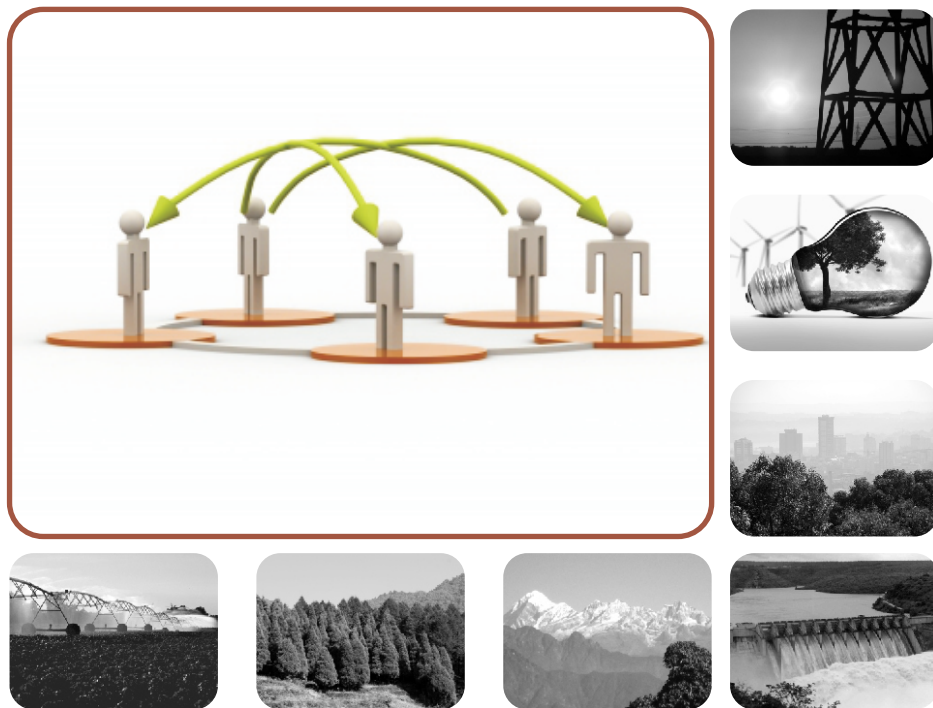


National Mission on Strategic Knowledge for Climate Change



Mission Brief prepared as part of the Study: Implementation of the National Action Plan on Climate Change (NAPCC) - Progress & Evaluation

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National Mission on Strategic Knowledge for Climate Change

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This is one of the eight-brief series prepared as part of the Study titled 'Implementation of the National Action Plan on Climate Change (NAPCC) – Progress & Evaluation'. The Study report, along with the eight briefs, can be accessed at <http://ifmrlead.org/napcc-progress-and-evaluation/>

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About the Study

This Study has been undertaken to provide pointers to facilitate effective implementation of the National Missions under the NAPCC, as well as to highlight key policy aspects that augur well to further this national mandate. Specifically, the Study has sought to track the progress achieved by each of the National Missions since their launch up to March 2015 and also evaluate them through the lens of core policy implementation functions.

Using a combination of desk research and expert interviews, the Study has consolidated informed insights on strategies to accelerate and enhance the efficacy of the Missions' implementation, apart from documenting details of their progress. The Study team has interacted with key Government officials, domain experts in affiliated technical and academic institutions and independent research organizations to gain perspectives from all relevant stakeholders in this context. A distinct format has been followed for reviewing the Missions which have achieved quantifiable progress against their targets.

The findings of this Study were disseminated at a policy workshop, hosted by IFMR LEAD in June 2015 at New Delhi, bringing together policymakers from the concerned Union Ministries, bilateral agencies and other relevant stakeholders. The event marked a focused dialogue on the progress of the NAPCC thus far as well as the way forward for the Missions. Inputs from the workshop have been incorporated into the Study report. While the Study objectives, methodology adopted and findings across Missions have been summarised in this report, detailed findings on each Mission have been elaborated in individual Mission briefs.

Introduction

The National Mission on Strategic Knowledge for Climate Change (NMSKCC) seeks to build a dynamic and vibrant knowledge system that informs and supports national policy and action for responding effectively to climate change challenges, while not compromising on the nation's growth goals. The Mission, approved in July 2010, was envisaged as a *support Mission*, for generating and providing strategic knowledge to the other seven Missions under the National Action Plan for Climate Change (NAPCC). Several inter-connected objectives are sought to be addressed including developing knowledge infrastructure, data sharing, technology solutions, institutional connectedness, capacity building and Mission mode programmes.

