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Trainer's Manual

Capacity development on climate
change adaptation for PRI
(Panchayati Raj Institution)-
members in Uttar Pradesh

Imprint

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FOREWORD

In the recent times, risks emanating from climate change and disasters have adversely impacted development efforts. The detrimental impacts have been seen again and again with every recurring climate-induced disaster, with destruction of lives and livelihoods setting back development progress and increasing levels of poverty. Uttar Pradesh has a climate of extremes. Fluctuating temperatures and cyclical droughts and floods due to unpredictable rains have affected the development scenario of the state.

The need to integrate disaster risk reduction, climate change adaptation in development programmes is urgently being witnessed in all sectors of development. This synergistic link is also being guided by the three global agendas, i.e. the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030, Sustainable Development Goals (SDGs) 2030 and the Paris Climate Agreement 2015, which share a common goal of sustainable development.

The 73rd Constitutional Amendment empowered Panchayati Raj Institutions as bodies of self-government who have been mandated for development of Gram Panchayat Development Plans (GPDP) for economic development and social justice. The Guidelines on GPDP developed by Govt of India and Govt of UP emphasizes on Gram Panchayats being the basic unit for integrating disaster risk reduction and climate resilience planning. The GPDP process also has ample scope to appropriately utilize the available financial resources, according to local needs and priorities, that can help in addressing CCA-DRR concerns in the planning and resilient development of villages.

Under the Climate Adaptation and Finance in Rural India (CAFRI) – a bilateral programme supported by GIZ India, the Capacity Development Package for PRI Members is an attempt to enhance capacities of PRI members through developing understanding on climate change impacts at the local level and adopting local adaptation actions in their development planning.

I hope this Capacity Development Package will be useful for the trainers conducting trainings for PRI members and the related government departments at State and District levels as a reference for practical strategies to integrate climate adaptation actions at the local level.

(Manoj Singh)



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PREFACE

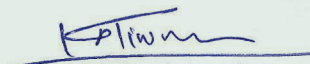
Climate change impacts like significant changes in temperature, precipitation, wind patterns and other such measures are impacting the developmental efforts and the resources invested. Uttar Pradesh is one of the most impacted state due to climate change resulting in hydro-meteorological disasters like floods, droughts, temperature variabilities and so on. The impacts are largely on communities, on ground, disrupting their life and livelihood. It is important that community as 'first responder' to such impacts are capacitated to deal with such challenges.

The 73rd Constitutional Amendment strengthened the Panchayat Raj institutions. Government of Uttar Pradesh has taken various measures in empowering the Village Panchayats and bringing the resources in their control so that they are able to take-up actions according to its need and priorities. Gram Panchayat Development Plans are an effective mechanism in support of village autonomy in terms of development.

While it is expected that invested resources by Gram Panchayats are able to fulfil the aspirations of village community, it is also important that the developmental outcomes are sustainable and resilient. The guidelines related to developmental planning of Gram Panchayats recommends integration of disasters and climate change resilience for optimal outcomes of developmental resources and efforts.

Uttar Pradesh has got freshly elected Panchayat representatives who need to be capacitated for optimal utilization of resources and sustainable outcomes of development.

I am happy to know that a Capacity Development Package has been developed by Department of Environment, Forest & Climate Change for strengthening the capacities of Panchayat representatives which will be a game changer for Climate Resilient Gram Panchayat Development Planning (GPDP).


