Global Water Partnership South Asia
India Water Partnership

Water & Climate Resilience Programme *(WACREP), India*

Adaptation Planning Guide

(Climate Adaptive Planning and Capacity Building of Farming Community in Semi-arid Areas of Bundelkhand Region, Madhya Pradesh)

Activity No. 3.6.3: *Climate Adaptive Planning, Capacity building and Training Programs*

Development Alternatives
B-32, TARA Crescent, Qutub Institutional Area
New Delhi, India
hbisht@devalt.org; akumar3@devalt.org

India Water Partnership (IWP)
Secretariat- WAPCOS Ltd.
76-C, Sector-18, Institutional Area, Gurgaon - 122015 (Haryana)
Tel. : (91-0124) 2348022 (D); (91-0124) 2399421, Extn : 1404
Email: iwpneer@gmail.com; veena@cwp-india.org Web: www.cwp-india.org
Facebook: India Water Partnership

Acknowledgement

This report is prepared under the financial support by **Global Water Partnership (GWP) and India Water Partnership (IWP)** within the **Water and Climate Resilience Programme**. This project focused on, **"Mainstreaming Climate Change Concerns in District Planning"** and was implemented by **Development Alternatives (DA)** in Datia district of Madhya Pradesh, India.

We place on record our gratitude to the Global Water Partnership (GWP) and India Water Partnership (IWP) for providing the financial and institutional support and guidance to this task. We also acknowledge the knowledge and institutional support provided to us by Datia District Panning Committee and district line departments, PRIs in Nauner and Pathari Panchayats of the district, local communities of the intervention villages for enthusiastic participation and academic research institutes such as National Research Centre for Agroforestry (Jhansi), Central Soil & Water Conservation Research & Training Institute (Datia) and Krishi Vigyan Kendra (Datia).

Executive Summary

Development Alternatives, in association with Global Water Partnership and India Water Partnership launched the WACREP initiative in Datia district, situated in the semi-arid Bundelkhand region of Madhya Pradesh. The objective of this initiative under the WACREP programme is **mainstreaming climate change concerns into development planning**. The initiative aimed to integrate climate change adaptation in development planning processes of Madhya Pradesh.

This Adaptation Guide is a guidance document for guiding district level officials and planners to mainstream climate change concerns in development planning.. The need for this document is driven by the observation that although communities experience and understand the impacts of changes in climate taking place in their immediate surroundings and also to a great extent have succeeded in finding quick solutions by adopting several autonomous adaptive strategies, mechanisms and practices. The aim of Adaptation Guide to help the planners to identify adaptation strategies for climate change so that they can be duly addressed and reflected in the decentralized district plans. Further it has been identified that this is mainly for the reason that the planning process in many districts does not follow the Planning Commission guidelines and the capacities of stakeholders to plan are weak. The guidance document seeks to fill this gap.

The Adaptation Guide is not a solution but a document which will aid the stakeholders in finding appropriate solutions in collaboration with communities to issues which they face. The guidance document is not the last word and is intended to be and should be adapted as per the needs at specific locations.

Climate Change Adaptation Planning Guide

- **An Outline**

1. **Executive Summary**
2. **Introduction**
   - About the guide
   - Aim and Objective
   - Usefulness
   - Expected outcomes

3. **Climate Adaptive Planning Framework**
   - Why do climate adaptation planning
   - Methodological Framework (process and steps)
   - Key stakeholders (Who needs to be involved/How public can be engaged)
   - Utility (What is the product of this process and How will it be used)

4. **Climate Adaptive Planning Process**
   - *Climate Change Vulnerability Assessment*
     - Step 1. Identify climate change vulnerability: What are the vulnerabilities to climate change?
     - Step 2. Key functions of climate change vulnerability: What functions increases or decreases the vulnerabilities to climate change?
     - Step 3. Assessing vulnerabilities to climate change: How can you measure vulnerabilities to climate change?
     - Step 4. Adaptive Capacity: What is or can be currently done to address the impacts
   - *Adaptation Strategy Development*
     - Step 5. Prioritize Adaptive Needs: Which impacts require actions to address them
     - Step 6. Identify Strategies: Which strategies should be pursued to address adaptation needs
     - Step 7. Integration- Phase and Implement: How can the strategies be funded, staffed, and monitored (analysis of schemes/programmes, understanding resource envelope and establishing linkages for effective implementation)
     - Step 8: Monitoring and Evaluation

In order to minimize climate risks in climate sensitive districts of India, it has become extremely crucial to mainstream climate change thinking in sub-national development process. This adaptation guide is a guidance document for decision makers and government officials of and will help to establish effective and climate resilient delivery mechanisms in the planning process.

1. Executive Summary

2. Introduction

a. About the Guide

This is a guidance document for policy makers, decision makers and planners working in different sectors at national and sub-national level and will help them to mainstream climate change adaptation and mitigation strategies in development planning processes. This guide will assist the decision makers and government officials to:

- Understand about climate and its impacts on local development
- Identify adaptation strategies and solutions for integrating climate change concerns into development planning
- Apply tools for developing, mainstreaming and implementing climate adaptive plans
- Monitor development activities from a climate change lens

b. Objectives

The prime objective of this guide is to enhance capacities of government officials and decision makers for mainstreaming climate change adaptation into district level development planning. This guidance document will provide an insight into climate change issues and will increase their understanding on:

- To build the capacities of government officials and decision makers for understanding the linkages between climate change and development and associated impacts and challenges
- To enable the government officials and decision makers to integrate cost effective and feasible adaptation options at horizontal and vertical levels of planning
- To provide a package of tools for mainstreaming, implementing and monitoring climate change adaptation into development planning

WHAT IS MAINSTREAMING CLIMATE CHANGE ADAPTATION?

It is a process of integrating climate change concerns & adaptation solutions into planning, budgeting, **implementation** and monitoring processes at national, sectoral, and sub national (district, state) levels.

In this process planning and implementation of development issues also addresses climate change concerns simultaneously and provide multifold benefits to the communities. It helps to view the development efforts from a climate change lens and reduces the long term risks of climate change.

