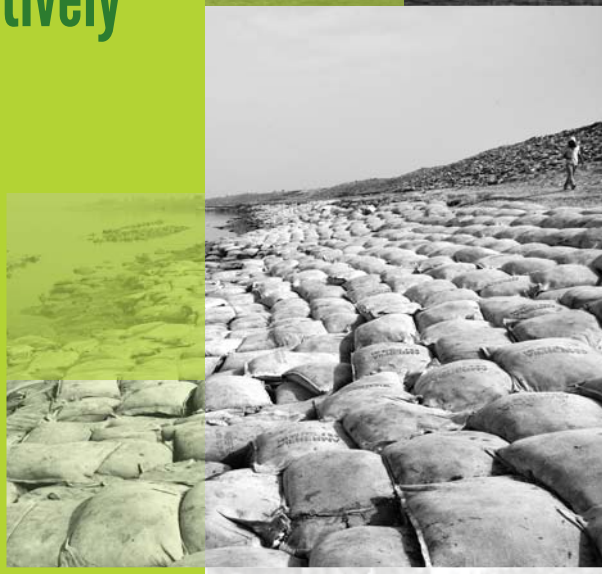
INDIA'S POLICY FRAMEWORK AND STATE OF PREPAREDNESS

for Implementing Measures to Effectively Deal with Climate Change



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With support from

HEINRICH BÖLL STIFTUNG

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CONTENTS


INDIA IS AMONG
THE MOST
VULNERABLE
COUNTRIES IN
THE WORLD TO
CLIMATE CHANGE

EXECUTIVE SUMMARY

Despite being the third largest economy in the world in terms of purchasing power parity [www.datacatalog.worldbank.org: latest data for 2014], India is among the most vulnerable countries in the world to climate change. This has been amply demonstrated by the recent floods and resultant loss and damage in Chennai, as well as in Uttarakhand and Jammu and Kashmir earlier. Despite being a large economy, India is a poor country with around 300 million people in India still living below the internationally defined poverty line [http://data.worldbank.org/indicator/ SI.POV.DDAY]. Further, India is also far behind the developed world in terms of its development attainments, and will take several decades to catch up with countries that have attained a high HDI score of 0.85 or above and are among the highest ranked countries of the world on that metric. However, India also needs to catch up in a manner that is sustainable and resilient to impacts of climate change.

One way in which we can examine whether India is in a position to address the various aspects of climate change is to test whether its policy framework addresses issues that arise out of dealing with climate change. We have done this by examining two major reports have been released relatively recently. These are the "Summary for Policy Makers" of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (AR5) published in 2014 and the report titled "Better Growth, Better Climate: Charting a new path for low-carbon growth and a safer climate" (NCE).

The first is a report that has been prepared by the Intergovernmental Panel on Climate Change (IPCC). The IPCC is an intergovernmental body. It is open to all member countries of the United Nations (UN) and World Meteorological Organisation (WMO). Currently 195 countries, including India, are Members of the IPCC. Governments participate in the review process and the plenary Sessions, where main decisions about the IPCC work programme are taken and reports are accepted, adopted and approved.

The second report has been prepared by The Global Commission on the Economy and Climate. This body is a major international initiative to analyse and communicate the economic benefits and costs of acting on climate change. Chaired by former President of Mexico Felipe Calderón, the Commission comprises former heads of government and finance ministers and leaders in the fields of economics and business. The report that was published in 2014 has an entire chapter on India and contains several specific as well as generic recommendations focused on the policy framework.

Together, both these reports contain several recommendations that have been extracted by us in the form of action points or policy advice that emanate from them. There are, in all, 210 specific pieces of advice or recommendations that can be gleaned from these reports. We have taken the liberty to categorise them in the following manner:

Category	Number of Recommendations[1]
Legal and Institutional Reforms	36
Fiscal and Monetary Policy Measures	28
Integrated Planning and Decision Making	20
Climate Resilient Infrastructure	19
Climate Resilient Ecosystem	18
Climate Resilient Agriculture	14
Social Sector Reforms and Safety Nets	10
Energy Efficiency	10
Education and Awareness	8
Climate Resilient Water Management	8
Disaster Risk Reduction	8
GHG Emissions Reduction	6
Decentralised Decision Making	6
International Cooperation	4
Climate Reslience Through Livelihood Security	4
Renewable Energy	2
Green and/or Smart Cities	2
Disaster Preparedness	2
Capacity Building	2
Artificial Carbon Sequestration Through Geo Engineering	2
Natural Resource Management	1
TOTAL	**210**

We find that the Indian policy framework is able to address only around 50% of the recommendations emanating from these two reports. Further, we find that even the recommendations that seem to be getting addressed by the Indian policy framework need to be further prioritized in order to meet the needs of the people. Greater focus as well as orientation is needed towards climate resilience in several of the ongoing programmes and schemes that could address the threats emanating from climate change. India already mops up a significant percentage of its tax revenues through taxes on fossil fuels without labeling them as carbon taxes and thus it would be useful to bear this in mind when engaging with India on this aspect of international cooperation on dealing with climate change. While the Indian policy framework appears to deal well with sector specific aspects of dealing with climate change such as energy efficiency, climate resilient agriculture, climate resilient water management etc, its weakness lies in not addressing overarching or cross-cutting aspects such as legal and institutional reforms, fiscal and monetary policy and integrated planning and decision making. On the whole however, the Indian policy framework is well placed to extend itself to deal holistically with the threat of climate change. Further, several existing policy initiatives and approaches are validated by the recommendations of the two reports that were examined by us, and need to be further strengthened.

1 For specific recommendations in each category as well as additional details regarding how they are dealt with at present under the existing policy framework, please see annexure 1

I. INTRODUCTION

India is among the most vulnerable countries in the world to the impacts of climate change. This has been amply demonstrated several times over. The recent deluge in Chennai, shows that there is no part of the country that is not vulnerable to the impacts of climate change. Further, the impacts of climate change in recent past have been so severe as to wipe out livelihoods of perhaps the bulk of the people living in the areas impacted by climate change. Thus, Chennai's floods resulting from unusually severe rainfall in a short span of time seems to have resulted in damage and destruction of houses and other fixed assets of the bulk of the population, and not just the poor. The same was the case in the Jammu and Kashmir floods as well as the Uttarakhand floods earlier, and the people of these two states are yet to recover from the devastating losses that they suffered from.

India's GDP when compared with other countries in the world in terms of purchasing power parity, is now the third highest in the world after China and the USA [*www.datacatalog.worldbank.org*: latest data for 2014]. Its per capita GNI in terms of purchasing power parity is, however, 149th in the world [*www.datacatalog.worldbank.org*: latest data for 2014]. In addition, despite the high growth rates that India has been clocking up, and the large number of people that have been lifted out of poverty, around 300 million people in India still live below the internationally defined poverty line [*http://data.worldbank.org/indicator/SI.POV.DDAY*]. Further, according to work done by Branko Milanovic, an economist at the World Bank's Development Research Group, "although there are in India some very rich, and even some extravagantly rich people, their numbers are not statistically significant, and the number of people who have the standard of living of the American middle class is still very limited" [*Milanovic B, Global Income Inequality by the Numbers: in History and Now - An Overview, November 2012*]. India is thus a large economy in gross terms, but still populated by a large number of very poor people. This adds to the level of its vulnerability.

Apart from poverty, there is also large development deficits that India suffers from when compared with the developed world. Vasudha Foundation had carried out a recent study comparing development attainments in India with a set of developed countries that have high HDI values. These were:

- Highest HDI Country Cluster– the countries whose data was included for the purpose of this analysis were Norway, Australia, USA, Netherlands, Germany, New Zealand, Ireland, Sweden
- Medium-High HDI Country Cluster – the countries whose data were included were Switzerland, Japan, Canada, Denmark, Belgium, Austria, and France
- Low-High HDI Cluster– the countries included were Finland, Slovenia, Spain, Liechtenstein, Italy, Luxembourg, UK, Czech Republic, Greece

India's existing development attainments were then juxtaposed against the thresholds exhibited by the above-mentioned groups of countries for the representative indicators identified by us.

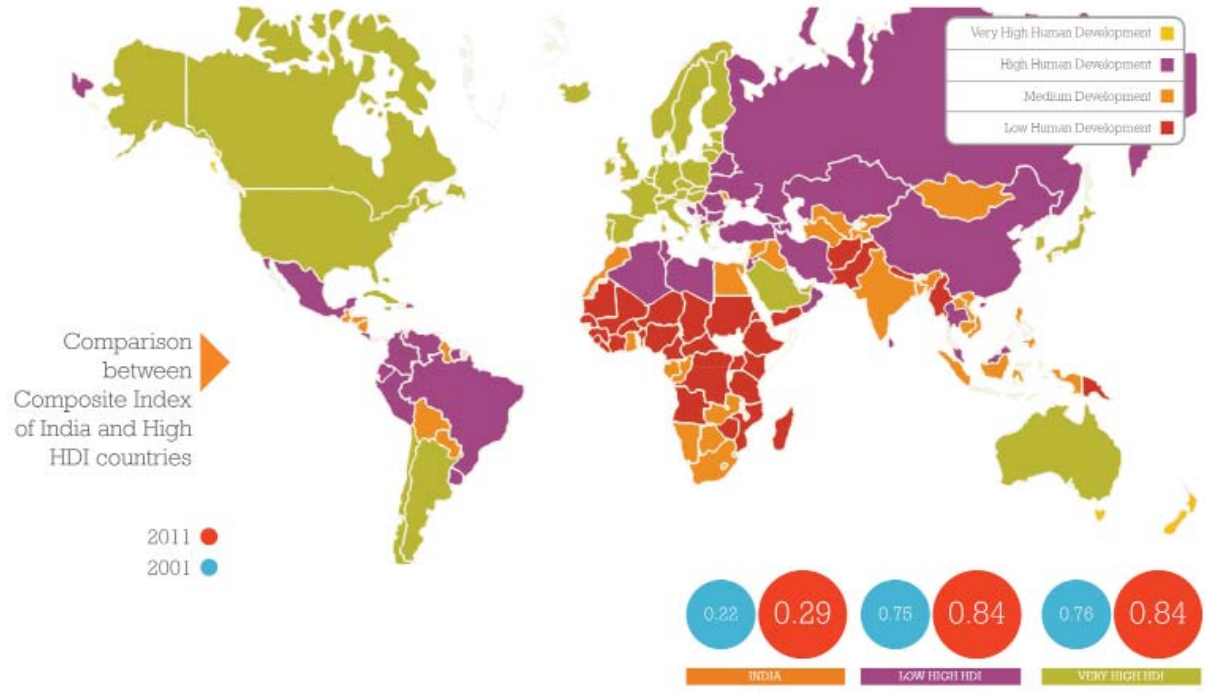
Table 1 shows the difference of India's attainments with these developed countries. India, thus, has lots of catching up to do.

TABLE 1 SECTOR WISE COMPARISON OF INDIA WITH OTHER DEVELOPED ECONOMIES IN TERMS OF HDI

		First data point: 2011 unless otherwise specified			
Sector	Indicator	Highest HDI Country Clusters	Medium High HDI Country Clusters	Low-High HDI Country Clusters	India
Education	Net Enrolment Ratio at the Primary Levels (%)	98	96.38	95.56	81.9
Education	Net Enrolment Ratio at Secondary Level (%)[2]	90.86	87.36	91.78	19.97
Water and Sanitation	Latrine facility at Home (% of total HH)[3]	99.75	100.0	99.6	58.85
Food and Nutrition	Calorie Intake (KCal/person/day)[4]	3374.36	3428.5	3360.86	2625.52
Infrastructure	Roads (kms per 1000 population)	16.47	12.33	15.83	1.25
Energy Access	Per Capita Electricity Consumption (KWH/yr/person)	11297.36	14304	7960	861.0
Household Assets	Telephony (landlines and mobiles)[5]	100.0	100.0	100.0	63.98
Household Assets	Refrigerators (per 1000 households)[6, 7]	1000.0	1000.0	1000.0	26.28
Health	Life Expectancy	81.13	81.75	81.11	67.3

Figure 1 Comparison of India and other developed economies.

Source: http://equity.vasudha-foundation.org/wp-content/uploads/2015/03/Full-Report.pdf



However, India needs to catch up in a manner that doesn't leave it vulnerable to a blowback from impacts of climate change that are expected to become more and more severe with time. Instead, India needs to develop in a manner that would make it resilient to the unfolding impacts of climate change.

2 Data points are 1999, and 2011
3 Data is for 2010-11
4 Data is for 2009-10
5 These thresholds were assumed levels. All High HDI country Clusters have attained full access to mobiles or landline telephones
6 Data is for 2009-10
7 These are assumed levels. We assume that all High HDI countries have access to refrigerators.

II. PURPOSE AND OBJECTIVE OF THE STUDY AND METHODOLOGY

The broad objectives of this project were

a) To deepen the understanding of the implications of the predictions of Climate Vulnerability and Mitigation Potential under various scenarios by the IPCC from an Indian Context

b) To identify the gaps in current policies and policy framework in India in the light of the IPCC findings

c) To analyze the cost implications and cost benefit analysis of Climate Proofing Development from an Indian Perspective

d) To influence the Policy makers on the issues and ensure that addressing climate change is prioritized along with other development priorities.

METHODOLOGY

From a climate change policy perspective, two major reports have been released relatively recently. These are the "Summary for Policy Makers" of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (AR5) published in 2014 and the report titled "Better Growth, Better Climate: Charting a new path for low-carbon growth and a safer climate" (NCE).

The first is a report that has been prepared by the Intergovernmental Panel on Climate Change (IPCC). The IPCC is an intergovernmental body. It is open to all member countries of the United Nations (UN) and World Meteorological Organisation (WMO). Currently 195 countries, including India, are Members of the IPCC. Governments participate in the review process and the plenary Sessions, where main decisions about the IPCC work programme are taken and reports are accepted, adopted and approved.

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economic benefits and costs of acting on climate change. Chaired by former President of Mexico Felipe Calderón, the Commission comprises former heads of government and finance ministers and leaders in the fields of economics and business. The report that was published in 2014 has an entire chapter on India and contains several specific as well as generic recommendations focused on the policy framework.

Together, both these reports contain several recommendations that have been extracted by us in the form of action points or policy advice that emanate from them. There are, in all, 210 specific pieces of advice or recommendations that can be gleaned from these reports. We have taken the liberty to categorise them in the following manner:

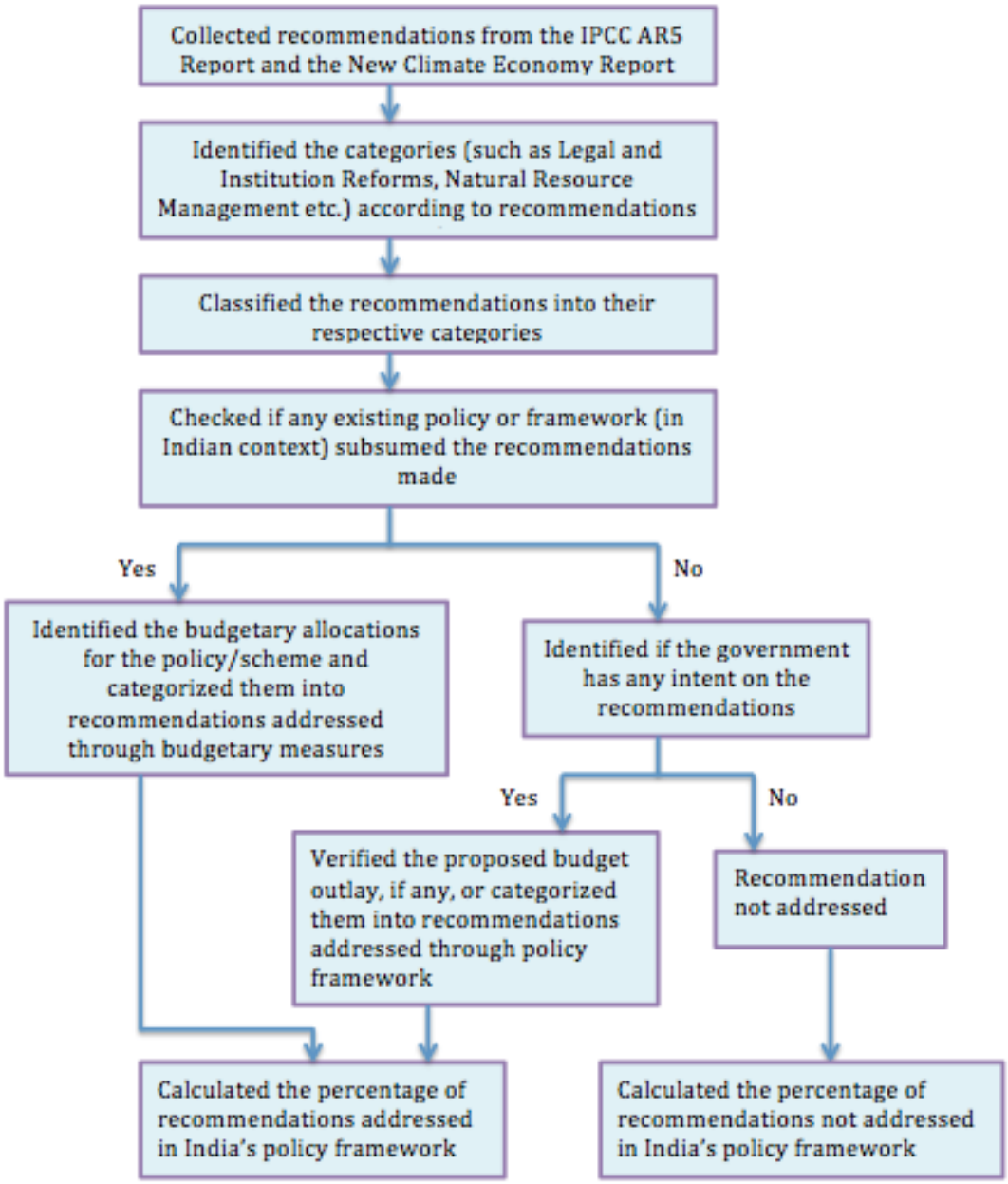
Table 2 Classification of Recommendations from IPCC AR5 Report and NCE Report into Categories

Category	Number of Recommendations[8]
Legal and Institutional Reforms	36
Fiscal and Monetary Policy Measures	28
Integrated Planning and Decision Making	20
Climate Resilient Infrastructure	19
Climate Resilient Ecosystem	18
Climate Resilient Agriculture	14
Social Sector Reforms and Safety Nets	10
Energy Efficiency	10
Education and Awareness	8
Climate Resilient Water Management	8
Disaster Risk Reduction	8
GHG Emissions Reduction	6
Decentralised Decision Making	6
International Cooperation	4
Climate Reslience Through Livelihood Security	4
Renewable Energy	2
Green and/or Smart Cities	2
Disaster Preparedness	2
Capacity Building	2
Artificial Carbon Sequestration Through Geo Engineering	2
Natural Resource Management	1
TOTAL	210

In so far as the process of applying this methodology is concerned, we proceeded in the following manner. Each of the recommendations emanating from these reports were isolated and collated. Then, each of the recommendations was classified as per the categories given above. Thus, a recommendation titled "Local governments and private sectors are considered critical for adaptation progress assuming their roles in scaling up adaptation of communities, households, and civil society and managing risk information and financing (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)*" was not simply put into a generic adaptation box but looked at carefully from the perspective of the suggested action to be taken in the general context of adaptation by *local governments and private sectors*, and thus categorised as a recommendation that was more apt to be placed within the box titled "Integrated Planning and Decision Making".