(Ashish Tiwari)

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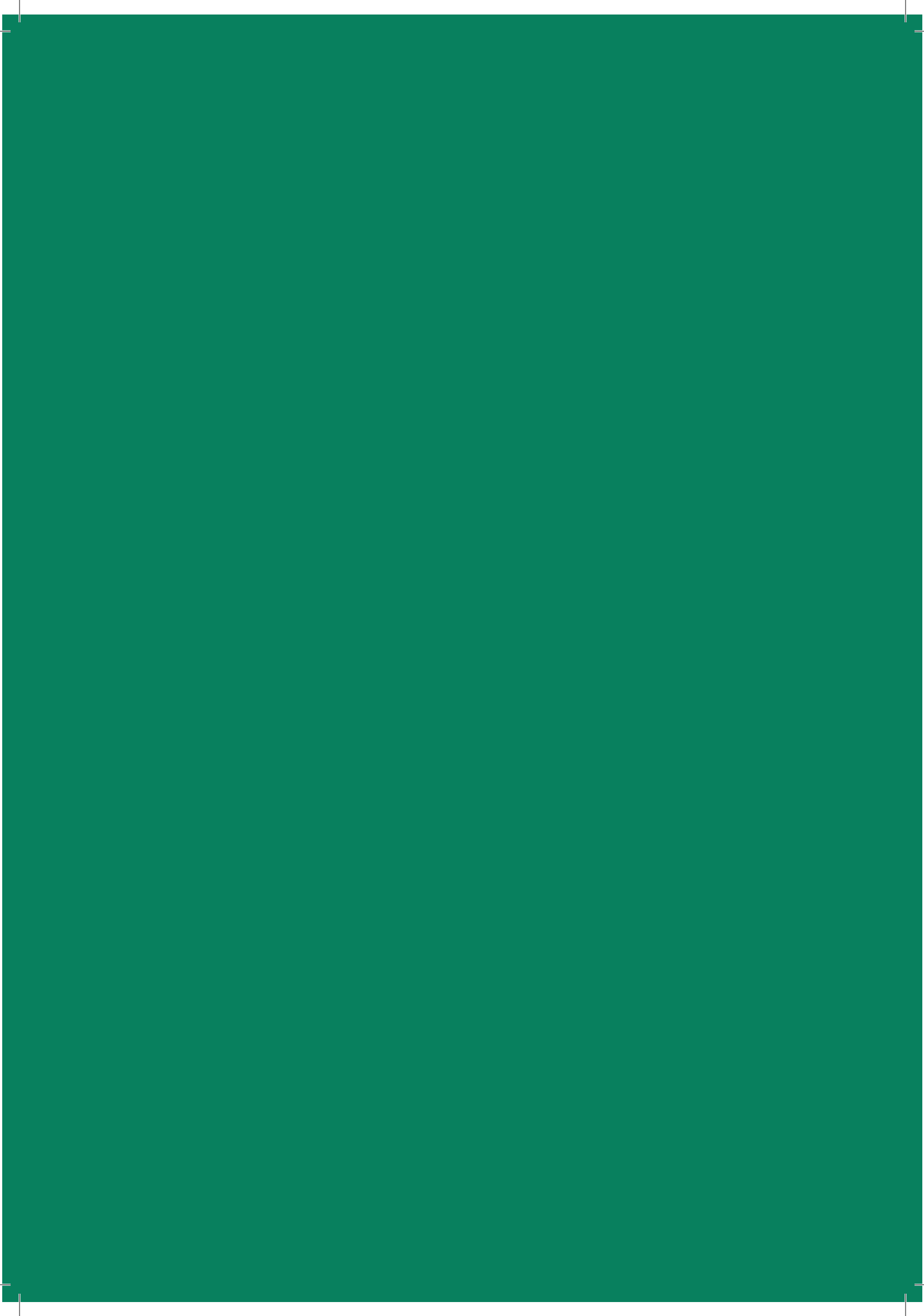
List of Abbreviations

CAFRI	Climate Adaptation and Finance in Rural India
CCA	Climate Change Adaptation
CBOs	Community-based Organisations
CC	Climate Change
CCA	Climate Change Adaptation
DoE	Directorate of Environment
GEAG	Gorakhpur Environmental Action Group
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MKSP	Mahila Kisan Sashaktikaran Programme
GPDP	Gram Panchayat Development Plan
MKSP	Mahila Kisan Sashaktikaran Pariyojana
NAFCC	National Adaptation Fund for Climate Change
NDCs	Nationally Determined Contributions
SLD	Shared Learning Dialogues
SAPCC	State Action Plan on Climate Change
SHG	Self Help Group
SIRD	State Institute of Rural Development
SLD	Shared Learning Dialogue
SRLM	State Rural Livelihood Mission
VDMP	Village Disaster Management Plan

Glossary

There is more than one definition for many of the terms listed below. It is important to understand how these terms are used in this manual in order to present the material and to help participants clarify terms as needed.