- To enable the government officials and decision makes to develop developmental plans from a climate change lens

c. Advantages of Using this Guide

- **Reduced Risks and Vulnerabilities**: Mainstreaming climate change adaptation will help the government officials and decision makers to plan from a climate change lens. This will help them to keep **bio-physical** (increased incidents of disasters, threat to natural resources, erratic rainfall patterns etc.) and **socio-economic** (loss of lives and livelihoods, decreased agriculture production, effect on tourism, dwindling food & water security, migration and rehabilitation etc.) risks into mind and reduce their impacts on vulnerable communities.
- **Climate Smart Investments**: Tools provided by this guide for climate adaptive planning will help the government to optimize resources for short term and long term development measures
- **Direct Benefits to Climate Sensitive Sectors and Sections:** Planning from a climate smart view will help the decision makers to impart direct benefits to climate sensitive sectors (such as agriculture, fisheries, forests etc.) and sections (rural economies, hill and coastal communities, farmers, tribal, fisherman etc.).
- **Climate Resilient Planning and Reduced Policy Conflicts:** This guidance document will develop and multi-sectoral and multi-level planning vision in mind and enable convergence between departments (e.g. agriculture, irrigation etc.) and policies

d. Expected Outcomes

The following document is a tool for decision makers and practitioners and expects to improve their understanding on climate change adaptation and its integration into the planning process. This document will build the capacities of decision makers for mainstreaming climate change adaptation in development planning and influence decision making processes from a climate change lens.

3. Climate Adaptive Planning Framework

a. Why do Climate Adaptive Planning?

Climate change is recognised as a core concern for national-level poverty reduction strategies across the world. India in particular is vulnerable to climate change, owing to geographical diversity, greater dependence on agriculture, increasing exploitation of natural resources coupled with population growth and socio-economic challenges. In India, impacts such as temperature rise, changing precipitation conditions and severity of extreme events will threaten to negate any development gains being made in recent times. Therefore, it is extremely important to mainstream climate change adaptation in country's development planning.

According to the Ministry of Environment and Forests, severe climate change impacts in India[1] will be observed in the coming years. Annual mean surface air temperature will increase from 1.7°C to 2°C by 2030 and a 3% to 7% increase in summer monsoon rainfall will be observed by 2030 as compared to 1970 and the frequency of rainy days (2.5+mm) will decrease in most parts of the country. Some of these potential impacts will adversely impact availability of water resources, agricultural productivity, food and livelihood security.

Climate adaptive planning will help India:

- To prepare against extreme weather conditions and disaster events such as floods, droughts, cyclones, glacial lake outbursts etc.
- To reduce the impacts of climate change on food, water and livelihood security, poverty eradication, human health, infrastructure, biodiversity and economic growth
- To minimize risks of poor, weaker and marginalized sections of the community
- To optimize the utilisation of natural, financial and human resources in short term and long term planning
- To reduce policy conflicts between climate smart and maladaptive policies and programme.

[1]Ministry of Environment & Forests. (2010). Climate Change and India: A 4x4 A
http://moef.nic.in/downloads/public-information/fin-rpt-incca.pdf

Why Climate Adaptive Planning in India?

Key Sectors Affected by Climate Change: Agriculture, Infrastructure, Forests, Fisheries, Biodiversity, Water, Tourism, Human Health

1.2 billion people live in areas vulnerable to hazards such as floods, cyclones and droughts

700 million people living in rural areas are dependent on climate-sensitive sectors like agriculture, forests, fisheries and natural resources such as water, fodder, and biodiversity for their livelihoods

1.7 % of GDP loss predicted, if the annual mean temperature rises by 1 degree Celsius compared to pre-industrialization level

US $7 billion loss in agriculture in India by 2030 due to decrease in seasonal mean rainfall and an increase in mean and extreme precipitation during monsoon

1m rise in sea levels will displace more than 7 million people, destroy more than 5000 sq. km. of land and 4000 km. of roads

http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1256566800920/nair.pdf
http://www.reuters.com/article/2014/03/31/us-india-climatechange-idUSBREA2U10I20140331

http://timesofindia.indiatimes.com/home/environment/global-warming/Climate-change-may-lead-India-to-war-UN-report/articleshow/33034504.cms

http://www.mckinseyonsociety.com/downloads/reports/Economic-Development/ECA_Shaping_Climate%20Resilent_Development.pdf

http://www.downtoearth.org.in/content/india-not-prepared-tackle-climate-change-impacts

b. Methodological Framework

Framework for Mainstreaming Climate Change Concerns in Development Planning

Mainstreaming climate change adaptation in development planning is a 4 step approach i.e. **setting up mechanisms for effective delivery, developing systems/tools for influencing development planning, building capacities for climate compatible development and lastly integrating climate change in development planning.**

I. **Mechanisms for effective delivery:** This is a preparatory phase which helps to
   - identify gaps in the existing and ongoing planning processes
   - create an enabling environment for overcoming the gaps, issues and challenges

This inception phase focuses on critically analyzing existing data, information and capacity building needs and reviews gaps in the current plans, schemes and planning processes from a climate change view. Simultaneously, this phase also identifies building blocks for integrating climate change concerns in planning processes. This includes engagement of trans-disciplinary stakeholders such as practitioners, researchers, government officials of different line departments, etc. Since climate change is an overarching concern, therefore ownership of different stakeholders in climate actions is necessary. Lastly, the inception phase also focuses on creating awareness on the different aspects of climate change.

II. **Systems/tools for influencing development planning:** This is a building block phase and aims to develop decision support systems for mainstreaming climate change concerns in planning processes. It answers the:

Why is there a need to integrate climate change concerns in development planning? What are the current vulnerabilities and adaptive capacities against climate change?

What are the solutions (both adaptation and mitigation strategies) which needs to integrated in the planning processes?

How can different decision support tools be used to facilitate the climate adaptive planning process? How can we use different technologies, climate models, economic assessments, GIS models etc. in this process?

