POLICY FRAMEWORK AND PREPAREDNESS

for Implementing Measures to Effectively Deal with Climate Change

An Analysis For The State Of Karnataka

A study titled "Policy Framework and Preparedness for Implementing Measures to Effectively Deal with Climate Change: An Analysis of four states in India" was conducted through the support of the Heinrich Böll Foundation, India.[1] The objective of the study was to assess climate change vulnerability of four states namely, Karnataka, Andhra Pradesh, Goa, and Tamil Nadu. The aim of the study was also to understand the implications of the predicted Climate Vulnerability and Mitigation potential under various scenarios generated under the Intergovernmental Panel on Climate Change (IPCC) from the states' perspective.

Further, a detailed gap analysis was done to understand which actions, interventions, and solutions mentioned under the State Action Plan on Climate Change (SAPCC) (mandated under Ministry of Environment, Forest and Climate Change (MoEFCC) were aligned with the IPCC AR5 report.[2]

This pull out comprises of findings for the state of Karnataka. It also lists out common recommendations that have emerged from the study. It has been prepared to initiate the discussions at the state level, on the status of the implementation of their climate change action plans.

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KARNATAKA State Profile

Energy Profile

Karnataka is located in the south-western coast of the Deccan Peninsular region in India. It is located between 15°N latitude and 75°E longitude. The state has a population of 6.11 crores.[3] The population growth has declined from 17.25% to 15.6% from 2001 to 2011. But the population density has increased from 276 to 319 sq.km within the same time period (2001- 2011).

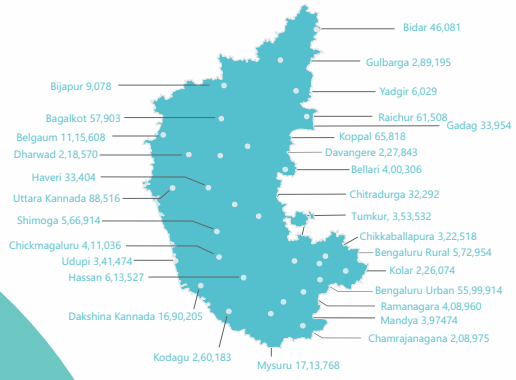
The states contributed 7.54% to the Gross State Domestic Product (GSDP) of India in 2015-16. The GSDP grew at a Compound annual growth rate (CAGR) of 13.93%, between 2004-05 and 2015-16.[4]

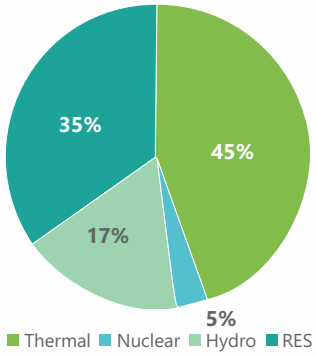
Agriculture and allied sector expected to show a decline on 4.7% in 2015-16. While the industry sector was expected to grow by 4.5%. Services sector is likely to grow slowly but steadily, at a rate of 9.1% in 2015-16 as compared to 10.3% in the previous financial year.[5] In spite of decline in GSDP contribution, agriculture remains the largest employment generating activity of the state.

This pull out comprises of the major findings for the state of Karnataka. It delves into the capacity and potential of the state to address the issues of climate change along with other related vulnerabilities. As mentioned, the paper is focused on looking at two broad parameters - Energy profile and Vulnerability and Impacts profile of the state.