There is increasing cognisance of the lacunae in and impediments that limit the ability of a national knowledge system to deliver the required outcomes for effective response. These largely refer to knowledge gaps in key scientific areas, inadequate understanding of the regional and sectoral impacts of climate change, poor connectedness between knowledge-generating institutions, and absence of a system which aids selection of appropriate technology options. Keeping these in mind, the Mission objectives fall broadly within the following domains: knowledge generation & networks, institutional networks, Science & Technology (S&T) innovation, institutional capacity & human resource investment and cross-pollination across Missions. Accordingly the Mission objectives as addressed by these domains are as shown in Table 1.

TABLE 1: NMSKCC OBJECTIVES AND DOMAINS

Objectives	Domain
Developing of national capacity for modeling the regional impacts of climate change on different ecological zones within the country	Knowledge generation and networks
Encouraging research and establishing research networks on impacts of climate change on key sectors (agriculture, health, biodiversity, oceans and coastal systems etc.)	
Formation of knowledge networks among existing knowledge generating institutions engaged in climate science Research & Development (R&D)	Institutional networks
Facilitating data sharing and exchange through a suitable policy framework	
Establish global technology watch groups with the institutional capacity to carry out research on technology selection	S&T innovation
Creating institutional capacity for research infrastructure, and ensuring flow and generation of human resources	Institutional capacity & human resource investment
Complement efforts undertaken by other National Missions	Cross-pollination across Missions ¹
Building alliances and partnerships through global collaboration in research & technology development under international and bilateral S&T cooperation arrangements	

Source: Compiled and adapted from the NMSKCC Mission document

¹ No information could be garnered about collaborations and partnerships, and hence this has not been tracked.

Under each of the domains, initiatives as proposed in the Mission design are highlighted, progress in terms of initiative implementation tracked², departures if any noted and outcomes and recommendations are suggested.

Overview

Mission Implementation

Mission elements and activities are to be implemented through a dedicated programme office, supported by scientific and technical staff, which coordinates with nodal officers of various partnering Ministries and Departments. These partnering nodal Ministries or Departments in charge of implementation Mission elements are as follow³:

1. Climate observations, monitoring, modeling and climate science: *Ministry of Earth Sciences (MoES)*
2. Development of technologies for adaptation and mitigation: *Council for Scientific and Industrial Research (CSIR), Ministry of Science and Technology (MoST)*
3. Agro-biotechnological initiatives for adaptation to climate change: *Department of Biotechnology (DBT) and MoST*
4. Technology watch, foresight, international cooperation: *Department of Science and Technology (DoST) and MoST*
5. Space based environmental data base: *Department of Space (DoS)*
6. International negotiation and policy development and dialogue: *Ministry of Environment, Forests & Climate Change (MoEF&CC)*
7. International cooperation and collaboration: *Ministry of External Affairs (MEA)*

Monitoring

The monitoring mechanism is to be undertaken by three oversight committees described below:

1. **MoEF&CC** is the nodal agency, which takes care of international oversight
2. **MoST** (DoST, CSIR, DBT) and MoES in charge of technology oversight
3. Science & Technology (S&T) oversight function will be steered by the **Principal Scientific Advisor (PSA)**, Government of India (GoI)

Approval and Coordination

An approval mechanism through an *Inter-Ministerial Council* in the form of *Committee of Secretaries (CoS)* is to be formed, comprising members of the MoES, various arms of the MoST, MoEF&CC, DoS and MEA. It is to be noted that there is no fixed timeline for CoS meetings, and this is done on a need basis.

While activities under the Mission are carried out within the administrative and resource allocations of each individual partner Ministry or Department, an effective coordination function is required for steering consultations and informing of each other's developments within the ambit of strategic knowledge.

² Information has been collated up to March 2015 for this purpose.

³ Each sub-Mission is to be steered by a lead institution within the designated Ministry/Department with participation from other related government, academic and private institutions. Also, in order to keep pace with the state-of-the-art emergent technologies, technology watch groups will be set up; and five to six professional expert groups (thematic working groups) will be identified in various scientific institutions for commissioning thematic and policy research programmes and activities.

A coordination cell with a nodal officer each in the MoST, MoEF&CC and MoES has been proposed. This mechanism is expected to facilitate coordination between nodal agencies and thematic working groups and report to the Central Oversight Mechanism and CoS, as well as submit reports to the Prime Minister Office (PMO).