III. **Capacity building for climate compatible development:** Based on the foundation developed in the first two phases, this phase helps to build the capacities of different stakeholders on understanding the importance of integrating climate change in planning processes. Besides increasing the substantial knowledge on climate change issues, this phase also aims to transformations in perceptions, ownership enabling behavioral change in existing systems and processes.

IV. **Integration of climate resilience in development planning:** This is the most extensive and crucial phase in the approach. Using the tools developed previously, this phase helps to develop climate responsive plans. It links the strategies with plans, appropriate schemes, budgets, departments and upcoming. Identification of entry points and linkages with resources are most important aspects of this phase. Lastly, it also evaluates that the designed strategies are being implemented from a climate resilient and low carbon development vision.

As the figure explains, this approach is a cyclic and ongoing phase, where processes in one phase influence the implementation of other phase. Even after the integration of strategies in development plans, there is a lot of scope for altering the implementation and planning process. Therefore, the cycle continues and feeds lessons for another set of planning cycle. Also, uncertainties and climatic variability requires this process to continue in a cyclic manner.

c. Key Stakeholders

In order to mainstream climate change adaptation into planning, it is first important to identify sector specific stakeholders who directly deal or indirectly deal with issues related to climate change. Some of the stakeholders these stakeholders include government officials from Planning department, officials from different line departments, district level Technical Support Groups and

development officers. It is also important to engage scientific institutions, NGOs and community based institutions for identifying the multi-dimensional impacts and solutions of climate change.
In order to identify stakeholders and assess their institutional capacities to deal with climate change, following are some of the points that need to be kept in mind:

- **Which institutions are engaged in responding to climate change?**
- **What is the role of these institutions?**
- **In which areas are these functional?**
- **How do these instituions interact with the community?**
- **What do the roles of these institutions overlap?**
- **What are capacity gaps which these institutions suffer from?**
- **Do the institutions negetively influence each others works?**
- **What are the long term objectives of these institutions?**
- **What are the strengths and weaknesses of these institutions?**
- **How influential are these institutions in influencing planning and implementation ?**

Some of the key stakeholders who need to be engaged in climate adaptive planning process are as follows:

Government Officials: Climate adaptive planning requires participation from government stakeholders at national, state, district, block and panchayat level. This includes government officials from different line departments (such as agriculture, health, and irrigation), planning department, finance department etc.

Trans disciplinary Scientists: Scientists and researchers working on different aspects of climate change play an important role in providing evidences to the government officials. The participation should include researchers from a wide spectrum of interdisciplinary studies analogous to the nature of climate change. Emphasis should be laid on the cross cutting nature of climate change thus including key actors from the fields of climate science, meteorology, agriculture, disaster management, geology, renewable energy, social science, economics and such sectors which are directly or indirectly related to climate change and adaptation.

Civil Society Organisations & NGOs: Climate change adaptation cannot be mainstreamed without the representation of community voices directly vulnerable to climate change. Therefore participation of nongovernmental organizations and civil society organisations directly working at the grassroots is equally important in the process.

Communities: As a last mile, closely related to the impacts of climate change, communities are important stakeholders in the process of climate adaptive planning. Their engagement in the process ensures the ownership of end users in the planning process. Their participation is also important for developing community based adaptation initiatives which can be executed at community level to minimize the risks associated with climate change.

Private sector & multilateral/bilateral donors: For the availability of funds and resources, the involvement of funders and donor agencies such as bilateral and multilateral donors is of utmost important. Apart from this, representatives of the private sector can act as an important component in the mainstreaming climate change adaptation.

Journalists & media: Even though much is talked about climate change, however a large number of stakeholders are still unaware of the general concept of climate change. Therefore, there is a strong need for a connecting link between all the stakeholders. Environmental journalists and media personnel can act as an important medium to sensitize the issues of climate change mainstreaming. Besides this they can also initiate a two way dialogue by enabling a balance between top down and bottom up planning processes.

d. Utility

The adaptation guide is a climate change adaptation tool and will help the practitioners and decision makers to integrate climate change adaptation into development planning. It will help:

- To identify resources, target groups, sectors, communities and livelihoods which are directly or indirectly impacted by climate change
- To identify government officials, schemes, departments and agencies who can be engaged for climate adaptive planning
- To identify adaptation options and resilience strategies for minimizing the impacts of climate change
- To minimize social, economic and environmental concerns arising from climate change

4. Climate Adaptive Planning Process

Climate Change Vulnerability Assessment

Step 1: Identify climate change vulnerability: What are the vulnerabilities to climate change?

What is Climate Change?

Climate change is said to have a great impact on millions of people and their livelihood. There are scientific evidences of climate change globally manifested through rise in temperature levels, increase in the incidence of extreme climatic events in the form of recurring droughts and floods, melting glaciers and sea-level rise. The concern now is the timing and magnitude of abrupt changes in the climate anticipated in future, particularly due to continuous warming of atmosphere.

Vulnerability to Climate Change

The Intergovernmental Panel on Climate Change (IPCC), defines climate vulnerability as " the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change including climate variability and extremes"[2]. It is the extent to which climate change may damage or harm a system. Vulnerability is the multilayered and multidimensional space defined by the determinate, social, political, economic and institutional capacities of people in specific places and in specific times (Boyle, 1994).

Vulnerability depends not only on a system's sensitivity, but also on its ability to adapt to new climatic conditions (Watson et al. 1996: 23). Furthermore, the vulnerabilities of systems or communities vary with the exposed pressures and location, dependence on climate sensitive sectors and living conditions.

For example:

- The type and magnitude of vulnerabilities faced by communities living in Himalayan region will differ from the vulnerabilities faced by coastal communities of Orissa.
- Vulnerabilities faced by farming communities of Indo-Gangetic plain will differ from the vulnerabilities of farming communities in Sunderbans

Key vulnerabilities are associated with many climate-sensitive systems, such as food supply, infrastructure, health, water resources, coastal systems, ecosystems, global biogeochemical cycles and ice sheets (IPCC, 2007).

Climate change impacts differ and therefore vulnerabilities to climate change also vary:

For different people (individuals, households, communities)

[2]IPCC, C. C. (2007). Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge Univ. Press, Cambridge.