Total LEDs distributed in Karnataka - 10179026

National Ujala Dashboard, as accessed on July 14, 2017





Energy Generation Profile
Karnataka

- Karnataka's total installed capacity as on 31st May 2017 is 21316.59 MW (CEA, 2017)[6], of which approximately 45% is produced through thermal setting utilizing coal, gas or diesel as fuel.
- Hydroelectric Energy accounts for almost 18% and other renewable sources as almost 35% of the total installed capacity.
- Nuclear energy accounts for 3.2% of the total installed capacity.
- The per capita energy consumption of the state is estimated at 925 Kwh as per FY 2013-14 data (IEP power sector road map).
- Karnataka recognizes that energy conservation is crucial for economic development and growth. The state has programs for Solar Roof Top Grid Connected Systems,[7] where government provides 30% subsidy for non-commercial and non-industrial categories for using domestic solar panels.
- Karnataka has also developed a Solar Policy 2011-16,[8] which was later updated in 2014 and extended to 2014-2021.[9] The objective is to promote solar power as part of the renewable energy generation.
- Energy efficiency initiatives taken by the state are, mandating the Energy Conservation Building Code (ECBC)[10], which has the potential to save 30% energy consumption in buildings.
- The government initiative to promote LED lights through National Ujala Scheme is also implemented in Karnataka. The map describes the status of LED distributed under this scheme.[11]

Vulnerability and Impacts

The vulnerability and impacts profile for Karnataka is based on the climate change impacts on the state. Focusing on parameters such as rainfall patterns and variation from mean precipitation levels. The occurrence of natural disasters like, drought and cyclone have been factored in among other parameters. Groundwater availability is also taken as parameter to assess potential vulnerability for states due to inadequate groundwater replenishment and high extraction.

Data sources for the Report -

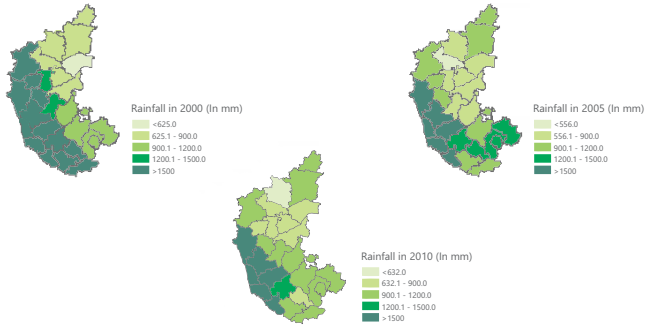
The data has been collected for each of the parameters – rainfall data, drought, cyclone and ground water (see table below).

Vulnerability maps have been prepared on these parameters to have a perspective of the most vulnerable districts for these Indian States. The maps have been made using Arc GIS and Quantum GIS software. The data has been mapped in different points of time to show the progressive changes in the vulnerabilities of the states.

Indicator	Data Source	Time Series
Rainfall fluctuations	IMD	2000-2010
Cyclones	IMD	1891-2008
Droughts	IMD	2002-2014
Ground Water Stress	CGWB	2010-2050 (Projections)

Rainfall Pattern

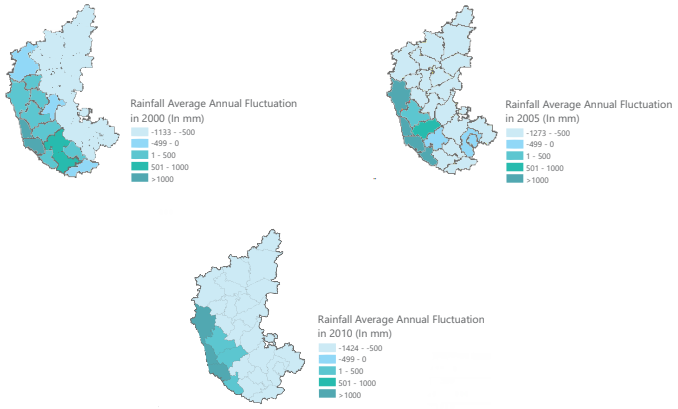
The annual rainfall in Karnataka varies from about 50 to 350cm.[12] The rainfall pattern from 2000-2010 depicts a rather lower coverage of precipitation for districts located on the western part of the state. While some non-coastal districts have experienced significant fluctuations over the years, all three coastal districts receive plentiful precipitation.