Timelines and Budget

While the Mission has proposed most activities (some of which are ongoing, e.g. strengthening of human and institutional capacities) to be completed by 2010-11, budgetary allocations have been continued till the end of the 12th Five Year Plan period.

Financing for the NMSKCC is envisaged from two sources. The first is from ongoing activities of various knowledge institutions supported through internal resources of the Ministry/Department. Various arms of the government have already earmarked large resources for climate change related actions leading to the indirect development of strategic knowledge. For example, within the MoST and MoES, these allocations are estimated to be above Rs. 2,500 Crores. Second, the Mission shall support research and analysis in areas associated with technology related activities in the R&D sector. It is proposed that Rs. 150 Crores will be required for the implementation of the Mission for the remainder of the 11th Plan Period. An additional special provision has been made for Rs. 150 Crores within the allocated fund of Rs. 11,028 Crores for the DoST for the 12th Plan Period. Special allocations of Rs. 2,500 Crores are planned to build capacity for various Missions/sub-Missions.

In order to understand the modalities of the NMSKCC, it is important to keep in mind the following:

1. There are several ongoing activities in partner Ministries/Departments which fall under the ambit of Mission elements & activities, which indirectly provide support to the NMSKCC. Issues of monitoring, finance and policy administration are therefore internal to these Departments. Hence they do not fall under the purview of NMSKCC tracking, which incorporates information collated up to March 2015 through this study.
2. Although coordination and monitoring mechanisms of the work undertaken by these Ministries and Departments have been envisaged, so far there has been no progress either under the CoS or the oversight mechanism.
3. The overall progress of the Mission must be understood in the context of activities taken up by the partner Ministries. This information is supplied to other Ministries and Departments on a need basis, and indirectly adds to the repository of strategic knowledge that the NMSKCC hopes to build.

Knowledge Generation & Networks

While there is increasing consensus on the deleterious effects of climate change, there is uncertainty on how these will manifest locally and on certain sectors. Moreover, there may be possible surprises from unanticipated effects. However, there are knowledge gaps in key scientific areas, insufficient observational and scientific information database, inadequate knowledge on the impacts of climate change on sectors such as agriculture, health, biodiversity and at disaggregated levels.

Therefore it is important to build a strong capability in basic and applied research in climate science by strengthening observational and modeling tools and systems. Certain areas of intervention have been identified and put into a five-year Mission plan. Table 2 tracks the activities proposed under the Mission, its implementation status and key outcomes.

TABLE 2: OBJECTIVES & DELIVERABLES UNDER KNOWLEDGE GENERATION & NETWORKS

Domain	Mission as written	Mission in practice
Knowledge Generation		
Creation of Regional Climate Models (RCMs)	To augment knowledge base in region-specific modeling, emission factors, vulnerability & adaptation, carbon footprints & disaggregated impact assessments, it was proposed to develop 4-6 RCMs over the 2013-2017 period.	3 RCMs have been developed. INCCA has released "Climate Change and India: A 4X4 assessment" to address concerns regarding the effects of climate change on natural resources and livelihoods.
Submission of technical reports	This is as part of the implementation of sub-Missions ⁴ . Each assigned agency is expected to publish reports. Between 10-12 reports to be prepared over the 2013-2017 period, with annual frequency.	17 technical reports have been published by relevant Ministries and Departments.
Observational ⁵ systems and models	To measure and monitor key climate/ biogeochemical variables	<u>MoES-led systems and models</u> 1. Atmospheric Observation Systems programme (IITM and IMD) ⁶ 2. National Monsoon Mission programme set up 3. Climate Modeling with National Centre for Medium Range Weather Forecasting, Noida. The Centre for Climate Change Research (CCCR), is developing a high resolution model covering entire South East Asia region.
Sectoral impacts of climate change	Impact of climate change on specific sectors such as agriculture, biodiversity, health, ocean & coastal systems, Himalayan ecosystem	Agro-meteorology initiative of the MoES in conjunction with the IMD and agricultural universities are providing weather advisory services to farmers before various stages of farming.

⁴ Sub-Missions include research on monsoons, sea-level rise & storm surges, extreme weather events (MoES), glaciers (DoST), agriculture (MoA), water resources (MoWR), human health & diseases (Ministry of Health), forests & biodiversity (MoEF&CC) and energy (MoP and MNRE)

⁵ It is to be noted that the MoES and the various autonomous bodies working under and with it, are the main drivers of providing observational systems and models. They provide information to relevant Departments as and when needed, and work on the fringes but not directly with the Mission. They work on projects which are not funded from the NMSKCC corpus, but supplement the existing database. However reports published under each of these programmes are counted as Technical Reports.