For different sectors (health, industry, agriculture fisheries, natural resources)

In different places (villages, towns, cities, districts, ecosystems, agroclimatic zones)
At different times (present, next year, next 10 years, several decades on or longer)[3]

Step 2: Identify Key Functions of Climate Change Vulnerability

The three functions of vulnerability, according to the IPCC definition are:
Exposure is the magnitude and duration of climate related exposure such as a drought temperature variability or change in precipitation

Sensitivity is the degree to which a system can be affected, negatively or positively, by change in climate. This includes change in mean climate and the frequency and magnitude of extremes. The effect may be direct or indirect.

Adaptive capacity is a system's ability to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities or to cope with consequences[4].

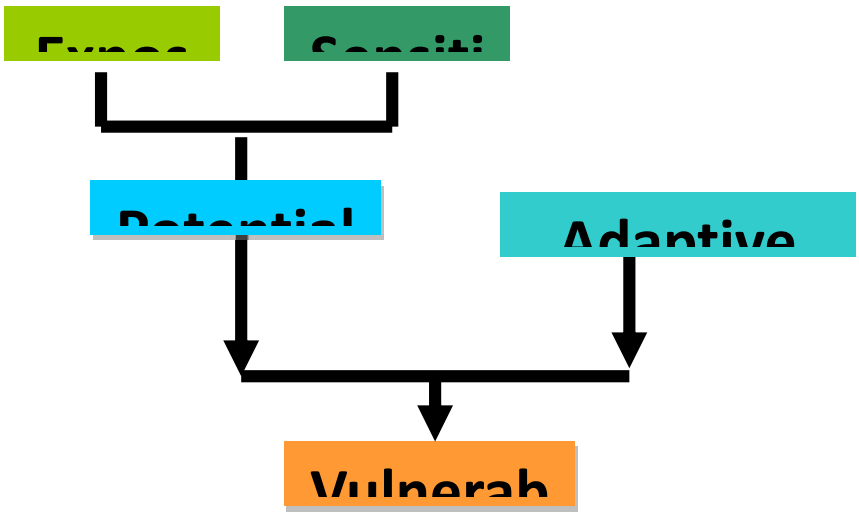


Figure 1–IPCC Framework for assessing vulnerability

Step 3: Assessing Vulnerabilities to Climate Change

The prime objective of vulnerability assessments is to identify people or places that are most susceptible to harm due to climate. Identification of such target groups and their specification in terms of enhanced

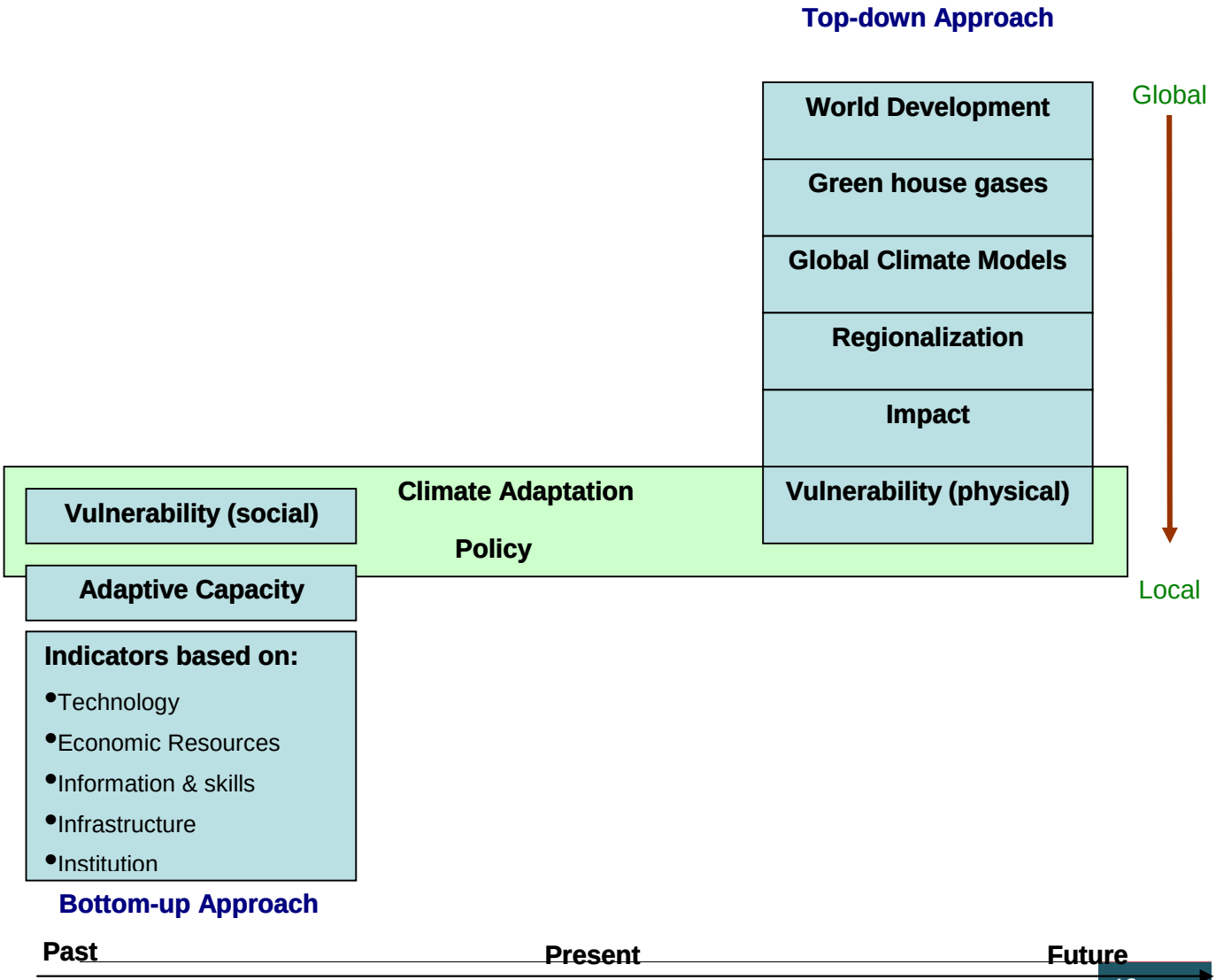
[3] http://www.caadp.net/pdf/3.%20Vulnerability%20Assessment%20Methodologies%20Factsheet.pdf
[4] Ebi KL, Mills DM, Smith JB, Grambsch A. 2006. Climate change and human health impacts in the United States: an update on the results of the U.S. national assessment. Environ Health Perspect 114:1318–1324.

sensitivity or low adaptive capacity to the exposure helps decision makers to recommend or implement specific policies to reduce the vulnerability. These assessments include identification of the characteristics of vulnerable systems, type and number of stressors involved, root causes, their effects on the system and the time horizon of the assessment.