Rainfall Pattern of Karnataka

Rainfall Variation

Some of the western districts, especially the coastal ones have received a considerable amount of rainfall above the mean in the decade 2000-2010. Overall, the coverage of high precipitation is falling, as there are an increasing number of districts that experience rainfall much below the state average in 2010.[13] Given the state average of 1759.1 mm in the year 2000, 2 of the districts are above the state average and lie within the maximum deviation category (greater than 1000 mm fluctuation), while 13 districts are well below the state average (higher than -500 mm fluctuation from the average). In the year 2005, the 5 districts have been above state average of 1829.3 mm and 18 districts have been in the highest negative fluctuation category.



Rainfall Variation In Districts Of Karnataka

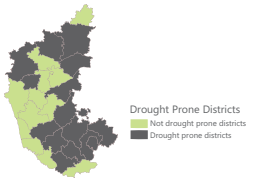
Data for the year 2010 depicts that 3 districts (all coastal districts) have been receiving rainfall much higher than the state average of 2057.8 mm, while 21 districts lie well below the state average. Over the 2000-10 decade 4 districts namely, Bangalore, Bellary, Raichur and Gulbarga have consistently been in the lowest category (higher than -500 mm fluctuation from state average), thus making their ecosystem vulnerable to climate change impacts.

Cyclone

In general Karnataka, is not categorised as being vulnerable to cyclones. However, it was affected by Cyclone Phylin, which had an impact on the western coast of India.

Drought

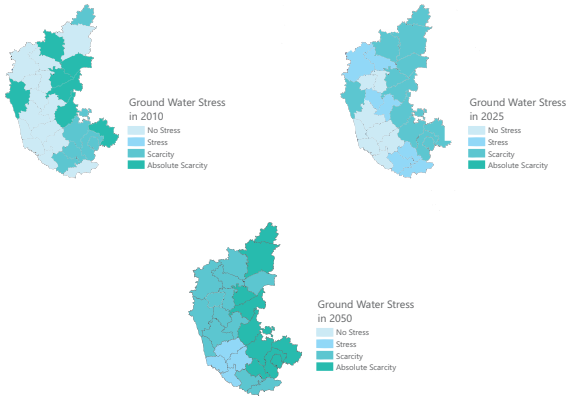
The droughts prone areas have been identified and constructed through ArcGIS. The state is also severely affected by droughts in almost 55.5% (15 out of a total of 27) of the total districts that are drought prone as shown in the map below (NIDM). Given the potential risk to crop production, especially in the non-coastal districts, droughts are a serious climate change related risk to Karnataka.



Drought Prone Districts In Karnataka

Ground Water

Since water resources are an important source for irrigation for the agricultural sector in Karnataka, it is important to recognize various threats they face. In spite of the fact that net and gross area irrigated has increased overtime, the net annual groundwater availability has fallen between 2004 to 2009 due to lack of replenishment as well as increased anthropogenic pressure of resource extraction. The maps represented, clearly show a rise in water scarcity and stress in almost all of the districts by the year 2050. In the year 2010, 7 districts out of a total of 27 were identified as absolutely scare. However, according to the 2050 projections, almost all the districts have been predicted to be under at least scarcity in terms of groundwater, especially the coastal districts, whereas the eastern districts have been consistently identified under absolute stress in 2025 and 2050 projections.



Groundwater Stress In Karnataka

Owing to the risk from natural phenomenon described above, Karnataka could be categorised as being highly vulnerable to climate change. Negative rainfall variations pose implications for various sectors such as agriculture and water. Further, changes in net annual groundwater availability impact the agricultural sector of the state as it derives 45% of the irrigation from groundwater resources (SAPCC). In addition, fresh water reserves including surface water as well as ground water aquifers, are prone to alteration owing to fluctuation in rainfall, which could be further aggravated by droughts.