8 For specific recommendations in each category as well as additional details regarding how they are dealt with at present under the existing policy framework, please see annexure 1

Figure 2 Flowchart of Methodology used



Once all the recommendations that we could extract from the two reports had been classified, we began the next step of trying to find whether these were being addressed within the existing policy and budgetary framework or not. This was done in a step-by-step manner. We first looked at the union budget to find out whether there were any existing and ongoing programmes that addressed the specific recommendations that we had extracted. Wherever, we found a programme or scheme that had objectives that matched with those that the extracted recommendations, in our judgment, sought to promote, we made a note of it. In many cases, the same programme, in our judgment, addressed many of the recommendations, and thus the same programme was noted against different recommendations on multiple occasions. We further looked at existing policies of relevance that may not be fully implemented through budgetary outlays and allocations, but have expressed an intent on behalf of the government for a move in a certain direction. This intent was also recorded against the specific recommendation of the two reports that we had extracted while our perusal of these documents. All of this information was compiled and summarised for brevity, and is placed in Annexure 1 of this report. Further, this summary table also allowed us to carry out an analytical exercise that has allowed us to produce this document which contains our findings as well as allows us to draw conclusions.

III. ANALYSIS OF THE ADEQUACY

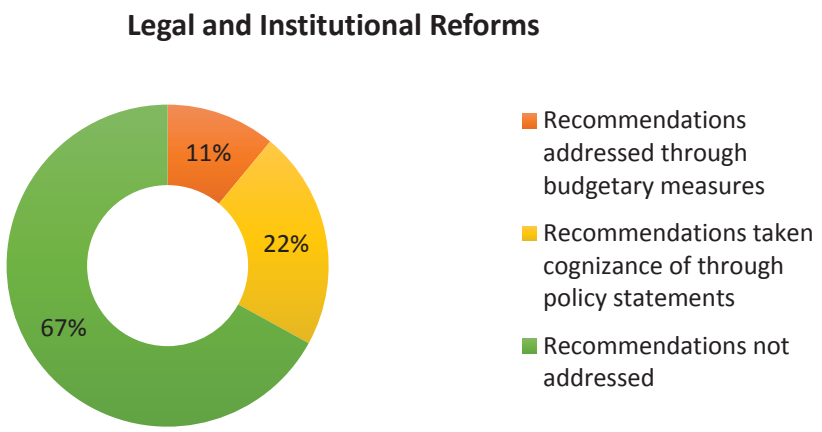
AND/OR INADEQUACY OF THE INDIAN POLICY FRAMEWORK FROM THE PERSPECTIVE OF READINESS TO ADDRESS POLICY IMPLICATIONS ARISING OUT OF THE IMPACTS OF CLIMATE CHANGE

We will now discuss whether the Indian policy framework seems to have the ability to deal with the issues that arise out of the implementation of these recommendations in each of the categories mentioned above. This analysis is based on whether any of the specific recommendations in each category can and/or are being implemented or not, and whether there are any specific gaps in implementing these recommendations or not.

A. OVERARCHING AND CROSS-CUTTING ISSUES

1. **Legal and Institutional Reforms:** Of the 36 recommendations that have been made in both the reports, 12 (33%) are acknowledged if not fully addressed, under the existing policy framework in India. Of these, 4 (33%) are backed by measures that have budgetary allocations against them. Thus, only 4 (11%) of the total recommendations that are acknowledged by existing policy measures are backed by budgetary support. The rest of the recommendations are not covered at all. Some of the notable omissions include recommendations relating to land zoning laws for better land-use and spatial planning, laws to encourage insurance purchasing, measures for mainstreaming of national and regional adaptation plans, reforms leading to the formation of independent regulatory bodies at the state and central levels, strengthening of capacity and accountability of government at the local level etc. Some of the notable recommendations that are already implemented include using a public sector approach where the Solar Energy Corporation of India has already been setup and Indian Renewable Energy Development Agency has been functioning now for around a quarter of a century. Similarly, for disaster planning and preparedness, there is a National Disaster Management Policy and Disaster Management Authorities have been set up at the national and state levels.

Figure 3 Comparison of Recommendations addressed through legal and institutional reforms



The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

The AR5 recommends that land tenure can be a soft adaptation measure for poverty alleviation [*SPM 4.1, pg 26, Para 6, IPCC AR5 SYR*]. In this regard, while land tenure laws vary from state to state, one of the fundamental difficulties is of not having up-to-date land records, which in many states happen to be shambolic. In this regard, the Ministry of Rural development runs a scheme titled "National Land Records Modernisation Programme". Department of Land Records of the Ministry of Rural Development Allocated Rs. 20 crores or USD 3.07 million for this activity in the union budget for 2015-16 [*http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf*]

Further, the AR5 also recommends that there ought to be enactment of laws to support disaster risk reduction as regulatory institutional adaptation measures [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. There are drought codes and flood codes which trigger off relief operations when certain conditions for defining a flood or drought are met. The Ministry of Home Affairs allocated Rs. 919.29 crores or USD 141.4 million under the general budget head of Disaster Management in the 2015-16 budget. This budget head covers "…expenditure on National Disaster Management Programmes (both natural disasters and man-made disasters), for providing grants-in-aid to various institutes/universities for bringing out literatures/organizing training programmes in tackling natural disasters and man-made disasters. It also covers assistance to capacity-building activities such as human resource development, research and consultancy services, studies, documentation and interaction with regional and international agencies in the field of disaster management. It includes provision for USAID Disaster Management Support Project, UNDP-Disaster Risk Management Programme, National Disaster Management Authority, National Disaster Management Training Institute, National Institute of Disaster Management, Disaster Knowledge Network and NIDM and National Disaster Response Force infrastructure. It also includes provision for ex-gratia assistance to victims of disasters, relief for earthquake victims and preparation of Detailed Project Reports for Disaster Management." [*http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf*]

In addition, the AR5 recommends that national government policy and programmes can include integrated water resource management [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. Some of the budget heads that the Government of India spends money on and which deal with various aspects of integrated water management through the Ministry of Water Resources include the Accelerated Irrigation Benefit and Flood Management Programme, Ground Water Management and Regulation, River Basin Management for Northeast and Sikkim especially as well as for the rest of the country, National River Conservation Plan, and the National Ganga Plan. All these programmes are in addition to the National Water Mission. The total allocation under all these budget lines for 2015-16 is Rs. 3937 crores or USD 605.7 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf*].

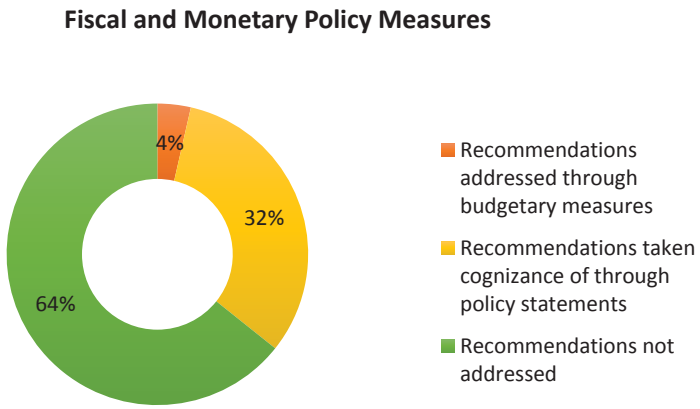
The AR5 also recommends that national and government policy and programs can include ecosystem based management and community based adaptation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. Some of the budget

lines that the Government of India spends money on include Forestry and Wildlife conservation, biodiversity conservation, national mission on Himalayan studies, mission on climate change and adaptation and several state programs on ecosystem management supported through central grants. The total allocation under these budget heads for 2015-16 is Rs. 1098.4 crores or USD 168.9 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

The NCE report recommends using a public sector approach e.g. creation of a national renewable power corporation. In this regard, the government set up the Solar Energy Corporation of India limited or SECL in 2011 with shareholding capital of Rs. 42 crores or USD 6.5 million in 2014 [*http://www.seci.gov.in/upload/uploadfiles/files/Annual%20Report%202013-14%2096dpi%20color.pdf*]. In addition, the government had also setup, way back in 1987, the Indian Renewable Energy Development Agency or IREDA having a shareholding capital of Rs. 784.60 crore or USD 120.7 million in 2014 [*http://ireda.gov.in/writereaddata/Ireda-annual-report-2014-%2015.pdf*]. Further, the Government of India has also further provided budgetary support of Rs. 92 crores to SECL and Rs. 3 crores to IREDA in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe69.pdf*].

2. **Fiscal and Monetary Policy Measures:** Of the 28 recommendations that have been made in both the reports, 10 (36%) are acknowledged if not fully addressed under the existing policy and legal framework of India. Of these, 1 (10%) are backed up by actual implementation. Thus, implementation of 1 (4%) of these recommendations are backed by actual budgetary and fiscal instruments. The rest of the recommendations are not covered by existing hard fiscal or budgetary measures. The notable recommendations that are covered by the existing fiscal and budgetary measures include those dealing with providing of incentives for renewable energy generation, mechanisms to set up carbon prices, scaling back of fossil fuel subsidies, taxes on fossil fuels, etc. The notable omissions among the recommendations offered that are not covered include better assessment of adaptation costs, funding and investments, accounting for all social coats and benefits of different fuels into account to determine the optimal energy mix for India, increasing the flow of concessional domestic debt to renewable projects, reallocation of spending from low yielding subsidies towards alternate and climate friendly initiative.

Figure 4 Recommendations addressed through fiscal and monetary policy measures



The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

The AR5 recommends mechanisms that set up carbon prices, including cap and trade systems and carbon taxes [*SPM 4.4, Pg. 30, Para 5, IPCC AR5 SYR*]. In this regard, there is the well-known PAT scheme which is being implemented by the Bureau of Energy Efficiency. Further, the Government of India also imposes, apart from the basic excise duty, additional excise duties on motor oil and high speed diesel. The revenues that are projected to accrue in 2015-16 from such duties are of the order of Rs. 171127 crores or USD 2632.7 million. In addition, there is also the coal cess which is expected to realise Rs. 13118.04 crores or USD 2018.2 million [*http://indiabudget.nic.in/ub2015-16/rec/tr.pdf*].

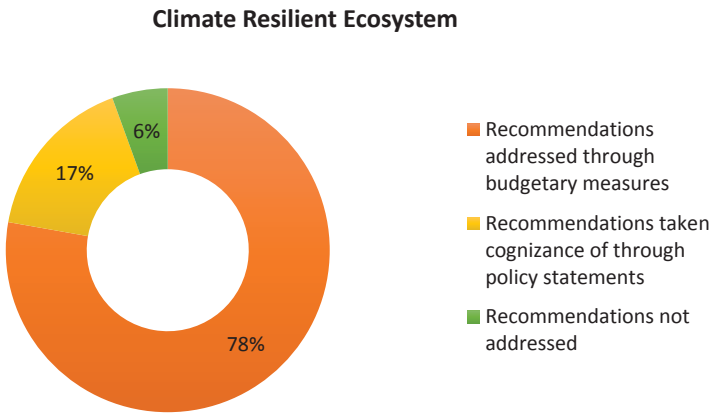
3. **Integrated Planning and Decision Making:** Of the 20 recommendations that have been made in both the reports, none (0%) are covered by the existing policy framework. Perhaps the reason for this anomaly is that India has so far resisted the call for creating new structures to deal with climate change, or begin making changes that are required to be made to the development and decision making process. The recommendations of both the reports contain myriad suggestions that need to be looked at closely and begun to be implemented. Some of these include making efforts to promote economic diversification, provisioning of enabling policy frameworks for integration, involvement of local governments and the private sector in the adaptation process, recognition of diverse interests, circumstances, social-cultural contexts and expectations, understanding and integrating knowledge about indigenous, local and traditional practises including indigenous peoples' holistic view of community and environment, enhancing integrated responses especially in the context of energy planning and implementation, and interactions among water, food, energy and biological carbon sequestration etc.

B. IISSUE / SECTOR SPECIFIC ANALYSIS

4. **Climate Resilient Ecosystem:** Of the 18 recommendations that have been made in both the reports, 17 (94%) are acknowledged if not fully addressed under the existing policy and legal framework of India. Of these, 14 (78%) are covered by measures that have budgetary allocations against them. Thus only 1 (6%) of the recommendations are not acknowledged by the existing policy measures or backed up by budgetary support. The 1 recommendation that is not backed up with hard budgetary and policy support is the one that recommends payments for ecosystem services as an adaptation measure.

   The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

Figure 5 Recommendations Addressed through climate resilient ecosystem



AR5 recommends the Protection of Ecosystem for carbon storage has synergies and trade-offs between adaptation and mitigation measures which can co-benefit both the sectors [*SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR*]. In this regard, the Green India Mission with an allocation of Rs. 64 crores or USD 9.8 million in 2015 is already underway. Further, there are additional ongoing ecosystem conservation programmes such as Project Tiger, Project Elephant, Integrated Development of Wildlife Habitats, National Afforestation Program, Biosphere Reserves, Conservation of Corals and Mangroves, and National Plan for Conservation of Aquatic Ecosystems with a combined allocation of Rs. 321 crores or USD 49.4 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

AR5 recommends that ecosystem adaptation can be done effectively by coastal afforestation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] and mangrove conservation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. The ongoing schemes on Conservation of Corals and Mangroves in particular and also the Green India Mission as well as the National

Afforestation Programme address this issue. The combined allocation of all these missions is Rs. 143.6 crores or USD 22 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

AR5 suggests that ecosystem management adaptation is enhanced by watershed and reservoir management [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, there is the national plan for conservation of aquatic ecosystems of the Ministry of environment and forests that has an allocation of Rs. 32.5 crores or USD 5 million in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]. Further, the Ministry of Water Resources also has allocations under budget heads such as National river conservation plan and the national ganga plan with an allocation of Rs. 2655 crores or USD 408.5 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf*]

Three3 of the recommendations that AR5 makes viz. Adaptation in ecosystem management can be conducted by reducing other stressors on ecosystems and habitat fragmentation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*], Maintenance of genetic diversity can enhance the adaptive capacity of ecosystem [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*], Manipulation of disturbance regimes can lead to better ecosystem management [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] also get addressed by the Green India Mission and various ecosystem conservation programmes mentioned above with a combined allocation of Rs. 385 crores or USD 59.2 million in the 2015 budget of the Government of India [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

AR5 also recommends that the Provision of protected areas can improvise adaptation in land-use and spatial planning [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, the Union Budget of the Government of India already has provisions and the allocations for this year that include budget lines titled Project Tiger, Project Elephant and Biosphere Reserves are of the order of Rs. 155.94 crores or USD 23.9 million in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

AR5 further recommends that Afforestation should be used as an ecosystem adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. Another recommendation is that Reforestation is a valid ecosystem adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. The Green India Mission and the National Afforestation Programme having a combined allocation of Rs. 138 crores or USD 21.2 million in 2015 address both these recommendations [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]. In addition, these allocations also address the following recommendations contained in AR5 and NCE:

a. Cost effective mitigation options in forestry are: Afforestation, sustainable forest management and reducing deforestation (with large differences in their relative importance across regions) [*SPM4.3, Pg. 29, Para 1, IPCC AR5 SYR*]

b. Scaling up of existing initiatives to expand the quality and quantity of forests under the 'Green India Mission'. [*Para 6, Pg. 41, 6.2, NCE SYR India Chapter*]

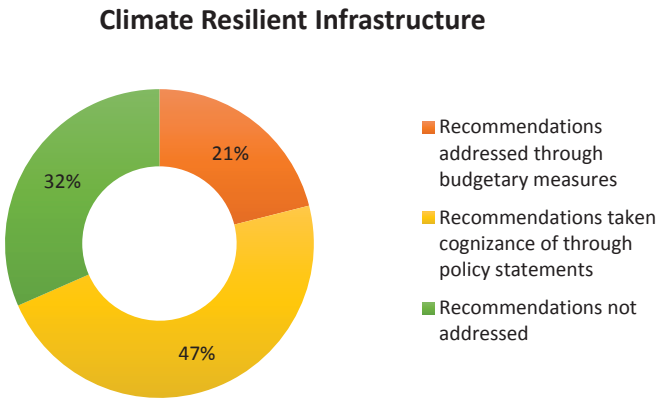
c. Ecological restoration as an ecosystem adaptation strategy. [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]

AR5 further recommends that Assisted Species Migration and Dispersal [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] and Creation of Ecological Corridors [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] ought to be used as an adaptation strategy. As already mentioned above, the Green India Mission with an allocation of Rs. 64 crores or USD 9.8 million in 2015 is already underway. Further, there are additional ongoing ecosystem conservation programmes such as Project Tiger, Project Elephant, Integrated Development of Wildlife Habitats, National Afforestation Program, Biosphere Reserves, Conservation of Corals and Mangroves, and National Plan for Conservation of Aquatic Ecosystems with a combined allocation of Rs. 321 crores or USD 49.4 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

5. **Climate Resilient Infrastructure:** Of the 19 recommendations that have been made in both reports, 13 (69%) are acknowledged if not fully addressed under the existing policy and legal framework of India. Of these, 4 (31%) are backed by measures that have budgetary allocations against them. Thus, only 4 (21%) of the total recommendations are covered by hard policy measures backed by budgetary support. The rest of the recommendations are either not covered at all or covered by soft policy measures that are not backed up by budgetary allocations and spending. Some of the notable omissions include coastal protection structures, floating houses as a structural/physical adaptation measure, using services such as municipal services including water and

sanitation for better adaptation, influencing behaviour, lifestyle and culture, broad reforms of land regulations, coordinating land regulation reforms with development of infrastructure initiatives etc. Some of the notable recommendations that are already implemented include dealing with disaster risk management, better transport and road infrastructure, food storage and preservation facilities, hazard and vulnerability mapping, monitoring early warning systems, creating building standards, upgrading and expanding electricity transmission network, voluntary codes along with minimum energy efficiency standards etc.