Approaches to Vulnerability Assessments

A diverse set of vulnerability assessment frameworks exist. These vulnerability assessment frameworks can broadly be classified as top-down and bottom-up frameworks.

- **Top-down frameworks** are designed to mainly help understand the potential long-term impacts of climate change (using global, national or regional models).
- **Bottom-up frameworks**, designed to focus on adaptation and involve stakeholders primarily at the local level. Since uncertainties will always be present in climate change predictions it is important to help build the resilience of the community. These frameworks focus on local approaches, which help to design initiatives which keep locally prevailing conditions in mind.



Source: UNFCCC Resource Guide, 2008

Figure 2: Features of top-down and bottom-up approaches to assessing vulnerability and adaptation

The ultimate aim of both approaches is to find out the vulnerability of the target group. The top-down approach relates more to the climatic aspects such as precipitation, temperature etc. whereas the bottom-up approach deals with social resilience to face the climatic impacts. The climatic impacts themselves are related to a degree of uncertainty and even though improvements are taking place the uncertainty can never be avoided. Therefore there is a need to identify the adaptive capacity and vulnerability of the target group.

However, it is important to note that approaches to vulnerability assessment are evolving rapidly, with more recent work focused on blending merits of both bottom-up and top-down approaches. For example, greater emphasis is being placed on socio-economic scenarios, stakeholder participation and strengthening adaptive capacity.

While lot vulnerability assessment frameworks are available for identifying biophysical, socio-economic and composite vulnerabilities to climate change, here is a generic framework for decision makers which will help them to assess climate change vulnerabilities in their region:

Exposure: What climate change effects will a community experience?
For conducting vulnerability assessments, it is important to first identify the degree and magnitude to which communities will be exposed as a result of climate change.

For ex: Frequency of extreme events (droughts, hailstorms, snow storms, cyclones floods etc.), changes in rainfall and precipitation conditions: number of rainy days, rainfall variability, extreme temperature conditions etc.

Sensitivity: What aspects of a community (functions, structures, and populations) will be affected?

Foe ex: Natural resources and ecosystems sensitive to climate change, topography and geographical challenges, climate sensitive livelihood dependency, agriculture systems (crop varieties, irrigation sources etc.) sensitive to climate change, increased sensitivity of weaker sections of community

Potential Impacts: How will climate change affect the points of sensitivity?

For ex: Degradation of ecosystems, decreased agriculture productivity, increased frequency of extreme events, loss of infrastructure and economic wellbeing due to increased disasters, impacts of climate change on health etc.

Risk and Onset: How likely are the impacts and how quickly will they occur?

For ex: Increased Frequency of extreme events, patterns of changing weather cycle

Adaptive Capacity: What is or can be currently done to address the impacts?
For ex: Disaster management strategies, resilient infrastructure systems, alternate livelihood sources, climate resilient farming systems, watershed structures etc.

Based on the above given parameters it is very important to apply a climate lens to different sectors, different agro climatic zones and ecosystems and different socio-economic structures which are vulnerable to climate change.

Here is an example of guiding questions that will help you to identify climate change vulnerabilities.

	Guiding Questions
Resilient Livelihoods	) Are scaled-down climate projections available?) If so, what are the observed and predicted impacts of climate change for the region and/or ecological zone?) Do local institutions have access to information on current and future climate risks?) What livelihood groups or economic sectors are most vulnerable to climate change?) Do local plans or policies support climate-resilient livelihoods?) Do local government and NGO extension workers understand climate risks and promote adaptation strategies?
Disaster Risk Reduction	) What are the most important climate-related hazards the region and/or ecological zone faces? Non-climate related?) How are hazards likely to change over time as a result of climate change?) What groups within the community are most vulnerable to disasters?) Do local institutions have access to disaster risk information?) Are local disaster risk management plans being implemented?) Are functional early warning systems in place at the local level?) Does the local government have the capacity to respond to disasters?) Which other institutions are engaged disaster risk management at local level?
Capacity Development	) What institutions (governmental and non-governmental) are involved in research, planning and implementation of adaptation?) What are the most important institutions in facilitating or constraining adaptation?) Do local institutions (governmental and non-governmental) have capacity to monitor and analyze information on current and future climate risks?) Are mechanisms in place to disseminate this information?) Do local institutions have capacity to plan and implement adaptation activities?) Are resources allocated for implementation of adaptation-related policies?

	What is the budget? Where are the resources coming from? • What are the existing capacity and resource needs and/or gaps for climate change adaptation? • What new capacities may be needed to address changing circumstances due to climate change?
Addressing Causes of Vulnerability	• What social groups within the community are most vulnerable to climate change? • Are local planning processes participatory? • Do women and other marginalized groups have a voice in local planning processes? • Do local policies provide access to and control over critical livelihoods resources for all? • What are the other factors constraining adaptive capacity of the most vulnerable groups? Do vulnerable communities and groups have any influence over these factors?

The above given set of questions and parameters help to identify vulnerabilities and identify background preliminary information for different vulnerability assessment methodologies. These vulnerability assessment methodologies help to quantify set of indicators relating to exposure to global change drivers, and the associated sensitivities and adaptive capacities of the human–environment system. These set of vulnerability indicators are then weighted, combined and indexed to produce a measure of vulnerability. Some of the vulnerability indices are: Environment Vulnerability Index, Livelihood Vulnerability Index, Composite Vulnerability Index etc.