⁶ Indian Institute for Tropical Meteorology, Pune (IITM) and Indian Meteorological Department (IMD)

TABLE 2 (concluded)

Domain	Mission as written	Mission in practice
Knowledge Networks		
Establishing knowledge networks	<p>Knowledge networks in important areas such as monsoon dynamics, aerosols, ocean & coastal change, long-term change in ecosystems, sector specific vulnerability and adaptation identified. Networks to be anchored by a lead institution depending on competency in the area.</p> <p>To bring out five thematic reports by 2017.</p>	<p>Networks on climate change impacts on health and long-term change in weather have been prepared. Networks on coastal vulnerability and aerosols are expected to be formed by mid-2015.</p> <p>Two reports on climate change impact on agriculture, ocean systems and climate modeling are being prepared.</p>

Source: Study by research team

Institutional Networks

Albeit there are a number of institutions engaged in R&D relating to climate change, there is no mechanism to network these institutions. Data sharing and exchange between them is also limited. Table 3 tracks the progress of objectives directed towards fulfilling these needs.

TABLE 3: OBJECTIVES & DELIVERABLES UNDER INSTITUTIONAL NETWORKS

Domain	Mission as written	Mission in practice
Networks between knowledge institutions	National Knowledge Network (NKN) to serve as the underlying infrastructure to support data sharing and collaboration.	<p>Set up in 2011 by the office of Principal Scientific Advisor, GoI and the National Knowledge Commission.</p> <p>GRID GARUDA initiative is a collaboration of scientific, engineering and academic community to carry out research and experimentation on a nation-wide grid. Currently, it connects 45 institutions across 17 cities.</p>
Data sharing and access	<p>National Data Sharing and Access Policy (NDSAP) to be launched.</p> <p>Establishment of an updatable and interactive knowledge portal on climate change research – free circulation on demand within the government.</p> <p>Limited, but free access with non-governmental and academic research institutions to registered users.</p>	<p>This has been launched, but the progress is currently unclear.</p> <p>This is yet to be initiated. Discussions regarding creating a site dedicated to data and information sharing are under way. States will be enrolled into this programme, and all relevant State-level websites will hold a link to the national-level site. This is considered to be an awareness and capacity building exercise.</p> <p>This is yet to be initiated.</p>

Source: Study by research team

Science & Technology (S&T) Innovation

Initiatives under this domain seek to establish technology watch groups with institutional capacities to undertake research on risk minimised technology selection across climate science, renewable energy, clean coal, sustainable habitats, solar energy, waste etc. It was proposed that eleven such watch groups be formed. Further existing organisations such as Technology, Information and Forecasting Assessment Council (TIFAC), Natural Resources Data Management Systems (NRDMS) within DST, National Environmental Engineering Research Institute (NEERI), National Institute for Science, Technology and Development Studies (NISTADS), divisions within the MoES, Indian Network for Climate Change Assessment/National Communication (INCCA/NATCOM) can play a role in serving as global technology and policy watch groups. Two technology watch groups have been set up so far. Additionally, S&T innovations for climate change are to be operationalized under through two sub-elements or sub-Missions: mitigation and adaptation. Table 4 highlights S&T innovations under the Mission.

TABLE 4: OBJECTIVES & DELIVERABLES UNDER S&T INNOVATIONS

Domain	Mission as written	Mission in practice
Technology	Formation of technology watch groups to select and prioritise technology. 11 groups are to be formed over the period 2013-2017. Existing organisations with institutional capacities can play a role.	Currently, two groups have been formed for solar and renewable energy. Organisations are currently tracking technology solutions on their own accord and provide advisory support as and when needed.
S&T innovations	Operationalised through mitigation and adaptation sub-Missions. CSIR has set aside 11% of the 11 th Five Year Plan budget for mitigation options. Other efforts include National Mission on Bamboo Applications for energy generation and desalination of coastal water through NIOT ⁷ , Chennai, and other programmes under the DoST like adaptation and vulnerability assessments.	There are no updates on the same.