<i>Training course</i>	The sum of all training modules for a target group. A training course can have a duration of one or several days.
<i>Training module</i>	The sum of all tools/sessions associated with a phase of local adaptation planning.
<i>Training session</i>	Smallest training unit that can serve as both – knowledge and information transfer (e.g., video material, infographics, case studies) – as well as a participatory, interactive approach (joint completion of a risk matrix). All sessions clustered under one phase build a training module.
<i>Modular approach</i>	With the help of the modular approach, a training course can be structured according to the specific needs of the target group with the help of the CDP toolkit. To this end, different sessions can be combined in different ways, taken out or also expanded with additional details and facts. This ensures that specific training needs/learning objectives and the different knowledge levels of the participants can be addressed. The knowledge base of the participants can be very diverse, ranging from participants with little to no understanding of climate change to those who are already familiar with the main CCA requirements.
<i>Phases of local adaptation planning</i>	The training courses are based on a logical sequence of six phases for local climate adaptation planning (see section 0.2 of this trainer's manual). The term <i>phase</i> represents the steps of an adaptation project starting with the assessment of climate change impacts and related risks to project design as well as operation and monitoring of a facility.
<i>Co-creation</i>	Co-creation describes the process of early involvement of customers, end-users and experts from different disciplines in the early discovery phase of product development. In this way, co-creation broadens the perspective on problems and solutions to include different backgrounds and specialist perspectives, thus increasing ownership and simultaneously reducing the risk of blind spots and misguided approaches due to misconceptions.



0 INTRODUCTION TO THE TRAINING



0.1 Background

Relevance of the topic and need for capacity development

Climate change is affecting land, water, forestry and other dependent livelihoods. While the Covid-19 pandemic dominated our lives in 2020, climate change continued to intensify, making 2020 one of the warmest years on record. Despite encouraging trends towards climate adaptation at the global level, the 2020 Adaptation Gap Report (UNEP 2020) – a flagship report published by the UN since 2014, focused on where the world stands on planning, financing and implementing adaptation actions – describes the extent of adaptation progress at the national level as insufficient. However, the longer we wait to take effective adaptation action, the more expensive and consequential the impacts of climate change will become at multiple scales with the potential to far exceed the costs of adaptation.

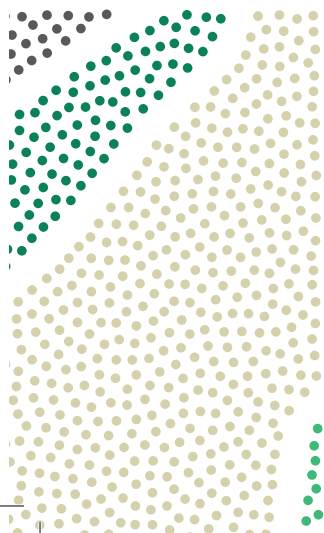
The Global Climate Risk Index 2020 (Germanwatch 2021) ranks India as the fifth-most vulnerable country to climate change. The key contributing factors to this were the prolonged monsoon phase in 2019, which affected 11.8 million people and caused economic damage of about US\$ 10 billion; and the eight tropical cyclones in 2019, which contributed to one of the most active cyclone seasons in the northern Indian Ocean ever recorded. The state of Uttar Pradesh has nine agro-climatic regions: Bhabhar and Tarai, the western plains, mid-western plains, south-western plains, eastern plains, central plains, north-eastern plains, Vindayan and the Bundelkhand region. A significant proportion of the state's population lives in rural areas and its predominant occupation is agrarian. Nevertheless, over the past decades, due to the impacts of climate change, there has been increased variability in climatic components (rainfall, temperature). The state has witnessed recurrent hydro-meteorological hazards like floods, droughts, heatwaves, cold waves and extreme rainfall (Envistats India report 2020) that have not only affected the people and their livelihood systems but also the development indices of the state (Scoping assessment of Uttar Pradesh 2020). Thus, from the climate variability perspective, the state of Uttar Pradesh is one of the most vulnerable areas in India.