Data for different vulnerability assessments can be gathered from government statistical handbooks and records, meteorological departments, environmental assessment reports, surveys with community, government officials, NGOs, academicians, media etc.

Step 4: Identify Current Adaptive Capacities to cope up with Climate Change

As a part of identifying vulnerabilities to climate change, it is also important to identify the status of adaptation capacity of a system. Adaptation Capacity of a system (communities, ecosystems, institutions etc.) is dependent on:

- The magnitude of resources available to the system to cope, or adapt. This includes resources such as **human, social, physical, financial, institutional and natural**
- The system's capacity to use such resources efficiently and effectively

(Easterling et al. 2004; Adger et al. 2004; Brooks and Adger 2005; Wall and Marzall 2006)

An example of Climate Adaptive Framework for chalking down climate adaptive capacities of a system[5]:

Resources for Climate Change Adaptation	Indicators
Natural	Available water resources
	Productivity of land
	Available forest and biodiversity resources
Human	Sex ratio
	Access to education
	Access to livelihood sources
	Skills and capacities of individual and communities
Physical	Climate adaptive infrastructure (roads, houses, seawalls, dikes, structures for flood control etc.)
	Equipment and technology
	Physical assets
Financial	Economic assets
	Level and diversity of livelihood sources
	Access to other financial resources
Institutional	Access to varied information systems
	Access to early warning systems
	Institutional set ups for CCA
	Institutional Services (health, education, market etc.)
Social	Equity
	Equality in access to common property resources
	Flexible and dynamic social structures

Step 5: Identify Vulnerability Based Adaptation Strategies

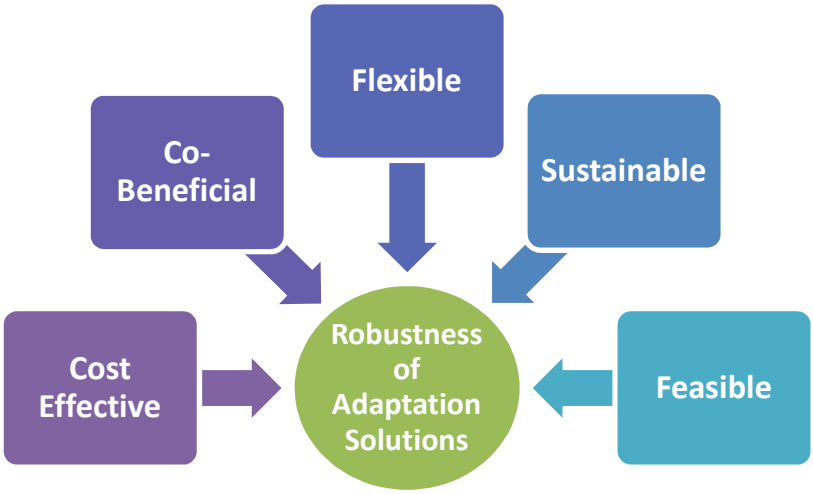
After the identification of climate change vulnerabilities with respect to different geographic locations, sectors, sections of society and temporal scales, adaptation strategies are identified for increasing resilience and increasing coping capacities.

Adaptation Assessment is the practice of identifying options to adapt to climate change and evaluating them with respect to criteria's such as availability, benefits, costs, effectiveness, efficiency, and feasibility. (IPCC TAR, 2001 a). Adaptation involves reducing the impacts of climate change that are happening now and increasing elasticity to future impacts, taking into account the urgent and immediate needs of the most sensitive regions which are identified through vulnerability assessments.

[5] Derived from Climate Adaptive Frameworks developed by Ellis (2000) and Wall and Marzall (2006). Retrieved from http://www.ccme.ca/assets/pdf/pn_1494_vat.pdf

Step 6: Prioritize Adaptation Strategies

The adaptation solutions should be identified on the basis of some key parameters:



Cost Effective: While many adaptation options may offer lucrative benefits, it is important for them to be financially and economically viable.

Co-beneficial: The adaptation options should provide co-benefits of climate change adaptation and development. Furthermore, these options should be cost effective in dealing with long term impacts of climate change. For example: robust strategies of climate resilient and sustainable farming which reduce threats to climate sensitive agriculture sector and also offer food security.

Flexible: These options should be easy to customize and contexualise on the basis of local conditions and local adaptability.

Sustainable: Besides being effective in the current scenario, these options should be sustainable over a long period of time and demonstrate long term viability for implementation. For example: sustainability of renewable energy technologies in rural and remote areas.

Feasible: The adaptation options should be feasible in disaster prone and climate sensitive areas with greater socio-economic and geographic challenges.

Based on these parameter, different cost-beneficial analysis tools and evaluation criterias can be developed for assessing implementation feasibility of adaptation options and prioritizing them.

Another alternate for selection of doable adaptation solutions is the adoption of **low regret** and **no regret** adaptation measures. These low-regret and no-regret adaptation options provide a host of development benefits in addition to fostering climate change adaptation. They can be implemented even in the presence of remaining uncertainties about future climatic conditions. No-regret adaptation is not affected by uncertainties related to future climate change because it helps address problems associated with current climate variability, while at the same time, builds adaptive capacity for future

climate change e.g. enhancing provision and dissemination of climate information as well as access to early warning systems by local communities living in drought prone areas.