Figure 6 Recommendations addressed through climate resilient infrastructure



The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

AR5 recommends addressing disaster risk management through flood and cyclone shelters [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, the Ministry of water resources spends money on flood forecasting and flood protection as well as developing flood control infrastructure. The allocation on overall flood control in the central budget was of the order of Rs. 244.64 crores or USD 37.6 million in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf*]. Further, cyclone shelters have been built through allocations made under the budget head of disaster management by the ministry of home affairs which has an overall allocation of Rs. 919.29 crores or USD 141.4 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf*]

AR5 recommends that Better transport and road infrastructures can also help in reducing the vulnerability by natural disasters [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, even excluding the expenditure incurred by the national highway authority of India which is a whopping Rs. 42,694.50 crores, the ministry of road transport and highways has allocated Rs. 8833.53 crores or USD 1359 million for various roads and bridges in the 2015 budget [*http://indiabudget.nic.in/ub2015-16/eb/sbe83.pdf*]

AR5 also recommends that Monitoring early warning systems be used as a technological adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, the Ministry of Earth Sciences is spending Rs. 178.54 crores or USD 27.5 million on satellite services and observatory and weather stations all across the country according to the GoI budget of 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe31.pdf*]

The NCE recommends that Voluntary codes along with mandatory minimum energy efficiency standards can play an important role in reducing GHG emissions [*Para 2, Pg. 41, 6.1, NCE SYR India*]. This work is being carried by the Bureau of energy efficiency which functions under the Ministry of Power. The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year was Rs. 50 crores or USD 7.69 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf*]

6. **Climate Resilient Agriculture:** Of the 14 recommendations made by both the reports, 14 (100%) are acknowledged and fully addressed by the existing poliy and legal framework of India as well as backed by hard

budgetary allocations. As such, all the recommendations in both the reports are fully addressed through the existing legal, policy and budgetary/fiscal framework.

The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

AR5 recommends that Changed cropping pattern, livestock and aquaculture practices are some adaptation options that can be used to conserve the ecosystem as well as better livelihood [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. These aspects are being address through the National Mission on Sustainable Agriculture having a budgetary allocation on Rs. 1018.55 crore or USD 156.7 million in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*]

Further, the AR5 also recommends using of new crops and animal varieties as a technological adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. Most of this work is carried out by the Indian Council of Agricultural Research and the specific programmes that the Government of India funds according to its budget include crop and animal husbandry as well as fisheries. The combined allocation under these heads for the union budget in 2015 was Rs. 5205.38 or USD 800.8 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf*]

In addition, the AR5 also recommends the use of efficient irrigation and water saving technologies as a technological adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This aspect is at present being addressed by the Pradhan Mantri Krishi Sinchai Yojana that has been allocated Rs. 1800 crores or USD 276.9 million in the 2015 budget [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*]. Further, the National Mission on Sustainable Agriculture having a budgetary allocation on Rs. 1018.55 crore or USD 156.7 million in 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*] also addresses this aspect

The AR5 recommends changed cropping, livestock and aquaculture practices as a behavioral adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. The national mission on sustainable agriculture and the climate resilience agriculture initiative together address this aspect. The combined allocation of these two budget lines is Rs. 1121.55 crores or USD 172.5 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf*]. Further, there is also an initiative on inland fisheries that deals with this aspect titled Blue Revolution and has been allocated Rs. 92.2 crores or USD 14.18 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf*]

The AR5 recommends that Cropland management, grazing land management and restoration of organic soils are important mitigation options for the agriculture sector [*SPM 4.3, Pg. 29, Para 1, IPCC*]. The integrated watershed management programme of the Ministry of Rural Development as also ICARs Soil and Water conservation programme together address this with a combined allocation of Rs. 2236.83 crores or USD 344.1 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf*]

Two recommendations made by the NCE for the farm sector are (a) Adaptation strategies like changes in planting dates and crop varieties can offset some of the negative impacts of smaller temperature increases [*Para 1, Pg. 10, 2.1, NCE SYR India Chapter*] and (b) Application of modern agricultural technologies and practices that boost crop and livestock productivity and which economise on inputs such as land, water and fertilizers can benefit in raising the farmer's income, strengthen resilience to climate change and abate GHG emissions [*Para 2, Pg. 27, 4, NCE SYR India Chapter*]. A whole host of the programmes of the Ministry of Agriculture address this through initiatives such as ICARs Climate Resilient Agriculture Initiative, Animal Husbandry, Crop Husbandry, Soil and Water Conservation address this aspect along with National Mission on Sustainable Agriculture and Per Drop more crop address these issues. The combined allocation of all these initiatives is by the Ministry of Agriculture is Rs. 7315.21 crores or USD 1125.4 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf*]

Additionally, 3 recommendations of the NCE are (a) Adequately resourced public initiatives in the livestock sector can increase animal productivity and can control total numbers, strengthen resilience and reduce GHG emissions [*Para 5, Pg. 33, 4.4, NCE SYR India Chapter*], (b) Methane emissions can be reduced by enhancing the digestibility of animal feeds by providing better quality of animal diets [*Para 5, Pg. 33, 4.4, NCE SYR India Chapter*] and (c) Better animal health and reproduction management can help increasing the proportion of healthy and productive animals thereby reducing methane emissions, reducing pressure on water and other natural resources and making

animals resilient to climate change [*Para 5, Pg. 33, 4.4, NCE SYR India Chapter*]. These are all addressed through the animal husbandry programme of ICAR as well as cattle development programme of the Department of Animal Husbandry and the combined allocation of these two programmes in the budget for 2015 was Rs. 794.6 crores or USD 122.24 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf*]

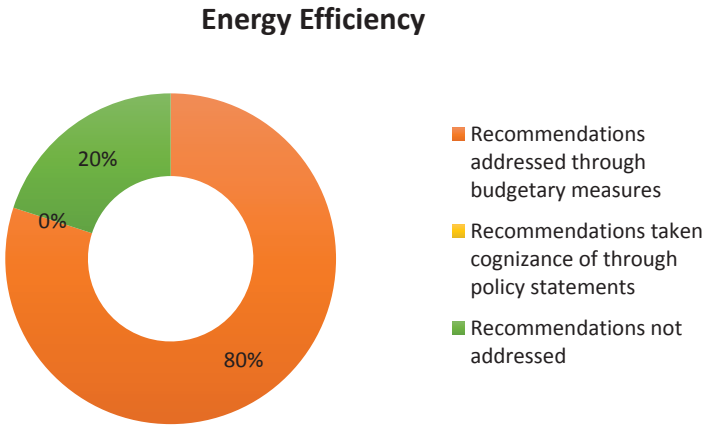
NCE also recommends that the Use of new methods of cultivation (e.g. System of Rice Intensification (SRI)) can help reduce water usage and methane emissions while improving resilience [*Para 7, Pg. 33, 4.4, NCE SYR India Chapter*]. This aspect is being taken care of by the Climate Resilient Agriculture Initiative and the National Mission on Sustainable Agriculture with a combined allocation of Rs. 403 crores or USD 62 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*]

Further, the NCE recommends Promoting energy efficient water pumps for better water management [*Para 8, Pg. 33, 4.4, NCE SYR India Chapter*]. This aspect is covered under the Bureau of Energy Efficiency's Agriculture Demand Side Management Scheme. The BEE has been provided with an annual budget of Rs. 50 crore or USD 7.69 million for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf*].

The NCE also recommends Using micro-irrigation methods such as drip and sprinkler irrigation for better water management [*Para 8, Pg. 33, 4.4, NCE SYR India Chapter*]. This aspect is at present being addressed by the Pradhan Mantri Krishi Sinchai Yojana that has been allocated Rs. 1800 crores or USD 276.9 million in the 2015 budget [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*].

7. **Energy Efficiency:** Of the 10 recommendations made by both reports on this aspect of dealing with climate change, 8 (80%) are acknowledged if not fully addressed under the existing policy and legal framework of India and being implemented in India under the various schemes being run by BEE. Some of these include regulatory approaches such as energy efficiency standards and information measures such as labelling programmes, making efforts to reduce the proportion of coal in the country's fuel mix, etc. Notable omissions include improving agglomeration productivity, behaviour, lifestyle and cultural influences etc. The only department that is proactively involved in this effort is the Ministry of Power. However, when doing hard implementing some of the planned interventions on energy efficiency, the relevant ministries such as ministries of coal, surface and air transport and industry are also involved.

Figure 7 Recommendations addressed through energy efficiency



The Bureau of Energy Efficiency is involved in implementing several programmes that also address the aspects covered under the following recommendations on energy efficiency that have been made in AR5 and NCE. These include:

a. Near-term reductions in energy demand are very important in cost-effective mitigation strategies. (*SPM 4.3, Pg. 29, Para 1, IPCC AR5 SYR*).

b. Regulatory approaches such as energy efficiency standards and information measures such as labelling programs are environmentally effective and can help consumers make better-informed decisions. (*SPM 4.4, Pg. 30, Para 3, IPCC AR5 SYR*)

c. Adopting methods such as improved energy efficiency or reducing the proportion of coal in the country's fuel mix will be necessary to reduce GHG emissions. (*Para 2, Pg. 14, 2.3, NCE SYR India Chapter*)

d. Mandatory minimum energy efficiency standards can be an effective tool (*Para 2, Pg. 14, 2.3, NCE SYR India Chapterl*)

e. Fuel efficiency standards for new cars can be an important step towards better management of energy demand in the transport sector. (*Para 1, Pg. 21, 3.2, NCE SYR India Chapter*)

f. Introduction/tightening up of mandatory minimum energy efficiency standards for appliances, vehicles and buildings can play an important role in reducing GHG emissions. (*Para 2, Pg. 41, 6.1, NCE SYR India Chapter*)

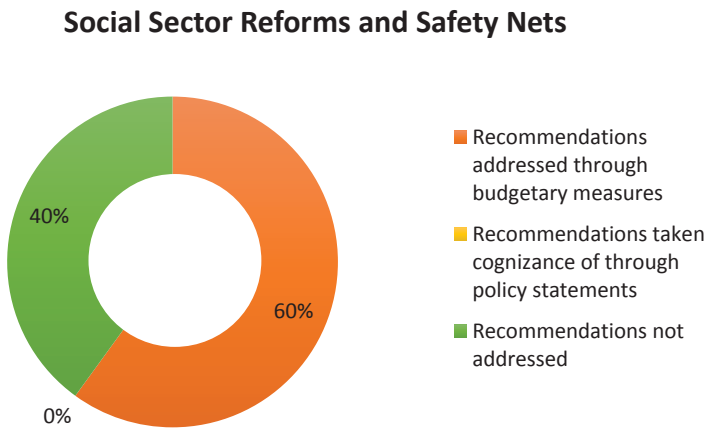
g. Careful monitoring and impact evaluation to ensure vigorous enforcement of minimum energy efficiency standards. (*Para 2, Pg. 41, 6.1, NCE SYR India Chapter*)

h. Expanded information initiatives along with mandatory minimum energy efficiency standards can play an important role in reducing GHG emissions. (*Para 2, Pg. 41, 6.1, NCE SYR India Chapter*)

As already mentioned, the allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million [http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf]

8. **Social Sector Reforms and Safety Nets:** Of the 10 recommendations made by both the reports, 6 (60%) of the recommendations are acknowledged if not fully addressed by the Indian policy and legal framework and all are backed by hard policy measures including budgetary support. The 4 exceptions are those pertaining to using food banks and distribution of food surpluses, using services such as vaccination programmes for better adaptation, reliance on social networks as behavioural adaptation strategy, using of food banks and to constitute a nationwide system of social protection to address adverse impacts of subsidy removal on the rural poor.

Figure 8 Recommendations addressed through social sector reforms and safety nets



The specific policy recommendations that are at present being backed up by budgetary measures and the specific allocations that address these recommendations are given below:

AR5 recommends that Some of the response adaptation options for human development can be improved access to education. [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, GoI through the Ministry of Human Resources Development supports elementary and secondary education that have a combined allocation of Rs. 36066.5 crores or USD 5548.69 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe59.pdf*]

AR5 recommends that Better nutrition and health facilities can also help in effective human development. [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, The Ministry of Women and Child Development and the Ministry of Health have Several allocations in the Union Budget. These include allocations for National Health Mission, Public Health, and Medical Institutions by the Ministry of Health and Integrated Child Development Scheme, Women Welfare, and National Nutrition Mission by the Ministry of Women and Child Welfare. The combined allocation of all these schemes in the Union Budget for 2015 by the GoI is Rs. 14806.7 crores or USD 2277.95 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf*]

AR% recommends that Reduced gender inequality and marginalization in other forms can be beneficial in enhancing adaptation in terms of human development. [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, The Ministry of Women and Child Development runs the following programmes viz. Empowerment of Adolescent Girls, Beti Bachao Beti Padhao Programme, an omnibus Women Welfare Programme and the Indira Gandhi Matritva Sahyog Yojana. In the Union Budget for 2015 there is a combined allocation in these heads of Rs. 798.53 crores or USD 122.85 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf*]

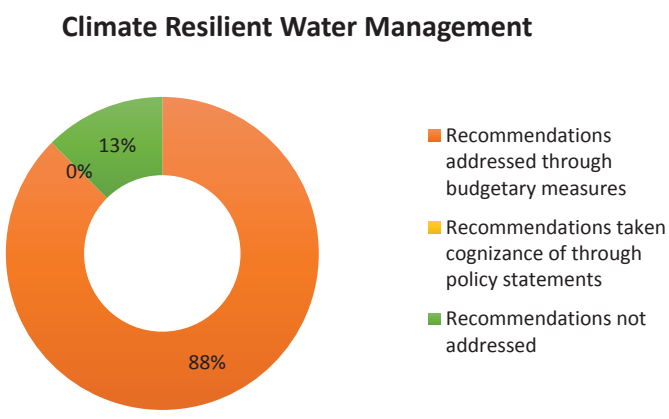
AR5 also recommends that Social safety nets along with social protection can help in effective poverty alleviation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, the Ministry of Rural Development runs the National Rural Employment Guarantee Act and the National Social Assistance Programme, while the Ministry of Consumer Affairs, Food and Public Distribution runs the Food Subsidy and Civil Supplies (including the Public Distribution System) programme. The combined allocation on all these programmes is Rs. 168263.6 crores or USD 25886 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe84.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe18.pdf*]

AR5 also recommends using services such as essential public health services for better adaptation [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. The Ministry of Health and Family Welfare runs a Public Health Programme and the National Health Mission that in the GoI budget for 2015 have a combined allocation of Rs. 20062.15 crores or USD 3086.48 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf*]

AR5 also recommends using services such as enhanced emergency medical services for better adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*). This is addressed by the Health Sector Disaster Preparedness and Management Including Emergency Medical Relief program of the Ministry of Health and Family Welfare programme. This programme is being funded with an allocation of Rs. 27 crores or USD 4.15 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf*]

9. **Climate Resilient Water Management:** Of the 8 recommendations made by the AR5, 7 (87%) are covered under the existing Indian Policy Framework. Further, all the measures that exist in the Indian Policy and Legal framework are hard measures backed by budgetary support. The only recommendation that is not already being addressed through the existing budgetary and policy framework is the one pertaining to diversifying of water resources.

Figure 9 Recommendations addressed through climate resilient water management



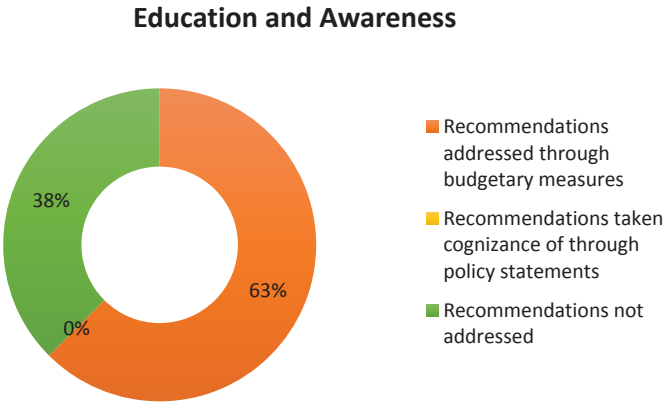
Of the 7 measures backed by budgetary support, 4 viz. (a) Disaster risk management can be addressed through improved drainage [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*], (b) Use of desalinization as a technological adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*], (c) Water regulations and agreements as regulatory institutional adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] and (d) Storm drain clearance as behavioural adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*] that have been recommended by the AR5, are all being addressed through the National Water Mission. As already mentioned, the National Water Mission that is being implemented by the Ministry of Water Resources is spending Rs. 20 crores or USD 3.07 million in 2015 under the Union Budget of GoI [*http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf*]

AR5 also recommends that Recycling of water have synergies and trade-offs between adaptation and mitigation measures can co-benefit both the sectors [*SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR*] and Pricing water to encourage universal provision and careful use as an economic institutional adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. These aspects are being addressed not just by the National Water Mission but additionally also through the larger initiative on National Rural Drinking Water programme of the Ministry of Drinking Water and Sanitation. The combined allocation of all of these initiatives is Rs. 2631 crores or USD 404.76 million in the GoI budget for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf*]

AR5 recommends that Better water storage is also a structural/physical adaptation response [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. While the National Water Mission addresses this aspect, so does the Dam Rehabilitation and Improvement Programme of the Ministry of Water Resources. The combined allocation of these two programmes in the GoI union budget is Rs. 49 crores or USD 7.53 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf*]

10. **Education and Awareness:** Of the 8 recommendations made by both the reports, 5 (63%) of the recommendations are covered under the existing Indian Policy Framework. Further, all the measures that exist in the Indian Policy and Legal framework are hard measures backed by budgetary support. The omissions include sharing indigenous, traditional and local knowledge, conducting participatory action research and social learning, and use of indigenous climate observations as a social (informational) adaptation measure

Figure 10 Recommendations addressed through education and awareness



AR5 recommends that Awareness raising and integrating climate change learning into education as educational and social adaptation measures [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This is partly addressed through the budgets allocated under the budget heads titled Environment Education/ Training/ Extension and National Museum of Natural History of the Ministry of Environment and Forests with an allocation of Rs. 48.71 crores or USD 7.49 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]. Additionally, though exact allocations could not be traced, environment education in the school system is being undertaken by the NCERT through adding environment into school curricula.