Capacities for climate change adaptation are currently being built in a wide range of sectors in India. With the establishment of the National Adaptation Fund for Climate Change (NAFCC) in 2015, and the revision of State Action Plans on Climate Change (SAPCCs) initiated in 2019, the Indian government has created important incentives for the implementation of ambitious adaptation measures and projects. Considering the UP SAPCC emphasizes engendering climate change adaptation, there is still scope for adaptation projects to better address the needs of the local population. While most current projects comply with generally valid standards, the actual needs on the ground – especially those of women – need urgent attention to implement climate adaptation actions (e.g., the high workload of women in the agricultural sector, limited access to agricultural inputs, advisory services or for decision-making).

Purpose and scope of the capacity development package

About the project:

In order to reduce the risks of climate change for vulnerable groups, the Indian Ministry of Environment, Forests & Climate Change (MoEFCC) has initiated the Climate Adaptation and Finance in Rural India (CAFRI) programme in collaboration with GIZ. The Directorate of Environment, Govt of UP, is the nodal agency in UP for the programming and coordinating of all capacity-building efforts. As part of this programme, adelphi, GEAG and CTRAN supported the development of a Capacity Development Package (CDP) – of which the trainer's manual is a part – for mainstreaming climate change adaptation into local planning processes in Uttar Pradesh.





For Panchayat Raj Institution (PRI) members, as one of the main target groups of the CDP, knowledge products and tools are provided to raise awareness and change behaviours towards climate resilience. Further, PRI-members will be trained and empowered to understand the climate risks for developmental activities related to the agriculture and allied sector, water resources and disaster risk reduction (DRR) at the Gram Panchayat (GP) level. Further, PRIs will be capacitated to identify adaptation needs to make villages resilient through the Gram Panchayat Development Plan (GPDP) (agriculture and allied sector, water resources, DRR) and develop an action plan for the risk-informed GPDP to incorporate the use of government-supported schemes and programmes for its implementation.

In this regard, the CDP follows the following overarching principles:

- supporting local adaptation needs;
- considering convergence with ongoing schemes;
- strengthening the role of intermediary organizations;
- supporting gender-responsive participatory planning;
- fostering behavioural change towards CCA/climate resilience;
- providing inputs for indicating CCA element in policy;
- enhancing ownership and advising on financing mechanisms for the local adaptation needs.

Multiple workshops with key training institutes and relevant departments, site visits and interviews with target group representatives to assess the local needs laid the groundwork for the CDP.

0.2 Training programme and methodology followed for planning, implementing and operating adaptation projects

The methodology used by the capacity-building package follows the logical sequences of local adaptation planning. Figure 1 below shows the arrangement of the CDP's modules and their key steps and assessment methods.

To develop, implement and operate adaptation projects, the CDP considers seven main steps (see Figure 1).