Both no-regret and low-regret options can be **"win-win"** options when they enhance adaptive capacity (i.e., they reduce climate vulnerability and exploit positive opportunities), while also contributing to the achievement of other social, environmental or economic outcomes. Some of their examples are[6]:

- Investments in development, particularly those that enhance the capacity of a society to adapt to climate change
- Enhancing climate information and access to early warning systems for local communities living in flood- and/or drought-prone areas
- Promotion of drought-resistant crop varieties in areas where drought risk is projected to increase
- Reducing pollution and destruction of natural habitats
- Water conservation
- Enhanced public health system

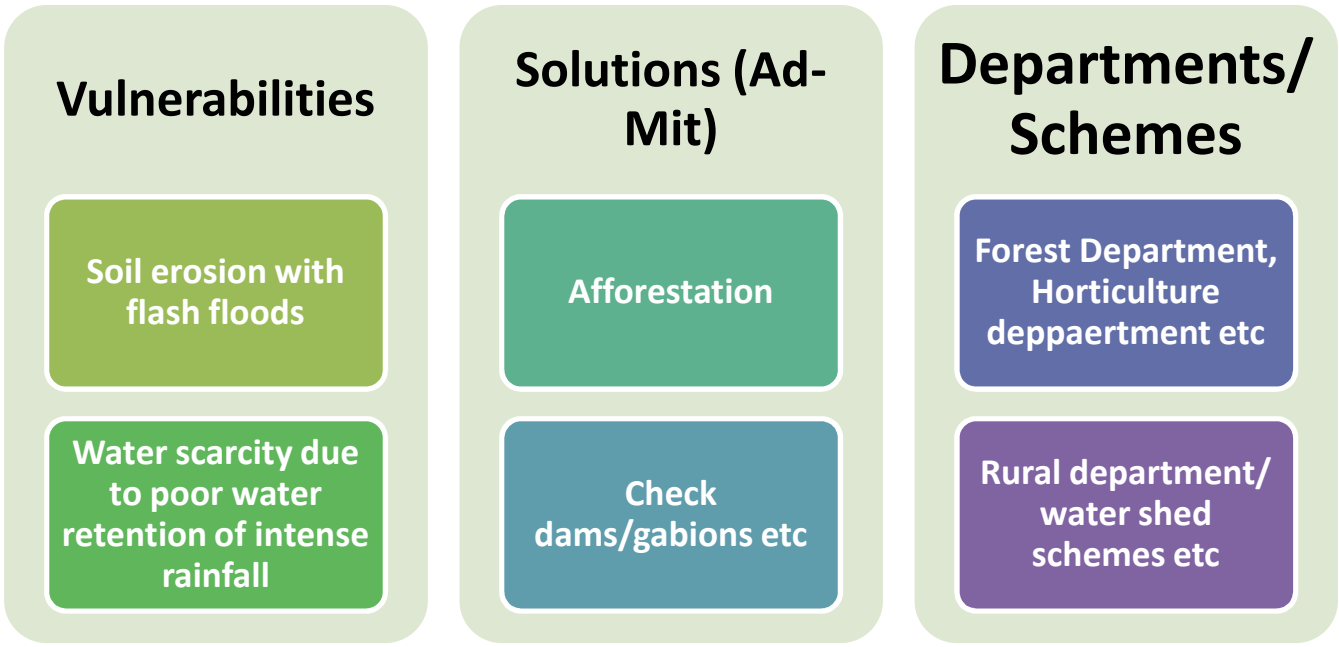
Therefore, **"win-win" adaptation options** are measures that contribute to both climate change mitigation and adaptation and wider development objectives, e.g. business opportunities from **energy efficiency measures, sustainable soil and water management, long-term weather forecasting and early warning systems etc**[7].

Step 7: Integration of Climate Change Adaptation in Development Plans

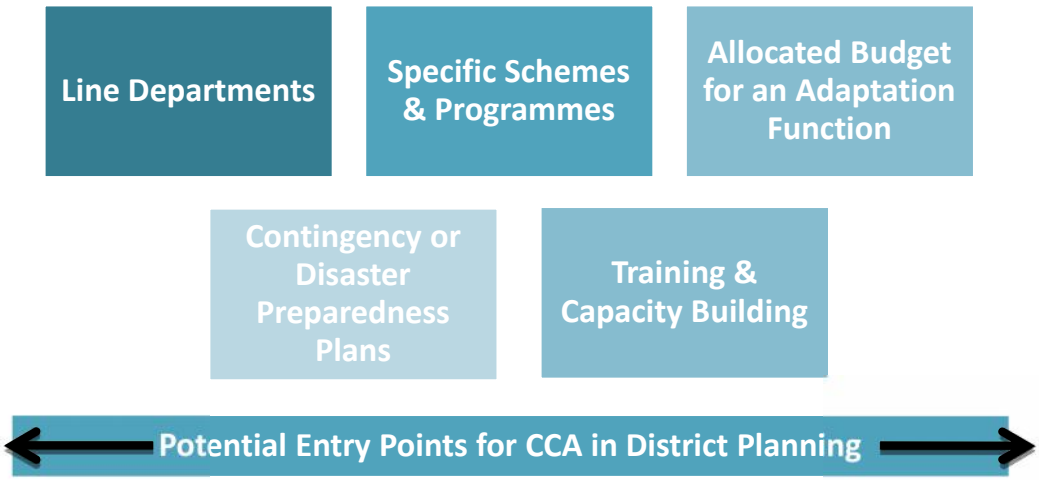
It is a phase and implements stage where prioritized adaptation strategies are phased out and identified on the basis of available funds, human resource, institutional capacities, available schemes and institutional capacities. Based on the availability and capacities in a given planning cycle, decision makers at national, state, district or even panchayat level can select adaptation strategies for integration into development plans.

[6] Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects (2010). *Guidance Note 6: Identifying Appropriate Adaptation Measures to Climate Change.*

[7] http://climatechange.worldbank.org/content/adaptation-guidance-notes-key-words-and-definition