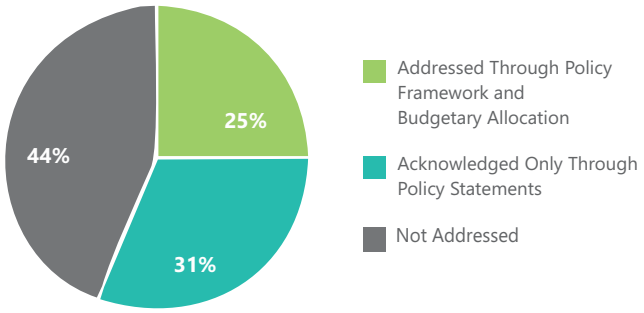
Gaps & Status of Preparedness

Climate Resilient Agriculture | Climate Resilient Ecosystem | Social Adaptation | Climate Resilient Infrastructure | Sustainable Water Management | Energy | Sustainable Smart Cities

This section looks at the Karnataka's state of preparedness with respect to seven categories. The recommendations for each of these categories are based on references from IPCC AR5 report, the New Climate Economy report (NCE)[14] and the State Action Plan on Climate Change for Karnataka.[15]

Climate Resilient Agriculture

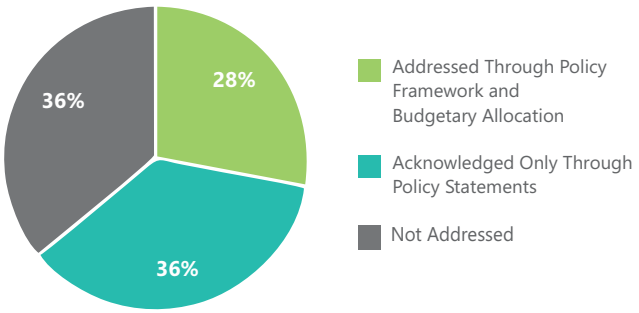
As per the recommendation under the IPCC AR5, NCE and SAPCC for Karnataka, 25% of the IPCC recommendations under this category are addressed through policy initiatives coupled with budgetary support. Some of these recommendations including Cropland management, Development and planting of climate-hardy indigenous cultivars, etc. have been addressed in the Bhoo Chetna (17000 crores) initiative. Recommendations such as better animal health, reproduction and management research, etc. are being addressed by the Disease Research Unit at KVAFSU, Shimoga and Livestock Health Research and IEC center at Mulabagilu (2 crores). Crop insurance is being provided in the state through Provision of Crop insurance under the National Agricultural Insurance Scheme (NAIS) and Water Based Crop Insurance Scheme. Mitigation oriented initiatives for carbon sequestration are addressed through the Afforestation schemes in Karnataka as well as the Agro Forest development scheme. 31% of recommendations are taken cognizance of, through policy statements only and initiatives without any corresponding budgetary support. 44% of the recommendations under this category have not been addressed.



Recommendations Addressed Through Climate Resilient Agriculture In Karnataka

Climate Resilient Ecosystem

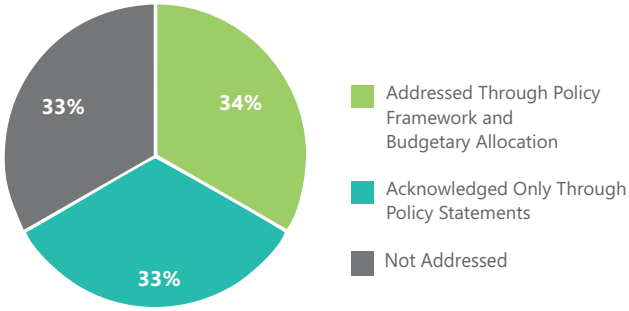
For this category, 28% recommendations have been addressed through policy framework and budgetary allocation. 36% of the recommendations such as Protection of Ecosystem, Ecosystem management, provision of protected area, initiating conservation and development programs are addressed through a policy focus coupled with budgetary support. Some of these initiatives include Integrated Coastal Zone Management Programme, Beach Protection and Coast Management Plan, National Disaster Mitigation Project, Agro Forestry Development Scheme, etc. The rest 36% of the recommendations have not been addressed.