AR5 recommends Gender equity in education as educational and social adaptation measures [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This is being addressed through the Beti Bachao Beti Padhao programme of the Ministry of

Women and Child Development with an allocation of Rs. 711.62 in the GoI budget for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf*]

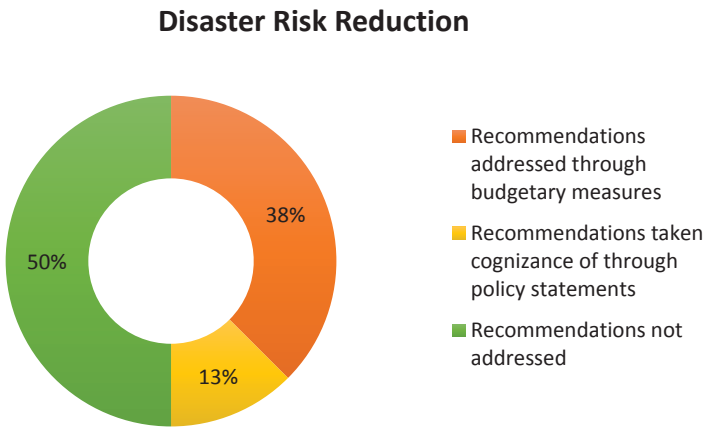
AR5 recommends the use of Extension services as educational and social adaptation measures [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. While this aspect is not addressed wholly, the Ministry of Agriculture does implement a mission on Agriculture Extension and Technology as also a Mission on Agricultural Extension having a combined allocation of Rs. 1087.8 crores or USD 167.35 million in the GoI budget for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf*]

AR5 recommends Creating knowledge sharing and learning platforms available as educational and social adaptation measures [SPM Table 4.2, Pg. 27, IPCC AR5 SYR]. While exact allocations could not be extracted, the process of preparation of the National Communication submitted to the UNFCCC from time-to-time involves creation of such platforms

AR5 recommends providing Climate services as social (informational) adaptation measure [SPM Table 4.2, Pg. 27, IPCC AR5 SYR]. This aspect is being addressed through the Atmosphere and Climate: Research, Modelling, Observation systems and services (ACROSS) of the Ministry of Earth Sciences. The allocation for this programme in the Indian Government's budget for 2015 is Rs. 250 crores or USD 38.46 million [http://indiabudget.nic.in/ub2015-16/eb/sbe31.pdf]

11. **Disaster Risk Reduction:** Of the 8 recommendations made by both the reports, 4 (50%) are acknowledged if not fully addressed under the existing legal and policy framework in India. Of these 3 or (75%) are hard policy measures that are backed by budgetary allocations of the Government of India. Thus, only 3 (38%) of the recommendations covered under the existing policy framework are backed by budgetary allocations. The notable omissions include using the DRR approach for poverty reduction, insurance, development of flood prone and high risk areas, issuing catastrophe bonds, etc.

Figure 11 Recommendations addressed through disaster risk reduction



AR5 recommends that Storm and wastewater management is an important hard adaptation measure that can help reduce disaster [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. In this regard, the Ministry of Water Resources spends money on the Accelerated Irrigation Benefit and Flood Management Programme as well as on the National Water Mission. These programmes have a combined allocation of Rs. 1020 crores or USD 156.92 million in the budget allocation for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf*]

AR5 also recommends using of Disaster contingency funds as an economic institutional adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This aspect is addressed through the Disaster Management head under the Ministry of Home Affairs. The total allocation for 2015 in the Union Budget for this activity is Rs. 919.29 crores or USD 141.42 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf*]

AR5 recomemmends the Systematic monitoring and remote sensing as social (informational) adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*)]. This aspect is being addressed through the Atmosphere and Climate: Research, Modelling, Observation systems and services (ACROSS) of the Ministry of Earth Sciences. The allocation for this programme in the Indian Government's budget for 2015 is Rs. 250 crores or USD 38.46 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe31.pdf*]

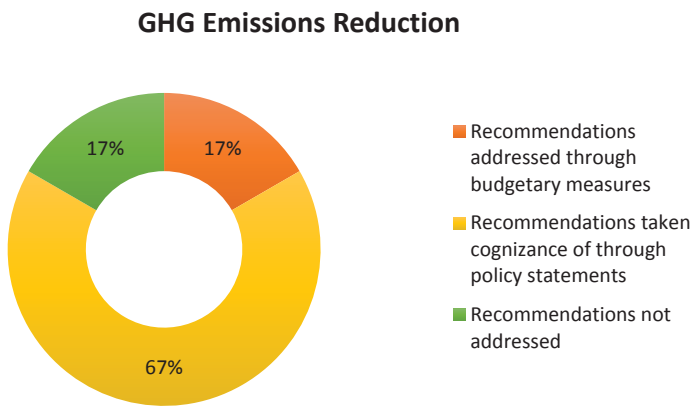
12. **Decentralised Decision Making:** Of the 6 recommendations contained in both the reports on this aspect of dealing with climate change, 3 (50%) are acknowledged if not fully addressed under the existing Indian policy framework. Further, 1 (33%) of these recommendations are backed by hard, budget supported initiatives, of the Government of India. Thus, only 16% of the recommendations of both these reports are currently covered under hard policy measures backed by budgetary allocations. The recommendation that are not covered even under a soft policy initiative include participatory scenario development, conducting integrated assessments, and improved access to and control over local resources.

    The AR5 recommends that Increased decision making power can also help in livelihood enhancement [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This aspect is addressed through the Rajiv Gandhi Panchayat Sashaktikaran Abhiyan of the Ministry of Panchayati Raj having an allocation of Rs. 50 crores or USD 7.69 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe71.pdf*]

13. **GHG Emissions reduction:** Of the 6 recommendations made by both the reports on this aspect of dealing with climate change, 4 (66%) are acknowledged under the existing policy framework of the Government of India. However, most of these measures are covered under India's Intended Nationally Determined Contribution to the UNFCCC from 2020 to 2030 and/or the Copenhagen Pledge that India made while associating itself with the Copenhagen Accord which was noted by the Conference of Parties at the 2009 COP of the UNFCCC.

    One of the recommendations of NCE viz. Adoption of existing cost-effective energy-efficient appliance technologies can result in large reductions in India's energy consumption and GHG emissions [*Para 5, Pg. 20, 3.2, NCE SYR India Chapter*] is addressed through the allocations made for the Bureau of Energy Efficiency of the Ministry of Power. The allocation for 2015 in the GoI budget is Rs. 50 crores or USD 7.69 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf*]

Figure 12 Recommendations addressed through GHG emission reduction



14. **International Cooperation:** Of the 4 recommendations made by both the reports, all 4 (100%) are acknowledged under the existing legal and policy framework in India. None of these, however, can be said to have a hard policy agenda of implementation except that the Ministry of Environment and Forests has been designated as a nodal agency to deal with International Cooperation aspects of climate change and coordinate with other agencies such as Prime Minister's Office, Ministry of External Affairs, Ministry of Power, Ministry of Transport and other such relevant line ministries.

15. **Climate Resilience through Livelihood Security:** Of the 4 recommendations made by both the reports, all 4 (100%) are acknowledged under the existing legal and policy framework in India. And all 4 (100%) are backed by hard policy measures through budgetary support.

    AR5 recommends that Income, assets and livelihood diversification are some of the mitigation options that address the issue of livelihood security [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. AR5 also recommends Livelihood diversification as behavioural adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. Both these aspects is addressed through initiatives of the Ministry of Rural Development such as NREGA and NRLM. These programmes have a combined allocation of Rs. 37081 crores or USD 5704.76 million in the budget allocation for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe84.pdf*]

    AR5 recommends that Encouraging microfinance as an economic institutional adaptation measure [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This is addressed through institutions such as the NABARD which work on issues such as microfinance for the rural poor.

    NCE recommends Expanding economic opportunities for people who constitute forest communities can strengthen resilience to climate change [*Para 6, Pg. 33, 4.4, NCE SYR India Chapter*]. This is addressed through various programmes of the Ministry of Environment and Forests viz. National Afforestation and Eco-development Programme, Integrated Development of Wildlife Habitats, Green India Mission, and the National Afforestation Programme. These programmes have a combined allocation of Rs. 204.71 crores or USD 31.49 million in the central government budget allocation for 2015 [*http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf*]

16. **Other recommendations:** Of the 19 other recommendations spanning various aspects of dealing with climate change, the situation is the following:

Table 3 Categories that have been completey addressed

Category	Number of Recommendations	Number of recommendations acknowledged under existing policy framework	Number of recommendations covered by hard policy initiatives backed by budgetary allocations
Natural Resource Management	1	1 (100%)	1 (100%)
Renewable Energy	2	1 (50%)	1 (50%)
Green and/or Smart Cities	2	1 (50%)	1 (50%)
Disaster Preparedness	2	0 (0%)	0 (0%)
Capacity Building	2	0 (0%)	0 (0%)
Artificial Carbon Sequestration Through Geo Engineering	2	0 (0%)	0 (0%)

On Natural Resource Management, AR5 recommends Soil Conservation as an ecosystem adaptation strategy [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This aspect is addressed through initiatives of the Ministry of Agriculture that include National Project on Management of Soil Health and Productivity, All India Soil and Land Use Survey and Application of Remote Sensing Technology for Soil Survey, Department of Agriculture Cooperation's Soil and Water Conservation Programme, and ICAR's Soil and Water Conservation Programme. In addition, the Integrated Watershed Management Programme of the Ministry of Water Resources also addresses this aspect. The combined allocation of these initiatives in the GoI's Union Budget for 2015 is Rs. 7677.89 crores or USD 1181.21 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf*]

On renewable energy, AR5 recommends that Use of cleaner energy sources have synergies and between adaptation and mitigation measures can co-benefit both the sectors [*SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR*]. This aspect is being addressed through the recently announced renewable energy targets for 2022. Further, these targets have been enhanced for 2030 according to the Intended Nationally Determined Contributions submitted by India to the UNFCCC. The Ministry of New and Renewable Energy having an overall allocation of Rs. 3660.73 crores or USD

56.31 million in the Union Budget for 2015 fully addresses this aspect [*http://indiabudget.nic.in/ub2015-16/eb/sbe69.pdf*].

On Green and/or Smart Cities, AR5 recommends that Urban planning and upgrading programs can be one of the adaptation options for land-use and spatial planning [*SPM Table 4.2, Pg. 27, IPCC AR5 SYR*]. This aspect is addressed through the Ministry of Urban Development's Development of 100 Smart Cities and Jawaharlal Nehru National Urban Renewal Mission programme and 500 cities and smart cities programme. The combined allocation of these initiatives in the GoI's Union Budget for 2015 is Rs. 6082.04 crores or USD 935.69 million [*http://indiabudget.nic.in/ub2015-16/eb/sbe104.pdf*]

IV. KEY FINDINGS

These two reports take a holistic view of the threat of climate change and thus tend to advocate a holistic policy response to this threat that spans across the entire gamut of public policy responses required to deal with a problem of this nature. Thus recommendations that can generally be placed in the basket of creating resilience, integrating public interventions and reforming institutions laws and policies appear to have attracted lots of advise. Therefore, categories such as climate resilient agriculture (14 recommendations), climate resilient infrastructure (19 recommendations), climate resilient ecosystem (19 recommendations), integrated planning and decision making (20 recommendations), fiscal and moretary policy measures (28 recommendations) and legal and institutional reforms (36 recommendations) together contain around 64% of the total recommendations that were extracted from these 2 reports. Further, both the reports tend to focus on relatively regret-free options to start with in order to begin dealing with climate change and thus recommendations such as those advocating energy efficiency (10 recommendations) perhaps because of this reason, have occurred with a greater frequency in these two reports than those advocating out and out GHG emissions reduction (6 recommendations). Perhaps due to these reasons, aspects such as renewable energy and green and/or smart cities have only 2 recommendations each from out of a total of 231 recommendations.

Table 4 given below shows that that the Indian policy framework is well placed to address climate change on issues such as climate resilient agriculture, climate resilient ecosystem, social sector reforms and safety nets, climate resilient water management, climate resilience through livelihood security, renewable energy, energy efficiency etc. The Indian policy framework also has policy statements that take congnizance of, if not address, issues relating to international cooperation, climate resilient infrastructure etc But the real deficits are in the policy domains of legal and institutional reforms, fiscal and monetary policy measures, integrated planning and decision making. In addition, disaster preparedness and capacity building, in general, on climate change, come across as policy domains of weakness. However, overall, the Indian Policy framework is well placed to address only around 50% of the initiatives that are needed to be taken to deal with climate change.

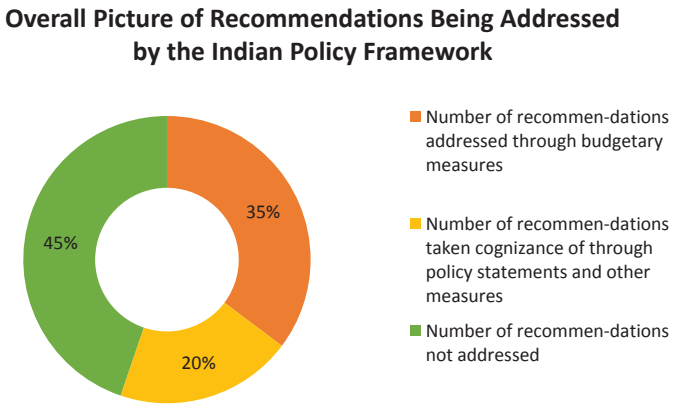
Table 4 Number and Percentage of recommendations addressed according to their respective categories

Categories	Total recommen-dations	Number of recommen-dations addressed through budgetary measures	Number of recommen-dations addressed through budgetary measures (percentage)	Number of recommen-dations taken cognizance of through policy statements and other measures	Number of recommend-ations taken cognizance of through policy statements and other measures (percentage)	Number of recommen-dations not addressed	Number of recommen-dations not addressed (percentage)
Legal and Institutional Reforms	36	4	11%	8	22%	24	67%
Fiscal and Monetary Policy Measures	28	1	4%	9	32%	18	64%
Integrated Planning and Decision Making	20	0	0%	0	0%	20	100%
Climate Resilient Infrastructure	19	4	21%	9	47%	6	32%
Climate Resilient Ecosystem	18	14	78%	3	17%	1	6%
Climate Resilient Agriculture	14	14	100%		0%	0	0%
Social Sector Reforms and Safety Nets	10	6	60%	0	0%	4	40%
Energy Efficiency	10	8	80%	0	0%	2	20%
Education and Awareness	8	5	63%	0	0%	3	38%
Climate Resilient Water Management	8	7	88%	0	0%	1	13%
Disaster Risk Reduction	8	3	38%	1	13%	4	50%
GHG Emissions Reduction	6	1	17%	4	67%	1	17%
Decentralised Decision Making	6	1	17%	2	33%	3	50%
International Cooperation	4	0	0%	4	100%	0	0%
Climate Reslience Through Livelihood Security	4	4	100%		0%	0	0%
Renewable Energy	2	1	50%	1	50%	0	0%
Green and/or Smart Cities	2	1	50%	1	50%	0	0%
Disaster Preparedness	2	0	0%	0	0%	2	100%
Capacity Building	2	0	0%	0	0%	2	100%
Artificial Carbon Sequestration Through Geo Engineering	2	0	0%	0	0%	2	100%
Natural Resource Management	1	1	100%		0%	0	0%
Total	210	74	35%	42	20%	94	45%

The overall picture from Figure 13 seems to suggest that the policy framework acknowledges if not fully addresses atleast 50% of the issues that emanate from the two reports. This may also imply that India is being proactive in dealing with climate change, given its development status as well the scale of climate challenges that the people of India face.

However, a closer look also reveals the weaknesses within. For example, even now, huge amounts of money are being spent on aspects of creating safety nets in the social sector. However, these allocations are dwarfed by the needs that are present on the ground. Thus, while USD 5548.69 million is being spent this year on access to education, there are still a huge number of children who do not go to school, especially once they get past the primary education level. Similarly, despite the fact that USD 2277.55 million is spent on better nutrition and health, India still has the highest number of malnourished people living in it.

Figure 13 Total Recommendations addressed by Indian Policy Framework



Within the Indian context, it appears that climate change, in order to be dealt with effectively, needs to be embedded within each policy domain and institutions much more firmly than at present. For example, while significant initiatives for creating resilience have been taken through the various missions of the National Action Plan on climate change, their overall scope and impact is severely limited due to the fact that the money provided for implementing these missions, within the overall context of the money being spent by respective nodal ministries that are responsible for implementing the missions, minuscule. Thus the budget of the National Mission on Sustainable Agriculture is only 1.76% of the departmental budget of the Department of Agriculture and Cooperation, which is supposed to implement the mission. This percentage is even lower in the case of the National Water Mission, while the National Mission on Sustainable habitat does not even have an explicit budget line in the budget of the Ministry of Urban Affairs that is the nodal agency for implementing it.

Even now, 20% of the tax revenues of the Government of India accrue from the various excise duties and the cess being imposed on motor oil, diesel oil and coal. Thus, India is in a good position where carbon taxes are concerned, despite the fact that these taxes are not called carbon taxes. The specific fossil fuels that are being taxed at present include motor oil, high speed diesel and coal. The total revenues accruing to the government from the various duties imposed on these fuels total upto USD 4650.9 million. There is thus already an implicit carbon tax being imposed by the Government of India on fossil fuels and could be a useful starting point for further engagement for moving towards an explicit national or global carbon tax.

Several recommendations regarding ecosystem adaptation contained in the two reports suggest that the conservation approach followed by India regarding forestry and wildlife conservation is a valid strategy. This needs to be acknowledged and further strengthened to ensure that ecosystem services of the country's natural resources do not degrade any further

V. CONCLUSION

The Indian Policy framework though not adequate to deal with the challenge of climate change, seems to have the wherewithal to meet these challenges. What is required, however, is an enhancement of investments in on-going initiatives that can help the people to deal with climate change, as well as an acknowledgement of the deficiencies that exist in the framework to make the current developmental process resilient to climate change. While the initiatives on the government regarding enhancement of investments in renewables and energy efficiency are correctly appreciated, more needs to be done to integrate the climate change agenda holistically into the agenda for growth and development. To begin seriously implementing the various recommendations embedded in these two reports would be a good way to start this process.