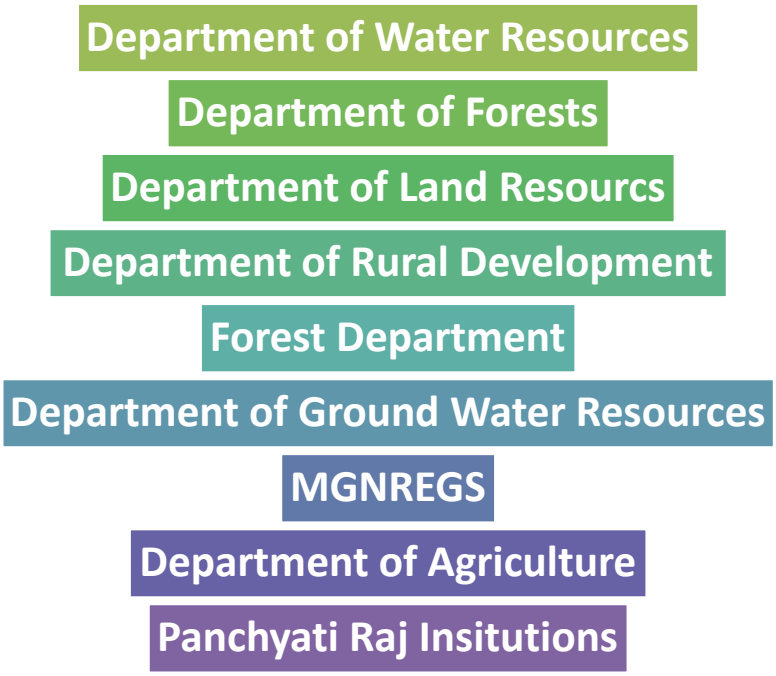
Once the adaptation options have been prioritized and identified, the next step is to understand resource envelope and establish linkages for effective implementation. For phasing and implementation, strategies identified for climate change adaptation needs to finds its way through necessary entry points. These entry points could be through various departments, existing schemes- directly or indirectly addressing adaptation, disaster preparedness plans and budgets that can increase climate change resilience of a region.



Potential entry points for climate adaptive planning are as follows:

Line Departments: Since climate change is a cross cutting issue, climate change adaptation requires convergence between different line departments and planning committees.

For example: In order to solve the water woes of community in a dry region, integrated watershed management is a good adaptation option. For this implementation and execution of this adaptation strategy convergence between various departments would be required such as :



Climate adaptive planning for watershed management in a region will require different departments to come together and plan for the implementation of the intervention. Identification of potential site and location, key strategy for engagement of communities, optimization of natural resources and maximising social, economic and environmental benefits in given resources over a scheduled period of time.

Specific Programmes and Schemes: For climate change adaptation and its integration into development planning, the adaptation interventions have to be aligned with schemes, programmes and ongoing government initiatives.

For example: Flagship programme, MGNREGS indirectly emphasises on land and water conservation measures which have the potential to generate environmental benefits, enhance food security and building resilience to current climate risks such as moisture stress, delayed rainfall, droughts and floods[8].

[8] R. Tiwari, H. I. Somashekhar, V. R. Ramakrishna, I. K. Murthy, M. S. Kumar, B. K. Kumar, H. Parate, M. Varma, S. Malaviya, A. S. Rao, A. Sengupta, R. Kattumuri and N. H. Ravindranath, 'MGNREGA for Environmental Service Enhancement and Vulnerability Reduction: Rapid Appraisal in Chitradurga District, Karnataka', Economic and Political Weekly, vol. 66, no. 20, 14 May 2011.

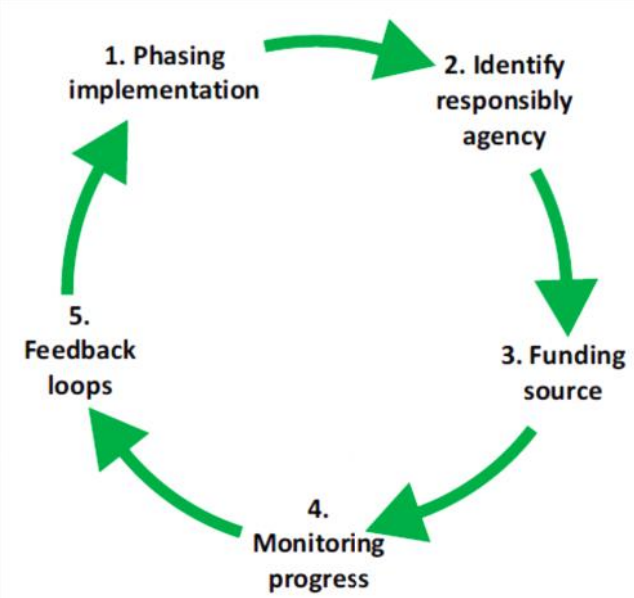
This flagship programme can with linked with different schemes such as Kapildhara Yojna, Nandan Phalodhyan Yojna and converged with schemes such as Integrated Watershed Management Programme. Such opportunities help to align adaptation interventions with schemes which provide the resources and budget for execution of climate adaptive planning.

Resource Envelope: Finance is the key driver of integrating climate change adaptation into development planning. Based on adaptation requirements and ongoing development works, resources allocated for a given fiscal year can be converged to meet the adaptation needs. These financial resources can come from different schemes, budget allocated for a given region, financial resources under special packages for drought, floods, disasters etc.

Contingency & Disaster Preparedness Plans: For contingencies of extreme climatic conditions, delayed monsoons, disasters such as droughts, floods etc. adaptation interventions can be placed in funds allocated for disaster preparedness and management plans. These are special windows which provide a good opportunity to integrate adaptation change adaptation in development plans.

Training & Capacity Building: Since climate change is a newly debatable issue and has still not strongly penetrated the discussions at state and district level, it is important to simultaneously build the capacities of decision makers and implementers on climate change adaptation. Integration of climate change here, helps to introduce new adaptation strategies which are still not being implemented in the region.

Once the responsible agency, potential schemes and budget resources are used to incorporate climate change adaptation solutions in the development planning process, an adaptation plan is carved out. It is very crucial to remember that once the plan is developed it is important to monitor its implementation through mapping of milestones and their delivery.



Step 8: Monitoring & Evaluation

Once adaptation strategies are integrated in the plans and are implemented, it is important to monitor and evaluate its progress throughout a current planning cycle. It is important to answer the following questions:

- Was the adaptation option cost-effective?
- Was the capacity available to implement the adaptation measure?
- Did the adaptation measure reduce vulnerability?

If your initial evaluation indicates a need for changes in your strategies and measures, determine whether the poor results are due to flaws in design or implementation or both. If the flaws are in the strategy or planning, you need to determine whether current measures can be adjusted to obtain the desired results or if new measures are required. If new or modified measures are needed, you will probably need to revise the strategies and implementation plan.