Recommendations Addressed Through Climate Resilient Ecosystem In Karnataka

Social Adaptation

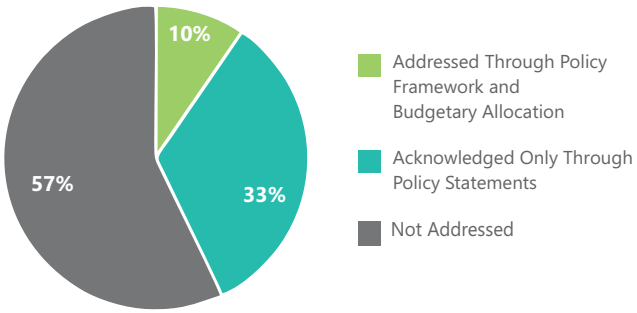
34% of the recommendations in this category have been addressed through a policy focus backed by budgetary allocations. Some of these initiatives include Karnataka Nutrition Mission, Karnataka Health System Development & Reform Project, Implementation of the Janani Suraksha Yojana (Maternal care scheme) and Prasuthi Ariake Yojana (Pregnant woman care) schemes under the umbrella of the Thayi Bhagya (Maternal health care) programme, etc. 33% of the recommendations, suggesting better nutrition and health have been taken cognizance of through a number of policy frameworks put in place such as Pradhan Mantri Gramin Awaas Yojana, Support to Training & Employment Programme for Women (STEP), Karnataka State Integrated Health Policy and the Karnataka Nutrition Mission and social safety nets. However 33% of the recommendations remain unaddressed by the state. These include climate services as social (informational) adaptation measures and reliance on social networks as behavioral adaptation.



Recommendation Addressed Through Social Adaptation In Karnataka

Climate Resilient Infrastructure

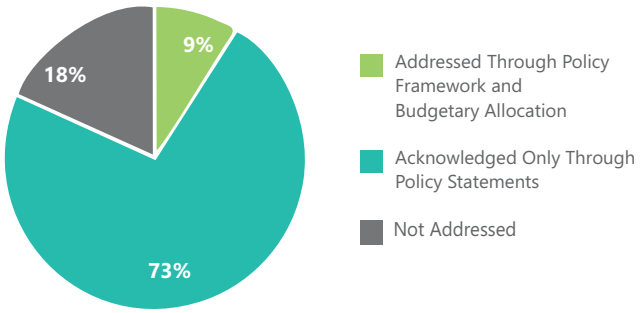
57% of the recommendations in this category are unaddressed. 10% of the recommendations have been addressed through policy statements supported by budgetary measures. These include, upgrading and expanding the transmission network or upgrading urban infrastructure. In addition, there are many recommendations (33%) that have been taken cognizance of through policy focus. Examples of such recommendations include building codes and practices, reforms of land regulations, better policies and planning to control land use and energy demand, etc.



Recommendation Addressed Through Climate Resilient Infrastructure In Karnataka

Sustainable Water Management

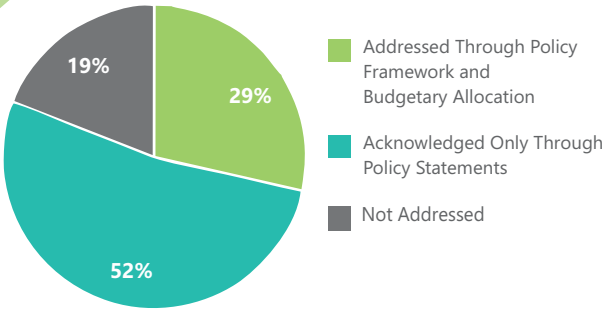
Of the total recommendations for the vulnerabilities identified in this category, 73% have been loosely addressed through cognizance within policy statements. Examples include urban drinking water and sanitation policy, industrial policy mandating rainwater harvesting, soil and water conservation, etc. However, recommendations that have been fully addressed through policy focus coupled with budgetary support are a mere 9% of the total number of recommendations. 18% of the recommendations have not been addressed at all. These include aspects such as research and study on efficient water utilisation methods, diversifying water resources, etc.