VI. ANNEXURE

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
Legal and Institutional reforms	Improvement in institutions as well as coordination and cooperation in governance is helpful to overcome regional limitations accompanying mitigation, adaptation and disaster risk reduction. (*SPM 4.1, Pg. 26, Para 6, IPCC AR5 SYR)*		
	Land tenure can be another soft adaptation measure for poverty alleviation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	National Land Records Modernisation Programme by Department of Land Records of the Ministry of Rural Development Allocated Rs. 20 crores or USD 3.07 million for this activity in the union budget for 2015-16[9].	
	Land zoning laws can lead to better land-use and spatial planning. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Laws to support disaster risk reduction as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Ministry of Home Affairs has allocated Rs. 919.29 crores or USD 141.4 million under the general budget head of Disaster Management in the 2015-16 budget[10]. This budget head covers "…expenditure on National Disaster Management Programmes (both natural disasters and man-made disasters), for providing grants-in-aid to various institutes/universities for bringing out literatures/organizing training programmes in tackling natural disasters and man-made disasters. It also covers assistance to capacity-building activities such as human resource development, research and consultancy services, studies, documentation and interaction with regional and international agencies in the field of disaster management.	Ministry of Home Affairs has a programme called National Platform on Disaster Risk Reduction to bring together the whole range of India's disaster risk community from Government, Parliamentarians, Mayors, Media, International Organisations, NGOs, local community representatives, scientific and academic institutions and corporate businesses etc. which will help in sharing of experiences, views and ideas, present findings of research and action and explore opportunities for mutual cooperation in the field of Disaster Risk Reduction[11].
	Laws to encourage insurance purchasing as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Defining property rights and land tenure security as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Defining fishing quotas, patent pools and technology transfers as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

9 http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf
10 http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf
11 http://nidm.gov.in/npdrr/

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	National and Government Policy and Programs can include mainstreaming of national and regional adaptation plans. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	National and Government Policy and Programs can include subnational and local adaptation plans. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	National and Government Policy and Programs can include municipal water management programs. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	National and Government Policy and Programs can include disaster planning and preparedness. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Disaster Management Policy formulated by the Ministry of Home Affairs covers the issue of disaster planning and preparedness. It aims at promoting a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education.[12]
	National and Government Policy and Programs can include integrated water resource management. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	Ministry of Water Resources include the Accelerated Irrigation Benefit and Flood Management Programme, Ground Water Management and Regulation, River Basin Management for Northeast and Sikkim especially as well as for the rest of the country, National River Conservation Plan, and the National Ganga Plan. All these programmes are in addition to the National Water Mission. The total allocation under all these budget lines for 2015-16 is Rs. 3937 crores or USD 605.7 million[13]	Ministry of Water Resources has also formulated a National Water Mission to ensure integrated water resource management helping to conserve water, minimize wastage and ensure more equitable distribution both across and within states[14]
	National and Government Policy and Programs can include integrated coastal zone management. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	National and Government Policy and Programs can include ecosystem based management, community based adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Government of India spends money on conservation of natural resources and ecosystems such as Forestry and Wildlife conservation, biodiversity conservation, national mission on Himalayan studies, mission on climate change and adaptation and several state programs on ecosystem management supported through central grants. The total allocation under these budget heads for 2015-16 is Rs. 1098.4 crores or USD 168.9 million[15]	The National Mission on Sustaining Himalayan Ecosystem aims to evolve management measures for sustaining and safeguarding the Himalayan glaciers and mountain ecosystem and attempt to address key issues namely impacts of climate change on the Himalayan glaciers, biodiversity, wildlife conservation and livelihood of traditional knowledge societies[16]

15 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf

16 Mission Objective, Pg. 9, Para 1, NMSHE NAPCC, http://envfor.nic.in/sites/default/files/press-releases/Indian_Country_Paper_Low_Res.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Policies that can help reduce excessive local pollution can benefit India improve the national welfare while still sustaining economic growth. *(Para 1. Pg. 11, 2.3, NCE SYR India Chapter)*		Environment Research Programme (EnvRP) of the Ministry of Environment, Forests and Climate Change deals with problems related to pollution and development of suitable cost effective technologies for abatement of pollution. Emphasis is laid on development of eco-friendly biological and other interventions for prevention, abatement of pollution and development of strategies, technologies etc. for control of pollution[17]
	Policies that can help reduce inefficient natural resource use can benefit India and improve the national welfare while still sustaining economic growth. (Para 1. Pg. 11, 2.3, NCE SYR India Chapter)		The Ecosystem Research Programme of the Ministry of Environment, Forest and Climate Change has an objective to develop a basis within the field of natural and social sciences for rational use and conservation of resources for general improvement of the relationship between man and his environment. The programme seeks to provide a scientific basis to solve the practical problems of resource management. The programme also seeks to provide a scientific knowledge and trained personnel needed to manage the natural resources in a rational and sustainable manner[18]
	Institutional and governance reforms such as unbundling and corporatizing State Electricity Board are required to push forward the approach of Electricity Act (2003). *(Para 3, Pg. 20, 3.2, NCE SYR India Chapter)(Para 1, Pg. 41, 6.1, NCE SYR India Chapter)*		
	Institutional and governance reforms such as forming independent regulatory bodies at the state and central level are required to push forward the approach of Electricity Act (2003). *(Para 3, Pg. 20, 3.2, NCE SYR India Chapter)(Para 1, Pg. 41, 6.1, NCE SYR India Chapter)*		

17 Environment Research Program, Para 3 http://repmismoef.nic.in/Public/research_development.aspx?status=3&name=National%20Natural%20Resources%20Management%20System%20NNRMS%20Programme

18 Ecosystem Research Program, Para 5, http://repmismoef.nic.in/Public/research_development.aspx?status=3&name=National%20Natural%20Resources%20Management%20System%20NNRMS%20Programme

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Institutional and governance reforms such as development of a performance-oriented culture in the sector are required to push forward the approach of Electricity Act (2003). *(Para 3, Pg. 20, 3.2, NCE SYR India Chapter)(Para 1, Pg. 41, 6.1, NCE SYR India Chapter)*		
	Insulating distribution companies and regulatory bodies from political interference by state governments is a dynamic political economy dimension of reform. *(Para 3, Pg. 20, 3.2, NCE SYR India Chapter)*		
	Financial incentives (e.g. consumer rebates) can be complemented along with minimum energy efficiency standards to encourage energy demand management and appliance efficiency. *(Para 7, Pg. 20, 3.2, NCE SYR India Chapter)*		
	Regulating policies along with fuel taxes can encourage alternative clean energy sources. *(Para 7, Pg. 24, 3.4, NCE SYR India Chapter)*		
	Using public sector approach e.g. creation of a National Renewable Power Corporation to undertake major renewable investments with world class levels of management and technological dynamism. *(Para 8, Pg. 25, 3.4, NCE SYR India Chapter)(Para 4, Pg. 41, 6.1, NCE SYR India Chapter)*	The government of India has set up the Solar Energy Corporation of India limited or SECL in 2011 with shareholding capital of Rs. 42 crores or USD 6.5 million in 2014[19]. In addition, the government had also setup, way back in 1987, the Indian Renewable Energy Development Agency or IREDA[20] having a shareholding capital of Rs. 784.60 crore or USD 120.7 million in 2014[21]. Further, the Government of India has also further provided budgetary support of Rs. 92 crores to SECL and Rs. 3 crores to IREDA in 2015[22]	
	Strong regulatory, governance and project selection mechanisms to reduce the risk that scarce public resources face because of government failures. *(Para 8, Pg. 25, 3.4, NCE SYR India Chapter)*		
	Policy reforms to use modern agricultural technologies and practices. *(Para 2, Pg. 27, 4, NCE SYR India Chapter)*		
	Improved public policy support in agriculture sector. *(Para 2, Pg. 30, 4.1, NCE SYR India Chapter)*		
	Property tax reforms that focus on taxing land values rather than building space can be effective in promoting development. *(Para 4, Pg. 39, 5.2, NCE SYR India Chapter)*		

19 http://www.seci.gov.in/upload/uploadfiles/files/Annual%20Report%202013-14%2096dpi%20color.pdf
20 IREDA, Para 5, http://www.ireda.gov.in/forms/contentpage.aspx?lid=820
21 http://ireda.gov.in/writereaddata/Ireda-annual-report-2014-%2015.pdf
22 http://indiabudget.nic.in/ub2015-16/eb/sbe69.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Better policies and planning to control land use and energy demand for urbanization. *(Para 4, Pg. 40, 6, NCE SYR India Chapter)*		
	Strengthening government administrative capacity to ensure vigorous enforcement of minimum energy efficiency standards. *(Para 2, Pg. 41, 6.1, NCE SYR India Chapter)*		
	Compensating farmers by credible and tangible improvements in public service delivery and better infrastructure could solve the problem of agriculture subsidy reform to some extent. *(Para 5, Pg. 41, 6.2, NCE SYR India Chapter)*		
	Reforms to achieve more compact, productive and green cities need to move simultaneously and in coordination. *(Para 1, Pg. 42, 6.3, NCE SYR India Chapter)*		
	Need of rent control laws (reform). *(Para 1, Pg. 42, 6.3, NCE SYR India Chapter)*		
	Need of better systems of appraise land values and determine property rights. *(Para 1, Pg. 42, 6.3, NCE SYR India Chapter)*		
	A comprehensive impact evaluation of Jawaharlal Nehru Urban Renewal Mission is needed to learn and improve effectiveness for a renewed and better urban investment and reform agenda. *(Para 8, Pg. 39, 5.2, NCE SYR India Chapter) (Para 2, Pg. 42, 6.3, NCE SYR India Chapter)*		
	Strengthening of capacity and accountability of the government at a local level is required. *(Para 3, Pg. 42, 6.3, NCE SYR India Chapter)*		
	Intergovernmental transfers from the state level and the centre needs to be enhanced and well monitored with accountability to ensure resources are spent wisely. *(Para 3, Pg. 42, 6.3, NCE SYR India Chapter)*		
Fiscal and Monetary Policy Measures	Innovation and investments in environmentally sound infrastructures and technologies can decrease greenhouse gas emissions and improve resilience to climate change. (SPM 4.1, Pg. 26, Para 4, IPCC AR5 SYR)		
	Financial incentives as an economic institutional adaptation measure. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)		National Mission on Sustainable Habitat aims at providing fiscal incentives for facilitating adoption of energy efficient ICT solutions[23]

23 Pg. 13, Para 14, NMSH NAPCC, http://www.nicra-icar.in/nicrarevised/images/Mission%20Documents/Sustainable%20Habitat%20Mission%20CII-DESC.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Cash transfers as an economic institutional adaptation measure. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)		
	Mechanisms that set up carbon prices, including cap and trade systems and carbon taxes must be given importance in order to ensure a cost effective mitigation approach. (SPM 4.4, Pg. 30, Para 2, IPCC AR5 SYR)	In this regard, Bureau of Energy Efficiency has implemented a PAT scheme. Further, the Government of India also imposes, apart from the basic excise duty, additional excise duties on motor oil and high speed diesel. The revenues that are projected to accrue in 2015-16 from such duties are of the order of Rs. 171127 crores or USD 2632.7 million. In addition, there is also the coal cess which is expected to realise Rs. 13118.04 crores or USD 2018.2 million[24]	
	Economic instruments such as subsidies, tax rebates or exemptions, grants, loans and credit lines must be applied across sectors. (SPM 4.4, Pg. 30, Para 5, IPCC AR5 SYR).		
	Adoption of complimentary policies such as income tax rebates or other benefit transfer mechanisms could help avoid the potential adverse effects of mitigation policies (e.g. energy sector). (SPM 4.4 , Pg. 30, Para 6, IPCC AR5 SYR)		
	Better assessment of global adaptation costs, funding and investments is required as limited evidences suggest that there is a gap between global adaptation costs and funds. (SPM 4.4, Pg. 31, Para 1, IPCC AR5 SYR)		
	Elimination of fuel subsidies can be undertaken alongside the modernisation of India's social protection framework that would help relieve the impacts of volatility in world energy prices and other risks affecting the poor people. (Para 8, Pg. 18, 3.2, NCE SYR India Chapter)(Para 8, Pg. 40, 6.1, NCE SYR India Chapter)		Ministry of Finance has implemented coal cess and has also removed subsidies on diesel.
	Institutional and governance reforms such as scaling back power/fuel subsidies and setting realistic prices to create financial viability are required to push forward the approach of Electricity Act (2003). (Para 3, Pg. 20, 3.2, NCE SYR India Chapter)(Para 1, Pg. 41, 6.1, NCE SYR India Chapter)		
	Reform of fuel subsidies is important to encourage more efficient energy use in transport. (Para 1, Pg. 21, 3.2, NCE SYR India Chapter)		Ministry of Finance has cut subsidies and increased taxes on fossil fuels (petrol and diesel) turning a carbon subsidy regime into one of carbon taxation[25]

24 http://indiabudget.nic.in/ub2015-16/rec/tr.pdf

25 9.6 Conclusion, Pg. 128, Para 10, Economic Survey, http://indiabudget.nic.in/es2014-15/echapvol1-09.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	To determine the optimal energy mix for India, it is important to take all the social costs and benefits of different fuels into account for maximizing India's social efficiency and social welfare. (Para 6, Pg. 24, 3.4, NCE SYR India Chapter)		
	Fuel taxes can act as the most efficient instrument to achieve socially optimal fuel mix, increase government revenues, providing resources to reduce other distorting taxes, to increase productive development spending or to fund cash transfers to compensate poor fuel consumers. (Para 7, Pg. 24, 3.4, NCE SYR India Chapter)(Para 3, Pg. 41, 6.1, NCE SYR India Chapter)		Ministry of Petroleum and Natural Gas has imposed excise duties on petrol or diesel also act as an implicit carbon tax - by putting an effective price on emissions[26]
	Fuel taxes complemented with concessional development financing can encourage alternative clean energy sources. (Para 7, Pg. 24, 3.4, NCE SYR India Chapter)		
	Public investment policies implemented with fuel taxes can encourage alternative clean energy sources. (Para 7, Pg. 24, 3.4, NCE SYR India Chapter)		
	Increasing the flow of concessional domestic debt to renewable projects through creation or strengthening of development banking institutions can help with the high financing costs in renewable energy projects in India. (Para 8, Pg. 25, 3.4, NCE SYR India Chapter)		
	Coordination and institution-building (e.g. subsidies) to overcome existing policy failures. (Para 2, Pg. 27, 4, NCE SYR India Chapter)		
	Reallocating spending from low-yielding subsidies towards high yielding agriculture R&D can improve the economic effectiveness of public spending and environmental sustainability of agriculture. (Para 6, Pg. 31, 4.4, NCE SYR India Chapter) (Para 5, Pg. 41, 6.2, NCE SYR India Chapter)		

26 9.2, Pg. 123, Para 2, Economic Survey, http://indiabudget.nic.in/es2014-15/echapvol1-09.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Reallocating spending from low-yielding subsidies towards education can improve the economic effectiveness of public spending and environmental sustainability of agriculture. (Para 6, Pg. 31, 4.4, NCE SYR India Chapter)(Para 5, Pg. 41, 6.2, NCE SYR India Chapter)		
	Reallocating spending from low-yielding subsidies towards extension services and rural infrastructure can improve the economic effectiveness of public spending and environmental sustainability of agriculture. (Para 6, Pg. 31, 4.4, NCE SYR India Chapter) (Para 4, Pg. 41, 6.2, NCE SYR India Chapter)		
	Formation of State Finance Commissions to determine the allocation of state revenues to local governments can create better urban growth. (Para 5, Pg. 39, 5.2, NCE SYR India Chapter)		
	Better targeted and much more effective spending on poverty reduction. (Para 2, Pg. 40, 6, NCE SYR India Chapter)		
	Build consensus for strong structural and fiscal reform to signal intent. (Para 3, Pg. 40, 6, NCE SYR India Chapter)		
	Reducing the costs of infrastructure to upgrade growth and economic efficiency. (Para 4, Pg. 40, 6, NCE SYR India Chapter)		
	Fuel subsidy reforms should be coupled with well-designed and targeted measures to protect the poor and vulnerable groups from high fuel prices. (Para 8, Pg. 40, 6.1, NCE SYR India Chapter)		
	Comprehensive, carefully sequenced, equitable and sustainable fuel subsidy reform plan. (Para 8, Pg. 40, 6.1, NCE SYR India Chapter)		
	Government initiatives to reduce the high cost of renewable projects can stimulate private investments in renewables. (Para 4, Pg. 41, 6.1, NCE SYR India Chapter)		The National Solar Mission would consider up to 30 per cent capital subsidy (which would progressively decline over time) for promoting such innovative applications of solar energy and would structure a non-distorting framework to support entrepreneurship, up-scaling and innovation[27]
	A well-developed housing finance system is required. (Para 1, Pg. 42, 6.3, NCE SYR India Chapter)		

27 C. Pg. 5, Para 4, NSM NAPCC, http://www.mnre.gov.in/file-manager/UserFiles/mission_document_JNNSM.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Local government's revenue (through reforms of property taxes) needs to be encouraged. (Para 3, Pg. 42, 6.3, NCE SYR India Chapter)		Reform of the Property Tax under Jawaharlal Nehru Urban Renewal Mission strategizes to tap the full potential of property tax as a source of own revenue of the Urban Local Body[28]
Integrated Planning and Decision Making	National governments can coordinate adaptation efforts of local and subnational governments by protecting vulnerable groups (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)*		
	National governments can coordinate adaptation efforts of local and subnational governments by economic diversification (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	National governments can coordinate adaptation efforts of local and subnational governments by providing information, policy and legal frameworks (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)*		
	National governments can coordinate adaptation efforts of local and subnational governments by financial support (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)*		
	Local governments and private sectors are considered critical for adaptation progress assuming their roles in scaling up adaptation of communities, households, and civil society and managing risk information and financing. (*SPM 3.3, Pg. 19, Para 6, IPCC AR5 SYR)*		
	For decision making process in adaptation planning and implementation, recognition of diverse interests, circumstances, social-cultural contexts and expectations are required. (*SPM 3.3, Pg. 19, Para 7, IPCC AR5 SYR)*		
	For effective adaptation, knowledge about indigenous, local and traditional practices, including indigenous peoples' holistic view of community and environment (*SPM 3.3, Pg. 19, Para 7, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Transformations in economic, social, technological, and political decisions and actions can enhance adaptation and promote sustainable development. (*SPM 3.3, Pg. 20, Para 3, IPCC AR5 SYR).*		
	Public private partnership as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