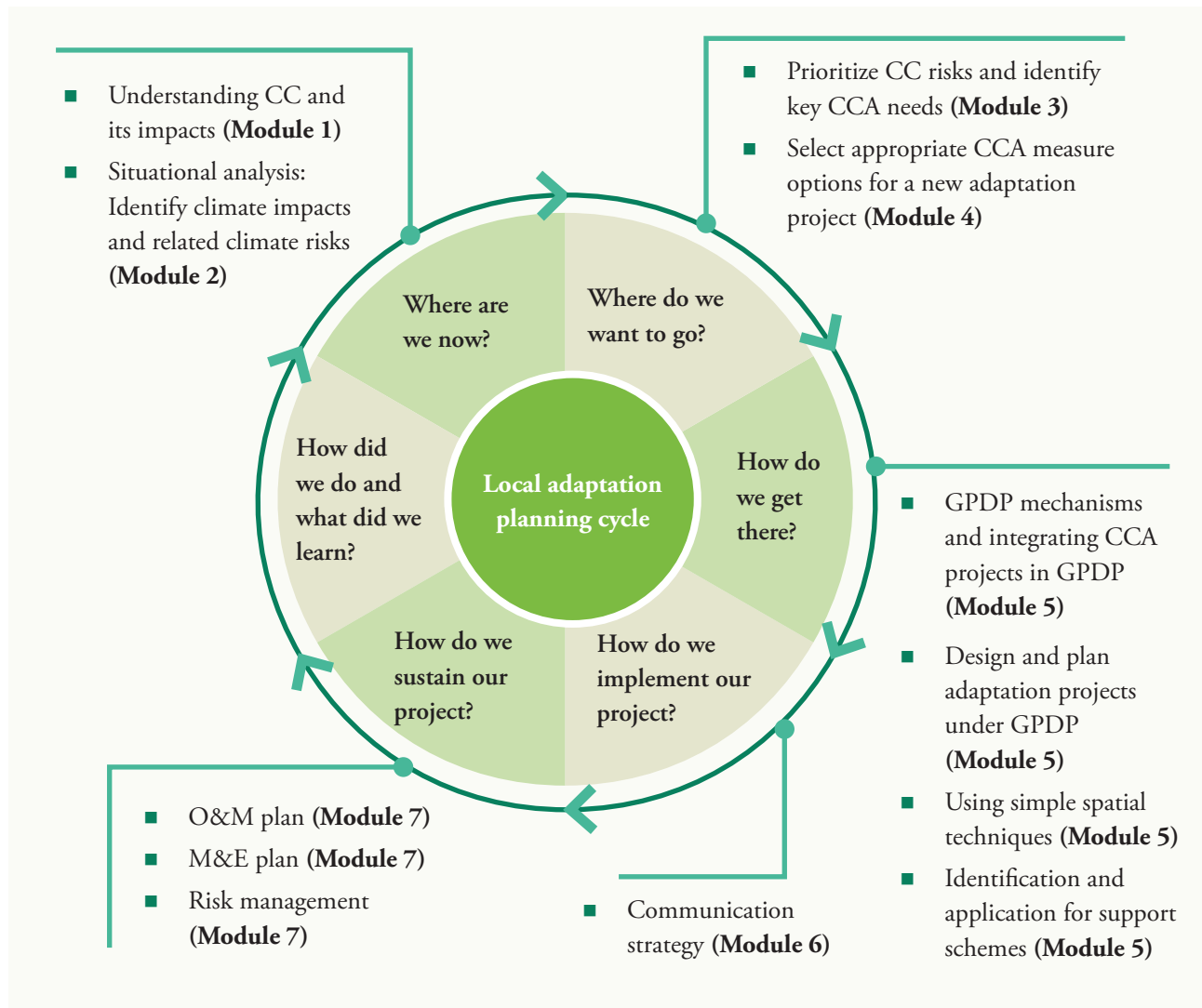
Module 1. Understanding climate change and its impacts

Foremost, before starting to plan an adaptation project, participants will be provided with a **basic understanding of climate change and its causes and impacts** on their sectors and livelihoods.

Module 2. Climate change impacts and related risks

Having taken an overarching perspective on the climate change phenomena, Module 2 looks at the **impacts of climate change on lives and livelihoods in the rural areas of UP**. The participants will be sensitized to the **significant risks to agriculture, water, forest and other infrastructures as well as the impacts on the livelihoods and income of vulnerable groups in UP**. The module concludes with the **identification and assessment of relevant climate impacts and related risks to the participants**.

