information was processed and analysed to present future climatic scenarios.

Similarly, in other sectors such as health, planning, resource management, and agriculture, while the stakeholders work in an organised and structured format with the disaster management framework, the generation and dissemination of information in the climate change domain remains fragmented. This is a direct consequence of the difference in the structure of the two frameworks. Activities in disaster management framework are legally mandated and have been brought into the mainstream by legislative action, while climate change policy network and its implementation is driven largely by international commitments.

Facilitating adaptation to climate change will require adaptation concerns to be integrated in disaster management initiatives. The implementation will essentially be best done by mainstreaming in existing structures for disaster management, rather than functioning parallel to it. Mainstreaming climate change adaptation in disaster management framework will need to address the missing links and gaps in the structures of interface organisations and institutions. This would ideally take a capacity-building approach within a broad and robust policy framework. At the broad level, the capacity of the two frameworks needs to be enhanced so that they are able to link and integrate with each other, that is, the capacity of disaster management framework to be able to incorporate adaptation concerns and that of climate change network for providing substantive inputs to the disaster management initiatives. This would be possible by undertaking extensive capacity-building in the common interface organisations. The internal capacities of these interfacing organisations should be enhanced so as to be able to develop links between their function-based and research-based organs.

Figure 11: Missing links in the Institutional Interfaces



Capacity building initiatives need to address three areas:–

- Developing institutional capacities in terms of the structure that can facilitate linking and knowledge sharing between the two frameworks.
- Developing personnel expertise, that is, the experts and scientists who will undertake and facilitate such knowledge sharing and link with the other framework in the structure provided.
- Providing a legislative basis that not only supports an institutional structure for addressing climate change adaptation and disaster management, but also integrates an accountability structure and defines the nature of interface between the stakeholders.

With such a multi-strand approach, the institutional interface between climate change and disaster management can be developed and strengthened in a manner that can facilitate mainstreaming climate change adaptation concerns in the disaster management framework, and also provide sound research support to the disaster management initiatives.

7 Conclusion

Traditionally, disasters in India have been compounded by climatic factors. Being under the monsoon regime, the country has faced frequent floods, drought and consequent famines. However, the recent developments in the fields of disaster management and climate change have overlooked these obvious links and two separate institutional structures have evolved to service climate change and disasters. Whilst both frameworks have seen parallel developments, disaster management structure receive greater political priority and command immediate attention among policy makers and users as they are associated with immediate and well known risks. Consequently, the disaster management structure in India has a more evolved setup in comparison with the structure for addressing action on climate change adaptation. The former structure, with strong legislative base, can be an effective entry point for integrating climate change adaptation concerns with the disaster management initiatives. Further, the presence of common stakeholders in the interfaces with the frameworks for disaster management and action for climate change make it a suitable alternative for exploring possibilities for integration. However, this will require wide-scale capacity building in the interface institutions. Robust policy measures to enhance the capacity of the interface institutions and also individuals who will be “gateway” and carriers of knowledge from one framework to the other will be required. Integration of climate change adaptation concerns in disaster management will need to be taken up at three levels – integrating adaptation to longer

term climate scenarios with the disaster mitigation and response interventions; regularizing policy networks to take up climate change adaptation within the disaster management framework; and facilitating permeability among the parallel structures within the common actors in both frameworks. Lessons from India can have wider applications as many other countries share the common challenge of deciding how to best link the two parallel tracks for tackling climate adaptation and disaster management.

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