28 Pg. 2, Para 3, JNNURM Primers, http://jnnurm.nic.in/wp-content/uploads/2011/01/Mandatory_Primer_3-Property-Tax.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Practical strategies such as Social and technical innovations, behavioural shifts or institutional and managerial changes that produce substantial shifts in outcomes. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Political strategies such as political, social, cultural and ecological decisions and actions consistent with reducing vulnerability and risk and supporting adaptation, mitigation and sustainable development. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Potential linkages among regional, national and sub-national climate policies must be encouraged in order to increase the climate change mitigation benefits. (*SPM 4.4, Pg. 29, Para 7, IPCC AR5 SYR)*		
	National government, local government and private sector coordination needs to be recognised for scaling up adaptation of communities, households and civil society and in further managing risks information and financing. (*SPM 4.4, Pg. 29, Para 10, IPCC AR5 SYR)*		
	Institutional approaches involves multiple actors and include economic options such as insurance, public private partnership, laws and regulations such land zoning laws and national and government policies and programs such as economic diversification play a key role in promoting the transition from planning to effective implementation of adaptation. (*SPM 4.4, Pg. 29, Para 11, IPCC AR5 SYR)*		
	Synergies between private sector and public sector should play an important role in financing mitigation and adaptation. (*SPM 4.4, Pg. 30, Para 8, IPCC AR5 SYR)*		
	Relevant tools like suitable governance structures and adequate institutional and human capacity together can enhance the effectiveness of integrated responses of mitigation and adaptation strategies. (*SPM 4.5, Pg. 32, Para 4, IPCC AR5 SYR).*		

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Opportunities for enhanced resilience, reduced emissions and more sustainable development can be achieved through integrated responses especially in the context of energy planning and implementation, interactions among water, food, energy, and biological carbon sequestration. *(SPM 4.5, Pg. 32, Para 4, IPCC AR5 SYR)*		
	For India to increase its growth requires policy-makers to find and unblock the critical obstacles and constraints to structural change and inclusive growth. *(Para 4, Pg. 9, 2.1, NCE SYR India Chapter)*		
	Better allocation of responsibilities between various levels of government for better urban service delivery. *(Para 6, Pg. 39, 5.2, NCE SYR India Chapter)(Para 3, Pg. 42, 6.3, NCE SYR India Chapter)*		
	Build strong low-carbon initiatives integrally into India's growth agenda. *(Para 4, Pg. 26, 3.4, NCE SYR India Chapter)*		
Climate resilient ecosystem	Protection of Ecosystem for carbon storage has synergies and trade-offs between adaptation and mitigation measures can co-benefit both the sectors. (SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR)	The Green India Mission with an allocation of Rs. 64 crores[29] or USD 9.8 million in 2015 aims to provide improved ecosystem services including biodiversity, hydrological services, carbon sequestration from the 10 m ha of forest/non-forest land[30]. Further, there are additional ongoing ecosystem conservation programmes such as Project Tiger, Project Elephant, Integrated Development of Wildlife Habitats, National Afforestation Program, Biosphere Reserves, Conservation of Corals and Mangroves, and National Plan for Conservation of Aquatic Ecosystems with a combined allocation of Rs. 321 crores or USD 49.4 million[31]	
	Ecosystem adaptation can be done effectively by coastal afforestation (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)* and mangrove conservation (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The ongoing schemes on Conservation of Corals and Mangroves in particular and also the Green India Mission as well as the National Afforestation Programme address this issue. The combined allocation of all these missions is Rs. 143.6 crores[32] or USD 22 million	

29 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
30 3.2.2, Pg. 3, Para 2, GIM NAPCC, http://www.moef.gov.in/sites/default/files/GIM_Mission%20Document-1.pdf
31 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
32 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Ecosystem management adaptation is enhanced by watershed and reservoir management. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The national plan for conservation of aquatic ecosystems of the Ministry of environment and forests that has an allocation of Rs. 32.5 crores[33] or USD 5 million in 2015 is implemented in this regard. Further, the Ministry of Water Resources also has allocations under budget heads such as National river conservation plan and the national ganga plan with an allocation of Rs. 2655 crores or USD 408.5 million[34]	The National Environment Policy, 2006 also aims to prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification, and expanding green cover[35]
	Adaptation in ecosystem management can be conducted by reducing other stressors on ecosystems and habitat fragmentation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The issue gets addressed by the Green India Mission and various other ecosystem conservation programme with a combined allocation of Rs. 385 crores[36] or USD 59.2 million in the 2015 budget of the Government of India	
	Maintenance of genetic diversity can enhance the adaptive capacity of ecosystem. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The issue gets addressed by the Green India Mission and various other ecosystem conservation programme with a combined allocation of Rs. 385 crores[37] or USD 59.2 million in the 2015 budget of the Government of India	The National Mission on Sustaining Himalayan Ecosystem strategizes that there is an urgent need to record and document the existing base in the Himalayan Ecosystem in terms of (1) Genetic diversity of crop plant, (2) Genetic diversity of livestock, (3) Genetic diversity of forest species (4) Aquatic diversity and (5) Soil microbial diversity[38]
	Manipulation of disturbance regimes can lead to better ecosystem management (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The issue gets addressed by the Green India Mission and various other ecosystem conservation programme with a combined allocation of Rs. 385 crores[39] or USD 59.2 million in the 2015 budget of the Government of India	
	Provision of protected areas can improvise adaptation in land-use and spatial planning. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Union Budget of the Government of India already has provisions and the allocations for this year that include budget lines titled Project Tiger, Project Elephant and Biosphere Reserves are of the order of Rs. 155.94 crores or USD 23.9 million in 2015[40]	National Environment Policy strategizes to expand the Protected Area (PA) network of the country, including Conservation and Community Reserves, to give fair representation to all bio-geographic zones of the country[41]
	Afforestation and reforestation as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Green India Mission and the National Afforestation Programme having a combined allocation of Rs. 138 crores or USD 21.2 million in 2015 address both these recommendations[42]	

33 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
34 http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf
35 5.2.1, Pg. 23, Para 1 (Point c), NEP 2006, http://www.tnpcb.gov.in/pdf/nep2006e.pdf
36 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
37 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
38 3.6.1, Pg. 22, Para 4, NMSHE NAPCC, http://dst.gov.in/scientific-programme/NMSHE_June_2010.pdf
39 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
40 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
41 5.2.3 (ii), Pg. 26, Para 3 (Point a), NEP 2006, http://www.tnpcb.gov.in/pdf/nep2006e.pdf
42 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Promoting Green infrastructure (e.g. shade trees and green roofs) as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Mission on Sustainable Habitat focuses on GHG emission reduction opportunities in three integral components of urban planning- buildings, municipal solid waste and transport.[43]
	Controlling overfishing, fisheries co-management as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Comprehensive Marine Fishing Policy (2005) formulated by the Ministry of Agriculture advocates a stringent fishery management to be in place.[44]
	Assisted species migration and dispersal as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Green India Mission with an allocation of Rs. 64 crores[45] or USD 9.8 million in 2015 will address the policy recommendation. Further, there are additional ongoing ecosystem conservation programmes such as Project Tiger, Project Elephant, Integrated Development of Wildlife Habitats, National Afforestation Program, Biosphere Reserves, Conservation of Corals and Mangroves, and National Plan for Conservation of Aquatic Ecosystems with a combined allocation of Rs. 321 crores[46] or USD 49.4 million.	
	Creation of ecological corridors as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Green India Mission with an allocation of Rs. 64 crores[47] or USD 9.8 million in 2015 will address the policy recommendation. Further, there are additional ongoing ecosystem conservation programmes such as Project Tiger, Project Elephant, Integrated Development of Wildlife Habitats, National Afforestation Program, Biosphere Reserves, Conservation of Corals and Mangroves, and National Plan for Conservation of Aquatic Ecosystems with a combined allocation of Rs. 321 crores[48] or USD 49.4 million.	
	Seed banks, gene banks and other ex-situ conservation as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Establishment and maintenance of Seed Banks is a component of the Sub- mission on Seeds and Planting Material[49]. The sub-mission is handled by the National Initiative for Information on Seed Banks and the National Seed Corporation Ltd. The government of India has allocated a budget of Rs. 157 crores for the same.[50]

43 3.2, Pg. 14, Para 7, NMSH NAPCC, http://www.nicra-icar.in/nicrarevised/images/Mission%20Documents/Sustainable%20Habitat%20Mission%20CII-DESC.pdf
44 5.0, Para 1, http://dahd.nic.in/fishpolicy.htm
45 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
46 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
47 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
48 http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
49 http://seednet.gov.in/Material/Guidelines%20and%20Schemes/Guidelines%20for%20seed%20bank_Revised_.pdf
50 http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Payments for ecosystem services as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Cost effective mitigation options in forestry are: Afforestation, sustainable forest management and reducing deforestation (with large differences in their relative importance across regions). (*SPM 4.3, Pg. 29, Para 1, IPCC AR5 SYR)*	The Green India Mission and the National Afforestation Programme having a combined allocation of Rs. 138 crores or USD 21.2 million in 2015 address both these recommendations[51]	
	Scaling up of existing initiatives to expand the quality and quantity of forests under the 'Green India Mission'. *(Para 6, Pg. 41, 6.2, NCE SYR India Chapter)*	The Green India Mission and the National Afforestation Programme having a combined allocation of Rs. 138 crores or USD 21.2 million in 2015 address both these recommendations[52]	
	Ecological restoration as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Green India Mission and the National Afforestation Programme having a combined allocation of Rs. 138 crores or USD 21.2 million in 2015 address both these recommendations[53]	Rainforest Restoration Programme has already been implemented successfully in the western ghats by the Ministry of Environment, Forest and Climate Change
Climate Resilient Infrastructure	Energy, safe housing and settlement structures and social support structure are helpful as human development adaptation measures. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		National Urban Housing and Habitat Policy, 2007, ensure safety & security in residential and institutional areas which may include construction of boundary walls around housing colonies as well as installation of security stems[54].
	Disaster risk management can be addressed through flood and cyclone shelters. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, the Ministry of water resources spends money on flood forecasting and flood protection as well as developing flood control infrastructure. The allocation on overall flood control in the central budget was of the order of Rs. 244.64 crores or USD 37.6 million in 2015[55]. Further, cyclone shelters have been built through allocations made under the budget head of disaster management by the Ministry of Home Affairs which has an overall allocation of Rs. 919.29 crores or USD 141.4 million[56]	

51. http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
52. http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
53. http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
54. 3.3 (xvii), Pg. 22, Para 1, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf
55. http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf
56. http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Disaster risk management can be addressed through building codes and practices as they can save lives and reduce structural damages. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Enforcement of the Building Code/Building Guidelines according to National Building Code 2005 relating to disaster resistant planning and technologies will be taken up and specific elements in different disaster prone zones will be made compulsory under the National Urban Housing and Habitat Policy[57], 2007.
	Better transport and road infrastructures can also help in reducing the vulnerability by natural disasters. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, even excluding the expenditure incurred by the national highway authority of India which Rs. 42,694.50 crores, the ministry of road transport and highways has allocated Rs. 8833.53 crores or USD 1359 million for various roads and bridges in the 2015 budget[58]	National Urban Transport Policy aims to improve access to all places by better transport and they strategizes to do this Incorporating urban transportation as an important parameter at the urban planning stage rather than being a consequential requirement and Encouraging integrated land use and transport planning in all cities so that travel distances are minimized and access to livelihoods, education, and other social needs, especially for the marginal segments of the urban population is improved[59]
	Structural/Physical Adaptation Response Options include some Engineered and built-environment options such as sea walls and coastal protection structures. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Floating houses as a structural/ physical adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Food storage and preservation facilities as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		NABARD established a warehousing scheme in year 2013 to provide financial assistance to Public and Private Sectors for construction of warehouses, silos, cold storages and other cold chain infrastructure for agriculture commodities[60]

57. 5.4 (v), Pg. 28, Para 3, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf
58. http://indiabudget.nic.in/ub2015-16/eb/sbe83.pdf
59. 5. Pg. 3, Para 2 and 3, NUTP, http://moud.gov.in/sites/upload_files/moud/files/pdf/TransportPolicy.pdf
60. NWS 2013-14, Para 1, https://www.nabard.org/english/NABARD_WAREHOUSING_SCHEME_NWS_2013_14.aspx

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	Hazard and vulnerability mapping as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The Ministry of Earth Sciences has a Multi-hazard Vulnerability Mapping Programme: 1. To assess the vulnerability of the Indian coastline by developing methodology, identifying suitable modelling tools and data assimilation techniques for multi hazard modelling and mapping of the Indian coast 2. A develop a webGIS based coastal vulnerability information system with information on vulnerability of the entire Indian coast due to multihazards and the area most vulnerable to climatic variants such as sea level rise demarcated using the hazard line[61]
	Monitoring early warning systems as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, the Ministry of Earth Sciences is spending Rs. 178.54 crores or USD 27.5 million on satellite services and observatory and weather stations all across the country according to the GoI budget of 2015	The High Impact Severe Weather Warning System Scheme of Ministry of Earth Sciences aims at (i) Development and testing of cloud resolving model to improve forecast & warning of severe weather systems (ii) Development of Observation Test Beds for severe weather systems.[62]
	Building insulation as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Using mechanical and passive cooling and developed technology as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Urban Housing and Habitat policy (2007) aims at: Using technology for modernizing the housing sector for enhancing energy and cost efficiency, productivity and quality. Technology would be harnessed to meet the housing needs of the poor. The concept of 'green' and 'intelligent' buildings would be put in place on the ground.[63]
	Using services such as municipal services including water and sanitation for better adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

61. a. Objectives, Para 3-4, http://moes.gov.in/programmes/multi-hazard-vulnerability-mapping
62. a.Objectives, Para 4-5, http://moes.gov.in/programmes/high-impact-severe-weather-warning-system
63. II. 2. (vi). Pg. 13, Para 7, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Creating building standards and easements as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Enforcement of the Building Code/Building Guidelines according to National Building Code 2005 relating to disaster resistant planning and technologies will be taken up and specific elements in different disaster prone zones will be made compulsory as per the National Urban Housing and Habitat Policy[64]
	Behaviour, lifestyle and culture influence energy use and associated emissions and have high mitigation potential in some sectors specially when complementing technological and structural change. (SPM 4.3, Pg. 29, Para 2, IPCC AR5 SYR)		
	Upgrading and expanding transmission network to allow tapping of power from new wind and solar sites. *(Para 6, Pg. 25, 3.4, NCE SYR India Chapter)*		The Jawaharlal Nehru National Solar Mission has a Utility connected applications: constructing the solar grid programme.[65]
	Upgrading urban infrastructure (scale and quantity) is required for better growth. *(Para 7, Pg. 37, 5.1, NCE SYR India Chapter)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Urban Housing and Habitat Scheme also talks about specially designed slum improvement programmes that will focus on upgrading of basic services and environment improvement of urban slums with a participative, in-situ slum rehabilitation approach.[66]
	Broad reforms of land regulation are required for infrastructure development/up-gradation. *(Para 7, Pg. 37, 5.1, NCE SYR India Chapter)*		
	Coordination of land regulation reforms with development of infrastructure initiatives is a key opportunity for clean urbanisation in India. *(Para 6 and 7, Pg. 38, 5.2, NCE SYR India Chapter)*		
	Voluntary codes along with mandatory minimum energy efficiency standards can play an important role in reducing GHG emissions. *(Para 2, Pg. 41, 6.1, NCE SYR India Chapter)(Para 7, Pg. 20, 3.2, NCE SYR India Chapter)*	This work is being carried by the Bureau of energy efficiency under the Standards and Labeling scheme[67] which functions under the Ministry of Power. The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year was Rs. 50 crores[68] or USD 7.69 million	

64. 5.4 (v), Pg. 28, Para 3, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf
65. 4A, Pg. 4, Para 2, JNNSM NAPCC, http://pib.nic.in/archieve/others/2009/Nov/mission-JNNSM.pdf
66. 5.8 (ii), Pg. 32, Para 2, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf
67. Summary, Para 1, http://www.ireeed.gov.in/policydetails?id=13
68. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf

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Climate Resilient Agriculture	Sustainable agriculture and forestry have synergies and trade-offs between adaptation and mitigation measures can co-benefit both the sectors. (*SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR)*		National Mission on Sustaining the Himalayan Ecosystem have sustainable agriculture and food security as a proposed strategy to address the goals of the mission[69] and the government of India has allocated a budget of Rs. 544.5 crores[70] for the mission.
	Changed cropping pattern, livestock and aquaculture practices are some adaptation options that can be used to conserve the ecosystem as well as better livelihood. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	These aspects are being address through the National Mission on Sustainable Agriculture having a budgetary allocation on Rs. 1018.55 crore[71] or USD 156.7 million in 2015	
	Using new crops and animal varieties as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	Most of this work is carried out by the Indian Council of Agricultural Research and the specific programmes that the Government of India funds according to its budget include crop and animal husbandry as well as fisheries. The combined allocation under these heads for the union budget in 2015 was Rs. 5205.38 or USD 800.8 million[72]	Rainfed Area Development is a programme component of the National Mission on Sustainable Agriculture which aims at promoting integrated farming system(IFS) with emphasis on multicropping, rotational cropping, inter-cropping, mixed-cropping practices with allied activities like horticulture, livestock, fishery, agro-forestry, apiculture, conservation/ promotion of NTFPs etc. to enable farmers not only in maximizing the farm returns for sustaining livelihood, but also to mitigate the impacts of drought, flood or other extreme weather events[73]. The budgetary allocation for this mission is Rs. 1018.55 crores[74]
	Efficient irrigation and water saving technologies as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is at present being addressed by the Pradhan Mantri Krishi Sinchai Yojana that has been allocated Rs. 1800 crores or USD 276.9 million in the 2015 budget[75]	On Farm Water Management is a programme component of National Mission on Sustainable Agriculture which will focus primarily on enhancing water use efficiency by promoting efficient on-farm water management technologies and equipment[76]. The budgetary allocation for this mission is Rs. 1018.55 crores[77].