Figure 1. Arrangement of the CDP's modules along a general local adaptation planning cycle



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Module 3. Adaptation needs

Once climate risks have been identified, participants **identify their related adaptation needs** to address prioritized risks. These needs provide a preliminary idea of the requirements for an adaptation approach. Participants are informed about the results of a recent needs assessment of the target group in UP and receive an overview of relevant adaptation approaches on the farm, ecosystem and extension levels.

Module 4. Adaptation measures

Participants will learn about the **best adaptation practices** at the sectoral level (agriculture, water resources, disaster risk reduction, etc.) as well as for farming system resilience, ecosystem services and resilient extension before they **identify, assess and select the most appropriate adaptation measures** for their own immediate needs.

Module 5. Designing adaptation projects

In this module, participants learn how to design their adaptation project considering **GPDP planning processes**. After a general introduction to GPDP processes and their **linkages to natural resources management (NRM) to address climate and disaster risks**, participants learn how to **make a risk-informed adaptation plan that can be integrated into the GPDP**. Participants design their own interventions to link **risk and resilience**, making optimal use of synergies between different measures. The **project design** involves (1) defining specific **objectives and project outputs**, (2) developing a **village-level action plan** with timelines, resources and roles, (3) adaptation measures that can be leveraged through GPDP/MGNREGA resources. Skilled experts will gain insights into **spatial techniques for NRM-based planning**. After developing a project design, participants will **link their adaptation actions to relevant support schemes** and institutions and learn how to **apply for them**. In this module, special emphasis has been placed on **GPDP and DRR linkages and the flagship MGNREGA programmes**.

Module 6. Implementing adaptation projects

Module 6 provides participants with key concepts for implementing adaptation projects. Developing an internal and external **communication strategy** enables participants to gather ideas and create ownership within their communities for their adaptation efforts, demonstrate their adaptation efforts to government agencies and neighbouring communities, and network with others on the topic of CCA.

Module 7. Operating and sustaining adaptation projects

Participants will learn principal concepts for increasing the sustainability of their adaptation projects. This includes the development of an **operation and maintenance plan, monitoring and evaluation plan** and **risk management**.

0.3 Materials provided with the CDP and their preparation

This training manual is part of a larger capacity development package for CCA planning that additionally includes presentation slides, participant handouts and a course planner:

Trainer's manual: The trainer's manual helps the trainer plan and conduct the training. The introductory chapter provides helpful information on the motivation for the training and the identified local needs, how the training helps drive local adaptation planning processes, how to adapt the training content to a specific target audience including suggestions for designing different training lengths and what documents are included in the overall CDP. In addition, guidance on the accessibility and use of local past and future climate data is provided. Chapter 1 includes didactic principles for the trainer including how to open the training, help participants focus, consolidate input learned, collect feedback and evaluate the training. The heart of the manual is in Chapter 2, which guides the trainer through the implementation of each training module designed for the target audience. It provides step-by-step introductions for each training session including an overview of the different steps, methodology, objectives, purpose and details on how to use the tools. In addition, detailed instructions are provided on how to present the tools or examples using cards, sticky notes, or flip charts. The trainer's manual should be studied by the trainer prior to conducting the training.



Presentation slides for each session: This includes the first slide for each tool, which has a step-by-step introduction and an overview of the different steps taken as well as objectives, purpose and one application example. In addition, for each session, a concluding slide provides the participants with key take-aways and follow-up questions if appropriate.