Recommendation Addressed Through Sustainable Water Management In Karnataka

Energy

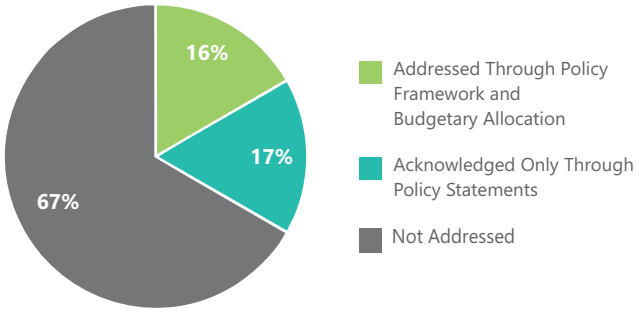
52% of the recommendations have been taken cognizance of through policy initiatives. These include initiatives such as the national labeling and standards scheme. 29% of the recommendations have been addressed through policy focus coupled with budgetary allocations. Examples of such initiatives include the National UJALA Scheme to distribute energy efficient LED lamps and incentivisation of roof top solar heaters, etc. Only around 19% of the recommendations remain unaddressed under this category.



Recommendation Addressed Through Energy In Karnataka

Sustainable Smart Cities

The Smart Cities Mission was launched in 2015 with a budget of Rs. 98,000 crores which identifies seven cities in Karnataka to be developed as smart cities. Karnataka also has the solar city mission to address reforms to achieve more compact, productive and green cities. Despite these initiatives, however, 67% of the recommendations made under this category are unaddressed. Of the rest, 16% are addressed through both policy focus and budgetary support and 17% are taken cognizance of through policy statements or focus.



Recommendation Addressed Through Smart And Sustainable Cities In Karnataka

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[9]Karnataka Solar Policy 2014-2021 (revised version of above policy) (https://goo.gl/y7oDy9)

[10]Karnataka Energy Conservation Building Code (ECBC) 2014 (https://goo.gl/XsvTqU)

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RECOMMENDATIONS

The following recommendations have been based on the study of four states – Karnataka, Andhra Pradesh (including Telangana), Goa and Tamil Nadu. The recommendations are common to all the states addressed in this study.

It is further based on the review of the seven sectors in the four states. Some issues /areas need to be addressed for states to enhance their capacities and preparedness to address climate change. The following recommendations are placed for concrete action for successful implementation of the respective State Action Plans on Climate Change.

This becomes important in context of the Paris Agreement being ratified in 2015. Under which, countries across the globe are required to be proactive in issuing policies and programs to ensure effective implementation of the Agreement.

Within the Indian context, implementation of the Paris Agreement requires national and state governments to formulate policies and programmes to address climate change and ensure compliance of targets.

The recommendations are as follows -

- **Long-Term Development Vision:** Karnataka needs to develop a long term 'Development Vision' which factors in challenges and risks emanating due to climate change
- **Road Map for Implementation:** following in line with the 'Development Vision' the state needs to develop an implementation road map with milestones and targets.
- **Institutional and Governance Structures:** to ensure holistic and integrated development planning and implementation of institutional and governance structures ought to be in place. As opposed to current pattern of planning and implementation of programmes and policies that are in silos.
- **Adequate Financing:** state ought to ensure that adequate financing is available for integrated development. Current budget allocation is based on departmental/ ministerial budgets.
- **Capacity Building and Training:** the states has a penchant for pursuing hard technological solutions to address climate change. But soft skills and capacities that are required to address climate change, tend to remain unaddressed. For example, adequate focus on capacity building, training, information sharing, creating repositories of good practices etc.
- **Context Relevant Solutions:** states seem to be going for solutions which are often tried and tested without delving into see whether these solutions continue to be appropriate with changing times and situations. For example, a couple of decades back, coal was perhaps the most viable source of electricity, while in today's world, renewable energy has proved to be more viable source of electricity. But states, continue to pursue options of generating electricity from coal, despite this.
- **State-Centre Linkages:** the Central Government needs to ensure that States are kept abreast of developments at international climate negotiations at various forums including the United Nations Framework Convention on Climate Change (UNFCCC) from time to time.
- **Specific Institutional Arrangements at State Level:** states need to create specific institutional arrangements that can enable them to meaningfully assist the Central Government in meeting its reporting and other obligations to the UNFCCC and its governance arrangements.

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