69. 3.6.1, Pg. 22, Para 4, NMSHE NAPCC, http://dst.gov.in/scientific-programme/NMSHE_June_2010.pdf
70. http://indiabudget.nic.in/ub2015-16/eb/sbe86.pdf
71. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
72. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
73. 6.1.1, Pg. 8, Para 4, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
74. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
75. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
76. 4.2, Pg.4 Para 2, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
77. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf

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	Changed cropping, livestock and aquaculture practices as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The national mission on sustainable agriculture and the climate resilience agriculture initiative together address this aspect. The combined allocation of these two budget lines is Rs. 1121.55 crores or USD 172.5 million[78]. Further, there is also an initiative on inland fisheries that deals with this aspect titled Blue Revolution and has been allocated Rs. 92.2 crores or USD 14.18 million[79].	
	Cropland management, grazing land management and restoration of organic soils are important mitigation options for the agriculture sector. (*SPM 4.3, Pg. 29, Para 1, IPCC AR5 SYR)*	The integrated watershed management programme of the Ministry of Rural Development and also ICAR's Soil and Water conservation programme together address this with a combined allocation of Rs. 2236.83 crores or USD 344.1 million[80]	Under the Rainfed Area Development component of National Mission on Sustainable Agriculture, farmland management practice will be adopted[81]. The budgetary allocation for this mission is Rs. 1018.55 crores[82].
	Adaptation strategies like changes in planting dates and crop varieties can offset some of the negative impacts of smaller temperature increases. *(Para 1, Pg. 10, 2.1, NCE SYR India Chapter)*	A whole host of the programmes of the Ministry of Agriculture address this through initiatives such as ICARs Climate Resilient Agriculture Initiative, Animal Husbandry, Crop Husbandry, Soil and Water Conservation address this aspect along with National Mission on Sustainable Agriculture and Per Drop more crop address these issues. The combined allocation of all these initiatives is by the Ministry of Agriculture is Rs. 7315.21 crores or USD 1125.4 million[83]	
	Application of modern agricultural technologies and practices that boost crop and livestock productivity and which economise on inputs such as land, water and fertilizers can benefit in raising the farmer's income, strengthen resilience to climate change and abate GHG emissions. *(Para 2, Pg. 27, 4, NCE SYR India Chapter)*	A whole host of the programmes of the Ministry of Agriculture address this through initiatives such as ICARs Climate Resilient Agriculture Initiative, Animal Husbandry, Crop Husbandry, Soil and Water Conservation address this aspect along with National Mission on Sustainable Agriculture and Per Drop more crop address these issues. The combined allocation of all these initiatives is by the Ministry of Agriculture is Rs. 7315.21 crores or USD 1125.4 million[84]	The objective of National Mission on Agricultural Extension and Technology scheme is to strengthen the extension machinery and utilizing it for synergizing the interventions[85]

78. http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
79. http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf
80. http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
81. 4.1, Pg. 3, Para 7, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
82. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
83. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
84. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
85. 1.1, Pg. 1, Para 1, NMAET Introduction, http://extensionreforms.dacnet.nic.in/PDF/atmaguid23814.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Adequately resourced public initiatives in the livestock sector can increase animal productivity and can control total numbers, strengthen resilience and reduce GHG emissions. *(Para 5, Pg. 33, 4.4, NCE SYR India Chapter)(Para 6, Pg. 41, 6.2, NCE SYR India Chapter)*	These are addressed through the animal husbandry programme of ICAR as well as cattle development programme of the Department of Animal Husbandry and the combined allocation of these two programmes in the budget for 2015 was Rs. 794.6 crores or USD 122.24 million[86]	National Livestock Policy tries to incoroporate public private partnership under ongoing central government schemes to provide basic services and technology to farmers relating to livestock production and to establish marketing linkages to ensure remunerative returns to the farmers[87].
	Methane emissions can be reduced by enhancing the digestibility of animal feeds by providing better quality of animal diets. *(Para 5, Pg. 33, 4.4, NCE SYR India Chapter)*	These are addressed through the animal husbandry programme of ICAR as well as cattle development programme of the Department of Animal Husbandry and the combined allocation of these two programmes in the budget for 2015 was Rs. 794.6 crores or USD 122.24 million[88]	
	Better animal health and reproduction management can help increasing the proportion of healthy and productive animals thereby reducing methane emissions, reducing pressure on water and other natural resources and making animals resilient to climate change. *(Para 5, Pg. 33, 4.4, NCE SYR India Chapter)*	These are addressed through the animal husbandry programme of ICAR as well as cattle development programme of the Department of Animal Husbandry and the combined allocation of these two programmes in the budget for 2015 was Rs. 794.6 crores or USD 122.24 million[89]	
	Use of new methods of cultivation (e.g. System of Rice Intensification (SRI)) can help reduce water usage and methane emissions while improving resilience. *(Para 7, Pg. 33, 4.4, NCE SYR India Chapter)*	This aspect is being taken care of by the Climate Resilient Agriculture Initiative and the National Mission on Sustainable Agriculture with a combined allocation of Rs. 403 crores or USD 62 million[90]	
	Promoting energy efficient water pumps for better water management. *(Para 8, Pg. 33, 4.4, NCE SYR India Chapter)*	This aspect is covered under the Bureau of Energy Efficiency's Agriculture Demand Side Management Scheme. The BEE has been provided with an annual budget of Rs. 50 crore or USD 7.69 million for 2015[91]	The National Mission on Sustainable Agriculture will cater to key dimensions of adoption of energy efficient equipment[92]. The National Water Mission has a state level programme for Research & Development for improving energy efficiency of water pumps used for irrigation etc[93]. The main objective of Ministry of New and Renewable Energy Solar Pumping Programme for Irrigation and Drinking Water under Off Grid and Decentralised Solar applications scheme is exploring prospects of solar pump programs to address and support rural development-related aspects, over and above the basic service of water and improvement in energy excess[94].

86. http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
87. 6.3, Pg. 12, Para 3, NLP 2013, http://dadf.gov.in/dahd/WriteReadData/NLP%202013%20Final11.pdf
88. http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
89. http://indiabudget.nic.in/ub2015-16/eb/sbe3.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf
90. http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
91. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
92. 1.3, Pg. 1, Para 3, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
93. VI, Pg. 13, Para 2, NWM NAPCC, http://wrmin.nic.in/writereaddata/nwm28756944786.pdf
94. 4.3, Pg. 3, Para 1, SPP, http://mnre.gov.in/file-manager/UserFiles/Scheme-for-Solar-Pumping-Programme-for-Irrigation-and-Drinking-Water-under-Offgrid-and-Decentralised-Solar-applications.pdf

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	Using micro-irrigation methods such as drip and sprinkler irrigation for better water management. *(Para 8, Pg. 33, 4.4, NCE SYR India Chapter)*	This aspect is at present being addressed by the Pradhan Mantri Krishi Sinchai Yojana that has been allocated Rs. 1800 crores or USD 276.9 million in the 2015 budget[95]	The National Water Mission envisages adoption of scientific water management, farm practices and sprinkler and drip system of irrigation to ensure judicious and only optimum use of water in irrigation[96]. On Farm Water Management is a programme component of the National Mission on Sustainable Agriculture) which will focus on enhancing water use efficiency by promoting appropriate technological interventions like drip & sprinkler technologies[97].
Energy Efficiency	Decarbonizing (reducing the carbon intensity) electricity generation as well as efficiency enhancement and behavioural changes without compromising development are important mitigation measures to limit global warming to 2^0C. (*SPM 4.3, Pg. 28, Para 3, IPCC AR5 SYR)*		
	Near-term reductions in energy demand are very important in cost-effective mitigation strategies. (*SPM 4.3, Pg. 29, Para 1, IPCC AR5 SYR)*.	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[98]	
	Behaviour, lifestyle and culture influence energy use and associated emissions and have high mitigation potential in some sectors specially… (SPM 4.3, Pg. 29, Para 2, IPCC AR5 SYR)		
	Regulatory approaches such as energy efficiency standards and information measures such as labelling programs are environmentally effective and can help consumers make better-informed decisions. (*SPM 4.4, Pg. 30, Para 3, IPCC AR5 SYR)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[99]	
	Adopting methods such as improved energy efficiency or reducing the proportion of coal in the country's fuel mix will be necessary to reduce GHG emissions. *(Para 2, Pg. 14, 2.3, NCE SYR India Chapter)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[100]	In the generation side, the Government is promoting greater use of renewable in the energy mix mainly through solar and wind and at the same time shifting towards supercritical technologies for coal based power plants. On the other side, efforts are being made to efficiently use the energy in the demand side through various innovative policy measures under the overall ambit of Energy Conservation Act 2001.

95. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf
96. 2.1.3, Pg V/4, Para 2, NWM NAPCC, http://wrmin.nic.in/writereaddata/nwm28756944786.pdf
97. 6.1.3, Pg. 10, Para 7, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
98. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
99. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
100. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf

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	Mandatory minimum energy efficiency standards can be an effective tool.	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[101]	The Energy Conservation Building Code (ECBC) was developed by Govt. of India for new commercial buildings on 27th May 2007. ECBC sets minimum energy standards for new commercial buildings having a connected load of 100kW or contract demand of 120 KVA and above. While the Central Government has powers under the EC Act 2001, the state governments have the flexibility to modify the code to suit local or regional needs and notify them[102]
	Fuel efficiency standards for new cars can be an important step towards better management of energy demand in the transport sector. *(Para 1, Pg. 21, 3.2, NCE SYR India Chapter)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[103]	
	Improving agglomeration productivity to upgrade growth and economic efficiency. *(Para 4, Pg. 40, 6, NCE SYR India Chapter)*		
	Introduction/tightening up of mandatory minimum energy efficiency standards for appliances, vehicles and buildings can play an important role in reducing GHG emissions. *(Para 2, Pg. 41, 6.1, NCE SYR India Chapter)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[104]	
	Careful monitoring and impact evaluation to ensure vigorous enforcement of minimum energy efficiency standards. *(Para 2, Pg. 41, 6.1, NCE SYR India Chapter)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[105]	
	Expanded information initiatives along with mandatory minimum energy efficiency standards can play an important role in reducing GHG emissions. *(Para 2, Pg. 41, 6.1, NCE SYR India Chapter)*	The allocation by the Government of Indian in the budget of the Ministry of Power to BEE this year in 2015 was Rs. 50 crores or USD 7.69 million[106]	
Social sector reforms and safety nets	Some of the response adaptation options for human development can be improved access to education. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, GoI through the Ministry of Human Resources Development supports elementary and secondary education that have a combined allocation of Rs. 36066.5 crores or USD 5548.69 million	Ministry of Women and Child Development's Early Child care and Education Programme seeks to universalise the provision of Early Child Care and Education for all children mainly through Integrated Child Development Scheme in public sector and other service provisions across systems[107]

101. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
102. http://www.eco3.org/ecbc/
103. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
104. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
105. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
106. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
107. 5.1.1, Pg. 7, Para 7, EECE, http://wcd.nic.in/schemes/ECCE/National%20ECCE%20Policy%20draft%20(1).pdf

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	Better nutrition and health facilities can also help in effective human development. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Ministry of Women and Child Development and the Ministry of Health have Several allocations in the Union Budget. These include allocations for National Health Mission, Public Health, and Medical Institutions by the Ministry of Health and Integrated Child Development Scheme, Women Welfare, and National Nutrition Mission by the Ministry of Women and Child Welfare. The combined allocation of all these schemes in the Union Budget for 2015 by the GoI is Rs. 14806.7 crores or USD 2277.95 million[108]	
	Reduced gender inequality and marginalization in other forms can be beneficial in enhancing adaptation in terms of human development. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Ministry of Women and Child Development runs the following programmes viz. Empowerment of Adolescent Girls, Beti Bachao Beti Padhao Programme, an omnibus Women Welfare Programme and the Indira Gandhi Matritva Sahyog Yojana. In the Union Budget for 2015 there is a combined allocation in these heads of Rs. 798.53 crores or USD 122.85 million[109]	
	Social safety nets along with social protection can help in effective poverty alleviation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, the Ministry of Rural Development runs the National Rural Employment Guarantee Act and the National Social Assistance Programme, while the Ministry of Consumer Affairs, Food and Public Distribution runs the Food Subsidy and Civil Supplies (including the Public Distribution System) programme. The combined allocation on all these programmes is Rs. 168263.6 crores or USD 25886 million[110]	The objective of the Food for Work programme of the Ministry of Rural Development, is to provide additional resources apart from the resources available under the Sampoorna Grameen Rozgar Yojana (SGRY) to 150 most backward districts of the country so that generation of supplementary wage employment and providing of food-security through creation of need based economic, social and community assets in these districts is further intensified[111]. Other than this the National Social Assistance Programme was launched in 1995 - (a) to ensure national minimum standards of social assistance for vulnerable groups and (b) to be an addition to the benefits that States are currently providing or might provide in future. NSAP further comprises of four schemes: 1. National Old Age Pension Scheme; 2. National Widow Pension Scheme; 3. National Disability Pension Scheme; 4. National Family Benefit Scheme; 5. Annapurna[112].

108. http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf
109. http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf
110. http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf
111. Objective, Pg. 8, Para 3, http://pib.nic.in/archieve/others/2005/nedocuments2005dec/ruraldevdec2005/Chapter2.pdf
112. http://nsap.nic.in/

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Using services such as food banks and distribution of food surplus for better adaptation. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)		
	Using services such as vaccination programs for better adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Ministry of Health and Family Welfare has constituted a National Vaccine Policy with specific relevance to local vaccine needs is required to guide decision-making and develop a long-term plan to strengthen the whole vaccine program and not just a component[113]. Also, the ministry runs a Universal Immunisation Programme (U.I.P.) which is one of the largest in the world in terms of quantities of vaccine used, the number of beneficiaries, the number of Immunisation session organised, the geographical spread and diversity of areas covered[114].
	Using services such as essential public health services for better adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The Ministry of Health and Family Welfare runs a Public Health Programme and the National Health Mission that in the GoI budget for 2015 have a combined allocation of Rs. 20062.15 crores or USD 3086.48 million[115]	
	Using services such as enhanced emergency medical services for better adaptation. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This is addressed by the Health Sector Disaster Preparedness and Management Including Emergency Medical Relief program of the Ministry of Health and Family Welfare programme. This programme is being funded with an allocation of Rs. 27 crores or USD 4.15 million[116]	
	Reliance on social networks as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	A modern nationwide system of social protection needs to be developed to address the adverse impacts of subsidy removal on the rural poor and also it helps in broadening the agenda for equitable development. *(Para 5, Pg. 41, 6.2, NCE SYR India Chapter)*		
Climate Resilient Water Management	Recycling of water have synergies and trade-offs between adaptation and mitigation measures can co-benefit both the sectors. (*SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR)*	These aspects are being addressed not just by the National Water Mission but additionally also through the larger initiative on National Rural Drinking Water programme of the Ministry of Drinking Water and Sanitation. The combined allocation of all of these initiatives is Rs. 2631 crores or USD 404.76 million in the GoI budget for 2015[117]	

113. 1.2, Pg. 3, Para 2, NVP, http://mohfw.nic.in/WriteReadData/l892s/1084811197NATIONAL%20VACCINE%20POLICY%20BOOK.pdf
114. Introduction, Para 1, http://www.nhp.gov.in/health-programmes/national-health-programmes/universal-immunization-programme-uip
115. http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf
116. http://indiabudget.nic.in/ub2015-16/eb/sbe48.pdf
117. http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf

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	Disaster risk management can be addressed through diversifying water resources. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The National Water Mission addresses this issue and is being implemented by the Ministry of Water Resources is spending Rs. 20 crores or USD 3.07 million in 2015 under the Union Budget of GoI[118]	
	Disaster risk management can be addressed through improved drainage. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Water Policy (2012) states that Encroachments and diversion of drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly[119]. The National Urban Sanitation policy also states that "…drainage improvements and community managed solid waste disposal systems – these areas should also be targeted while planning for sanitation is being undertaken"[120]
	Better water storage is also a structural/physical adaptation response. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	While the National Water Mission addresses this aspect, so does the Dam Rehabilitation and Improvement Programme of the Ministry of Water Resources. The combined allocation of these two programmes in the GoI union budget is Rs. 49 crores or USD 7.53 million[121]	The National Water Policy (2012) anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination. States should be incentivized to increase water storage capacity, which inter-alia should include revival of traditional water harvesting structures and water bodies[122]
	Use of desalinization as a technological adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The National Water Mission addresses this issue and is being implemented by the Ministry of Water Resources is spending Rs. 20 crores or USD 3.07 million in 2015 under the Union Budget of GoI[123]	
	Pricing water to encourage universal provision and careful use as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	These aspects are being addressed not just by the National Water Mission but additionally also through the larger initiative on National Rural Drinking Water programme of the Ministry of Drinking Water and Sanitation. The combined allocation of all of these initiatives is Rs. 2631 crores or USD 404.76 million in the GoI budget for 2015[124]	

118. http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf
119. 8.2, Pg. 8, Para 2, NWP, http://www.dowrorissa.gov.in/ActsnPolicies/NWP/2012/NationalWaterPolicy2012.pdf
120. Pg. 26, Para 4, NUSP, http://moud.gov.in/policies/NUSPpolicy
121. http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf
122. 4.2, Pg. 5, Para 3, NWP, http://www.dowrorissa.gov.in/ActsnPolicies/NWP/2012/NationalWaterPolicy2012.pdf
123. http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf
124. http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf

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	Water regulations and agreements as regulatory institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The National Water Mission addresses this issue and is being implemented by the Ministry of Water Resources is spending Rs. 20 crores or USD 3.07 million in 2015 under the Union Budget of GoI[125]	
	Soil and water conservation as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The National Mission on Sustainable Agriculture aims to optimize utilization of water resources through efficient water management to expand coverage for achieving 'more crop per drop[126]. One of the goals of the Nation Water Mission is promotion of citizen and state action for water conservation, augmentation and preservation[127].
	Storm drain clearance as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	The National Water Mission addresses this issue and is being implemented by the Ministry of Water Resources is spending Rs. 20 crores or USD 3.07 million in 2015 under the Union Budget of GoI[128]	
Education and Awareness	Awareness raising and integrating climate change learning into education as educational and social adaptation measures. *(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This is partly addressed through the budgets allocated under the budget heads titled Environment Education/ Training/ Extension and National Museum of Natural History of the Ministry of Environment and Forests with an allocation of Rs. 48.71 crores or USD 7.49 million[129]. Additionally, though exact allocations could not be traced, environment education in the school system is being undertaken by the NCERT through adding environment into school curricula.	
	Gender equity in education as educational and social adaptation measures. *(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This is being addressed through the Beti Bachao Beti Padhao programme of the Ministry of Women and Child Development with an allocation of Rs. 711.62 in the GoI budget for 2015[130]	
	Extension services as educational and social adaptation measures. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	While this aspect is not addressed wholly, the Ministry of Agriculture does implement a mission on Agriculture Extension and Technology as also a Mission on Agricultural Extension having a combined allocation of Rs. 1087.8 crores or USD 167.35 million in the GoI budget for 2015[131]	
	Sharing indigenous, traditional and local knowledge as educational and social adaptation measures. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