Source: Study by research team

⁷ National Institute of Ocean Technology (NIOT), Chennai

Institutional Capacity & Human Resource Investment

In light of the long-term nature of climate change, its broad scope and inherent complexities, developing a diverse portfolio of capacity-building interventions is key. Capacity building must be undertaken at both the institutional level as well as human capital level. Table 5 provides additional details on this domain.

TABLE 5: OBJECTIVES & DELIVERABLES UNDER INSTITUTIONAL CAPACITY & HUMAN RESOURCE INVESTMENT

Domain	Mission as written	Mission in practice
Institutional Capacity	Centres of Excellence to be initiated by leveraging infrastructure and capabilities of existing institutions at the outset. These could be collectively termed as the 'national climate change knowledge centres'.	SCOPUS™ data provided a list of 100 institutes and 100 scientists, of which 30 institutes working on climate change were invited to submit proposals for 15 topics. 29 proposals from 21 institutions were received. 11 projects were selected, of which 2 were from centres of excellence. Proposals received from IIT-Mumbai and ICRISAT have been accepted. Indo-German Centre for Sustainability (IGCS) set up in IIT-Chennai, funded by the MoST, in collaboration with and part funding from the German Academic Exchange Service (DAAD), for five research projects in four thematic areas - energy, land-use, waste and water - around sustainability challenges that will be exacerbated by climate change.
Human Resource Investment	Climate Change Research and Fellowship Programme to be initiated to create special fellowships at the pre and post-doctoral level. Starting at 50 per year and increasing to about 200 trained professionals. 50 “professor chairs” in universities and IITs for climate research. Incentives to attract young scientists. E.g. the Training School Model of the Dept. of Atomic Energy with training linked to guaranteed employment to be explored for bringing in quality manpower.	75 fellowships have been awarded through this programme. Process of formulating professor chairs for the next five years has been initiated. Currently, institutions that can undertake this are being identified.

Source: Study by research team

Cross-Pollination across Missions

The NMSKCC was envisaged as a Mission to provide inputs to other Missions. Currently, various Ministries, Departments and agencies conduct climate change related research which is shared only on a need basis. Hence there are no directives for convergence between the NMSKCC and other Missions. However, clear areas of synergy can be identified with several Missions, such as cryosphere research (National Mission for Sustaining the Himalayan Ecosystem), adaptation and vulnerability assessment of climate change impacts on agriculture (National Mission for Sustainable Agriculture) and hydrological modeling (National Water Mission). Once an effective mechanism through the NKN is fully operationalised, it can act as a hub where information can be shared and accessed.

Conclusions

1. The greatest achievement of the NMSKCC is the conscious attempt that has been made in ***building capacity of institutions and human resources for knowledge generation***. This includes understanding the critical need to build platforms for filling overall knowledge gaps; data acquisition and sharing; regional and sector specific impacts of climate change and emphasising the need to look at adaptation to climate change by studying socio-economic sectors.
2. Another success has been the ***reliance on existing knowledge institutions***, with specialized core competencies and platforms for undertaking research and development. The decision to use the NKN as the underlying infrastructure for data sharing and collaboration is one such example.
3. ***Avoidance of duplication of efforts*** by stock-taking and mapping in detail nuances of the work being undertaken by each Ministry and Department is another positive aspect of the NMSKCC.
4. There is also an understanding of the ***critical role that the State governments can play*** in the implementation of Mission activities and the need for their enrolment into the NMSKCC. For example, it is proposed that a NMSKCC cell will be created at the State level, wherein all knowledge generated will be made available to the relevant State machinery.
5. While the NMSKCC was conceived as a ***support Mission to other Missions***, the status on this is unclear. There seems to be little or no guidelines or directives in this regard.
6. ***Convergence between the NMSKCC and State-level initiatives*** also is not mentioned. The Mission could have an overarching structure whereby specific State level needs for strategic knowledge could be identified and thereby attention devoted to these. A cognisance of State Action Plans for Climate Change (SAPCC), for example, does not reflect in the NMSKCC.
7. While the Mission discusses ***collaborations and partnerships for inter-disciplinary research and international cooperation on S&T*** through strategic alliances, little has moved on this front. The only effort in this regard has been taken by the MoES for technology enhancement for forecasting by working with universities abroad.
8. ***Private sector participation*** through PPP models in areas such as solar photovoltaic applications and R&D in carbon capture have not been explored.
9. ***Outreach of scientific information*** in a demystified manner to wider audiences is one of the stated objectives of the Mission. It was proposed that NGOs (already working with the MoEF&CC and MoST) could be apposite channels. This is an area where attention must be devoted.

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