125. http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf
126. 2.4, Pg. 2, Para 4, NMSA NAPCC, http://agricoop.nic.in/imagedefault/whatsnew/nmsagidelines.pdf
127. Chapter 1, Pg. 2, Para 3, NWM NAPCC, http://wrmin.nic.in/writereaddata/nwm28756944786.pdf
128. http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf
129. http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf
130. http://indiabudget.nic.in/ub2015-16/eb/sbe108.pdf
131. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Conducting participatory action research and social learning as educational and social adaptation measures. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)		
	Creating knowledge sharing and learning platforms available as educational and social adaptation measures. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)	While exact allocations could not be extracted, the process of preparation of the National Communication submitted to the UNFCCC from time-to-time involves creation of such platforms	The National Mission on Strategic Knowledge for Climate Change aims at establishing networks of knowledge institutions[132] and setting up an effective mechanism for data sharing and access[133]
	Climate services as social (informational) adaptation measure. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)	This aspect is being addressed through the Atmosphere and Climate: Research, Modelling, Observation systems and services (ACROSS) of the Ministry of Earth Sciences. The allocation for this programme in the Indian Government's budget for 2015 is Rs. 250 crores or USD 38.46 million[134]	The Climate Services Programme of the Ministry of Earth Sciences aims to create facilities for providing Climate Services through the establishment of a Regional Climate Centre (RCC)-South Asia of the WMO, within IMD and to cater to the need of a comprehensive set of specialized climate services for the country and for South Asia as a region identified with the South West Monsoon climate[135]
	Use of indigenous climate observations as a social (informational) adaptation measure. (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)		
Disaster Risk Reduction	Disaster risk reduction is a very important adaptation measure in reducing poverty. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Storm and wastewater management is an important hard adaptation measure that can help reduce disaster. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	In this regard, the Ministry of Water Resources spends money on the Accelerated Irrigation Benefit and Flood Management Programme as well as on the National Water Mission. These programmes have a combined allocation of Rs. 1020 crores or USD 156.92 million in the budget allocation for 2015[136].	
	Land-use and spatial planning can be enhanced by development of flood prone and high risk areas. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The Central Water Commission along with National Flood Commission (Rashtriya Barh Ayog) has assessed the total flood prone area in the country as 40 m.ha which included the unprotected flood area of 33.516 m ha and the balance as protected area[137].
	Insurance as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

132. 4.1, Pg. 17, Para 1, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
133. 4.3, Pg. 19, Para 2, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
134. http://indiabudget.nic.in/ub2015-16/eb/sbe31.pdf
135. a. Objectives, Para 4-5, http://moes.gov.in/programmes/climate-services
136. http://indiabudget.nic.in/ub2015-16/eb/sbe30.pdf
137. http://india-wris.nrsc.gov.in/wrpinfo/index.php?title=Flood_Management#Flood_Prone_Areas_in_India

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Catastrophe bonds as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Disaster contingency funds as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through the Disaster Management head under the Ministry of Home Affairs. The total allocation for 2015 in the Union Budget for this activity is Rs. 919.29 crores or USD 141.42 million[138]	The scheme of National Calamity Contingency Funds may continue in the twelth five year plan in its present form with core corpus of Rs. 500 crore. The outgo from the fund may continue to be replenished by way of collection of National Calamity Contingent Duty and levy of special surcharges[139].
	Systematic monitoring and remote sensing as social (informational) adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is being addressed through the Atmosphere and Climate: Research, Modelling, Observation systems and services (ACROSS) of the Ministry of Earth Sciences. The allocation for this programme in the Indian Government's budget for 2015 is Rs. 250 crores or USD 38.46 million[140]	The National Natural Resources Management System (NNRMS) Scheme of the Ministry is part of an umbrella scheme of the Planning Commission-Planning Committee-National Natural Resources Management System (PC-NNRMS) and is in operation since, 1985. The main objective of PC-NNRMS is utilization of remote sensing technology for inventorization, assessment and monitoring of country's natural resources[141]. Another project is being carried out by the Ministry of Earth Sciences called 'Space based Information Support for Decentralized Planning' and it aims to create satellite images for the country[142]. ISRO formulated the National Information System for Climate and Environment Studies (NICES) with the mandate to build an information base for climate change impact assessment and mitigation under the guidance of NICES Programme Management Council (NICES-PMC) with representatives from inter and intra-departmental institutions[143].
Decentralised Decision Making	Adaptation options for poverty alleviation include improved access to and control of local resources. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		

138. http://indiabudget.nic.in/ub2015-16/eb/sbe56.pdf
139. Twelfth Finance Commission, Para 3, http://finmin.nic.in/the_ministry/dept_expenditure/plan_finance/FCD/national-calamity.asp
140. http://indiabudget.nic.in/ub2015-16/eb/sbe31.pdf
141. http://repmismoef.nic.in/Public/research_development.aspx?status=3&name=National%20Natural%20Resources%20Management%20System%20NNRMS%20Programme
142. http://www.nrsc.gov.in/Programmes_sisdp.html
143. http://nrsc.gov.in/nices2/index.html

Category	Specific Recommendations	Budgetary Allocations that Address the Issue	Policy and other Government statements that acknowledge the issue
	Increased decision making power can also help in livelihood enhancement. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through the Rajiv Gandhi Panchayat Sashaktikaran Abhiyan of the Ministry of Panchayati Raj having an allocation of Rs. 50 crores or USD 7.69 million[144]	Under the seventy third amendment of the Constitution Act, it was proposed to add a new Part relating to Panchayats in the Constitution to provide for among other things, Gram Sabha in a village or group of villages; constitution of Panchayats at village and other level or levels to enable decentralised decision making[145]
	Access to technology can also help in livelihood enhancement. *(SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		The Science and Technology Policy aims at promoting the spread of scientific temper amongst all sections of the society[146]
	Ecosystem management adaptation can also be done by community-based natural resource management. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR) (SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		Joint Forest Management Programme provides a framework for creating massive people's movement through involvement of village committees for the protection, regeneration and development of degraded forest lands[147] and is based on community based natural resource management. Also, community based management can be seen in Paani panchayat[148].
	Participatory scenario development as a social (informational) adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Conducting integrated assessments as a social (informational) adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
GHG Emissions Reduction	Reducing emission of non-CO_2 agents, expressed as "CO_2- equivalent emissions", can be a significant component of mitigation strategies. (*SPM 3.4, Pg. 23, Para 1, IPCC AR5 SYR)*		
	Limiting warming over the 21st century to below 2^0 C relative to pre-industrial level requires higher rates of emission reductions from 2030 to 2050. (*SPM 3.4, Pg. 24, Para 1, IPCC AR5 SYR)*		
	Limiting warming over the 21st century to below 2^0 C relative to pre-industrial level requires rapid scale-up of low carbon energy from 2030 to 2050. (*SPM 3.4, Pg. 24, Para 1, IPCC AR5 SYR)*		

144. http://indiabudget.nic.in/ub2015-16/eb/sbe71.pdf
145. http://indiacode.nic.in/coiweb/amend/amend73.htm
146. Capturing Aspirations, Pg. 3, Para 3, Science Technology and Innovation Policy 2013, http://dst.gov.in/sti-policy-eng.pdf
147. Strengthening of Joint Forest Management, Para 1, http://www.moef.nic.in/sites/default/files/jfm/jfm/html/strength.htm
148. http://panipanchayat.org/content/mission-and-vision

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	GHG Emissions can be reduced substantially through changes in consumption patterns and adoption of energy saving measures. *(SPM 4.3, Pg. 29, Para 2, IPCC AR5 SYR)*		
	Dietary change and reduction in food waste can also help in lowering the emissions. (*SPM 4.3, Pg. 29, Para 2, IPCC AR5 SYR)*		
	Adoption of existing cost-effective energy-efficient appliance technologies can result in large reductions in India's energy consumption and GHG emissions. *(Para 5, Pg. 20, 3.2, NCE SYR India Chapter)(Para 1, Pg. 41, 6.1, NCE SYR India Chapter)*	This is addressed through the allocations made for the Bureau of Energy Efficiency of the Ministry of Power. The allocation for 2015 in the GoI budget is Rs. 50 crores or USD 7.69 million[149]	
International Cooperation	To effectively mitigate GHG emissions and other climate change impacts, cooperative responses including international cooperation are required. *(SPM 3.1, Pg. 17, Para 5, IPCC AR5 SYR)*	None of them have a hard policy agenda of implementation except that the Ministry of Environment and Forests has been designated as a nodal agency to deal with International Cooperation aspects of climate change and coordinate with other agencies such as Prime Minister's Office, Ministry of External Affairs, Ministry of Power, Ministry of Transport and other such relevant line ministries	The National Mission on Strategic Knowledge for Climate change aims at building international cooperation on S&T for climate change agenda through strategic alliance[150]. Also, India is a party to five major international conventions related to Wild Life conservation, viz., Convention on International Trade in Endangered Species of wild fauna and flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN), International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) and the Convention on Migratory Species (CMS)[151].

149. http://indiabudget.nic.in/ub2015-16/eb/sbe77.pdf
150. Pg. 7, Para 3, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
151. International Cooperation, Para 1, http://envfor.nic.in/division/international-conventions

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	Complimentary actions across levels including international cooperation are required for effective adaptation. *(SPM 3.1, Pg. 17, Para 5, IPCC AR5 SYR)*	None of them have a hard policy agenda of implementation except that the Ministry of Environment and Forests has been designated as a nodal agency to deal with International Cooperation aspects of climate change and coordinate with other agencies such as Prime Minister's Office, Ministry of External Affairs, Ministry of Power, Ministry of Transport and other such relevant line ministries	The National Mission on Strategic Knowledge for Climate change aims at building international cooperation on S&T for climate change agenda through strategic alliance[152]. Also, India is a party to five major international conventions related to Wild Life conservation, viz., Convention on International Trade in Endangered Species of wild fauna and flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN), International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) and the Convention on Migratory Species (CMS)[153].
	Lessons/ outcomes of Kyoto Protocol with respect to participation, implementation, flexibility mechanisms and environmental effectiveness must be taken into consideration for effective international cooperation. (*SPM 4.4, Pg. 29, Para 6, IPCC AR5 SYR)*	None of them have a hard policy agenda of implementation except that the Ministry of Environment and Forests has been designated as a nodal agency to deal with International Cooperation aspects of climate change and coordinate with other agencies such as Prime Minister's Office, Ministry of External Affairs, Ministry of Power, Ministry of Transport and other such relevant line ministries	The National Mission on Strategic Knowledge for Climate change aims at building international cooperation on S&T for climate change agenda through strategic alliance[154]. Also, India is a party to five major international conventions related to Wild Life conservation, viz., Convention on International Trade in Endangered Species of wild fauna and flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN), International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) and the Convention on Migratory Species (CMS)[155].

152. Pg. 7, Para 3, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
153. International Cooperation, Para 1, http://envfor.nic.in/division/international-conventions
154. Pg. 7, Para 3, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
155. International Cooperation, Para 1, http://envfor.nic.in/division/international-conventions

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	International cooperation for supporting adaptation planning and implementation must be given a priority for the creation of effective adaptation strategies. (*SPM 4.4, Pg. 29, Para 8, IPCC AR5 SYR*)	None of them have a hard policy agenda of implementation except that the Ministry of Environment and Forests has been designated as a nodal agency to deal with International Cooperation aspects of climate change and coordinate with other agencies such as Prime Minister's Office, Ministry of External Affairs, Ministry of Power, Ministry of Transport and other such relevant line ministries	The National Mission on Strategic Knowledge for Climate change aims at building international cooperation on S&T for climate change agenda through strategic alliance[156]. Also, India is a party to five major international conventions related to Wild Life conservation, viz., Convention on International Trade in Endangered Species of wild fauna and flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN), International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC) and the Convention on Migratory Species (CMS)[157].
Climate Resilience Through Livelihood Security	Income, assets and livelihood diversification are some of the mitigation options that address the issue of livelihood security (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through initiatives of the Ministry of Rural Development such as NREGA and NRLM. These programmes have a combined allocation of Rs. 37081 crores or USD 5704.76 million in the budget allocation for 2015[158]	
	Encourage microfinance as an economic institutional adaptation measure. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This is addressed through institutions such as the NABARD which work on issues such as microfinance for the rural poor.	
	Livelihood diversification as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through initiatives of the Ministry of Rural Development such as NREGA and NRLM. These programmes have a combined allocation of Rs. 37081 crores or USD 5704.76 million in the budget allocation for 2015[159]	
	Expanding economic opportunities for people who constitute forest communities can strengthen resilience to climate change. *(Para 6, Pg. 33, 4.4, NCE SYR India Chapter)*	This is addressed through various programmes of the Ministry of Environment and Forests viz. National Afforestation and Eco development Programme, Integrated Development of Wildlife Habitats, Green India Mission, and the National Afforestation Programme. These programmes have a combined allocation of Rs. 204.71 crores or USD 31.49 million in the central government budget allocation for 2015[160].	

156. Pg. 7, Para 3, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
157. International Cooperation, Para 1, http://envfor.nic.in/division/international-conventions
158. http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf
159. http://indiabudget.nic.in/ub2015-16/eb/sbe85.pdf
160. http://indiabudget.nic.in/ub2015-16/eb/sbe32.pdf

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Natural Resource Management	Soil Conservation as an ecosystem adaptation strategy. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through initiatives of the Ministry of Agriculture that include National Project on Management of Soil Health and Productivity, All India Soil and Land Use Survey and Application of Remote Sensing Technology for Soil Survey, Department of Agriculture Cooperation's Soil and Water Conservation Programme, and ICAR's Soil and Water Conservation Programme. In addition, the Integrated Watershed Management Programme of the Ministry of Water Resources also addresses this aspect. The combined allocation of these initiatives in the GoI's Union Budget for 2015 is Rs. 7677.89 crores or USD 1181.21 million[161]	
Renewable Energy	Use of cleaner energy sources has synergies and between adaptation and mitigation measures can co-benefit both the sectors. (SPM 3.3, Pg. 20, Para 2, IPCC AR5 SYR)	This aspect is being addressed through the recently announced renewable energy targets for 2022. Further, these targets have been enhanced for 2030 according to the Intended Nationally Determined Contributions submitted by India to the UNFCCC. The Ministry of New and Renewable Energy having an overall allocation of Rs. 3660.73 crores or USD 56.31 million in the Union Budget for 2015 fully addresses this aspect[162]	
	Substitution of renewable energy for imported coal at the margin can have vital economic and social benefits such as greater energy security and a cleaner environment. *(Para 3, Pg. 24, 3.4, NCE SYR India Chapter)*		
Green and/or Smart Cities	Urban planning and upgrading programs can be one of the adaptation options for land-use and spatial planning. (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*	This aspect is addressed through the Ministry of Urban Development's Development of 100 Smart Cities and Jawaharlal Nehru National Urban Renewal Mission programme and 500 cities and smart cities programme. The combined allocation of these initiatives in the GoI's Union Budget for 2015 is Rs. 6082.04 crores or USD 935.69 million[163]	The National Urban Housing and Habitat Policy has a specially designed slum improvement programmes which focus on upgrading of basic services and environment improvement of urban slums with a participative, in-situ slum rehabilitation approach[164]

161. http://indiabudget.nic.in/ub2015-16/eb/sbe1.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe2.pdf, http://indiabudget.nic.in/ub2015-16/eb/sbe107.pdf
162. http://indiabudget.nic.in/ub2015-16/eb/sbe69.pdf
163. http://indiabudget.nic.in/ub2015-16/eb/sbe104.pdf
164. 5.8 (ii), Pg. 32, Para 2, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf

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	High restriction on floor space indexes (FSI) needs to be relaxed. *(Para 1, Pg. 42, 6.3, NCE SYR India Chapter)*		The National Urban Housing and Habitat Policy provides innovative spatial incentives like relaxation of Floor Area Ratio (FAR) for ensuring that 20-25 % of the FAR are reserved for EWS / LIG and issuance of Transferable Development Rights(TDR) for clearance of transport bottlenecks in the inner-city areas and availability of additional FAR in Outer Zones will be promoted with a view to meeting the housing shortage amongst EWS/ LIG.(ii) Careful review of authorized Floor Area Ratio (FAR) in line with international practices for allowing more efficient use of scarce urban land by construction of high rise buildings[165].
Disaster Preparedness	Household preparation and evacuation planning as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
	Migration as behavioural adaptation strategy (*SPM Table 4.2, Pg. 27, IPCC AR5 SYR)*		
Capacity Building	Building adaptive capacity is important for better selection and implementation of adaptation options. (*SPM 3.3, Pg. 19, Para 5, IPCC AR5 SYR)*		The National Mission on Strategic Knowledge for Climate Change aims at developing the national capacity to model the impacts of climate change[166].
	Enhanced capacities to mitigate and adapt are an important foundation step for managing climate change risks for many regions and sectors. (*SPM 4.1, Pg. 26, Para 6, IPCC AR5 SYR)*		The National Mission on Strategic Knowledge for Climate Change aims at developing the national capacity to model the impacts of climate change[167]. Ministry of Environment and Forest and Ministry of Power has a CDM Capacity Building Program embedded in the BEE to foster high quality CDM Projects[168]
Artificial Carbon Sequestration Through Geo-engineering	Limiting warming over the 21st century to below 2^0 C relative to pre-industrial level requires larger reliance on Carbon Dioxide Removal (CDR) (*SPM 3.4, Pg. 24, Para 1, IPCC AR5 SYR)*		
	Availability of Carbon Capture and Storage (CCS) technology can help reduce the adverse effects of mitigation on value of fossil fuels. (*SPM 3.4, Pg. 25, Para 2, IPCC AR5 SYR)*		

165. II (xii), Pg. 14, Para 4, NUHHP, http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf
166. Chapter 2, Pg. 12, Para 6, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
167. Chapter 2, Pg. 12, Para 6, NMSKCC NAPCC, http://dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf
168. (GIZ and MOEF in CDM, Para 2, http://www.cdmindia.gov.in/capacity_building.php