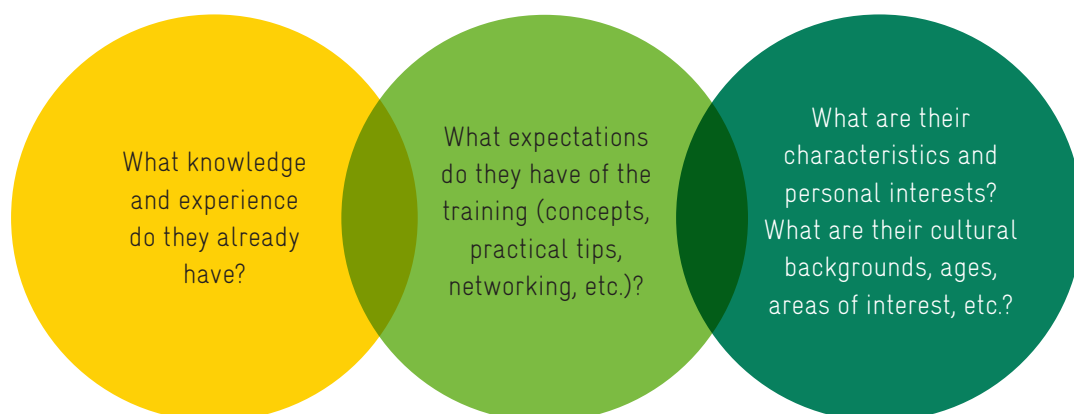
Handouts for each session: For each session, participants receive handouts with background reading, illustrative examples and worksheets. The worksheets summarize the exercises and provide a framework for the group work. The handouts are designed to help participants follow the training sessions and collect their results from the exercises. This way, they can easily remember their results and assumptions and reuse them at a later stage both during the training and after the training. The handouts are prepared so that they can be used by the participants to replicate the exercise for new or different contexts.

Course planner: A course planner supports the trainer in planning the whole training by providing an overview of the available sessions with their objectives, durations, suggested methods, materials needed and suggestions for session constellations for different training durations.

ExcelTool: The ExcelTool helps the trainer collect key results during capacity development. This clear compilation of the results will make it easier for participants to prepare, apply for, implement and monitor CCA projects in a structured manner after the course. Following the structure of the CDP's modules, the tabs of the ExcelTool provide the possibility to collect results on the following key topics: climate change impacts and risks (Tab 1), CCA needs (Tab 2), CCA measures (Tab 3), project design (Tab 4), scheme matching (Tab 5), Gender Action Plan (GAP, Tab 6), communication (Tab 7), operation and maintenance (Tab 8), M&E and risk management (Tab 9).

0.4 Adapting the training materials and programme to the target group

A key success factor of any training workshop is that the training content and methods are tailored to the specific needs, interests and expectations of the participants. Before conducting a training, get to know your participants' expectations, needs and constraints. By involving them and relating to their experiences, you will be able to keep their interest and attention and enable them to transfer training content to real-life situations. Important questions when adapting the training content to the specific group could be:



To support the trainer in adapting the training programme to specific participant groups, the CDP provides a **modular design**. It offers several stand-alone, optional sessions that the trainer can combine according to the needs, knowledge level and time allotment of the participants. This approach allows the inclusion of participants with little understanding of climate change as well as those who are already familiar with the main CCA requirements. Depending on the target group, in-depth engagement with different topics starting at different levels is possible. In addition, given the range of CCA measures, new details and facts can easily be added to each training course allowing adaptation to current climate change scenarios and the needs of the specific participant group.

The following list includes important hints for preparing and adapting the materials (further hints can be found in the sessions' descriptions):

- **Adjust the wording** to the prior knowledge, interests and skills of your target group.
- **Adjust the workshop method** based on the literacy level of the group (identify before you start your training).
- **Choose appropriate methods:** The CDP materials proposed specific methods (discussions, transect walks, seasonal calendars, etc.). You are free to modify these methods if you consider a different approach more suitable for the specific participant group. A selection of different methods with short instructions on how to apply them can be found in Chapter 1.
- **Choose additional interactive methods** (examples found in Chapter 1) for better learning results and to make your training more interactive and less tiring, especially if the session is composed mainly of input.
- **Choose relevant, local climate data, examples and case studies** (for guidance on how and where to access current and future climate data, see Chapter 0.4.1)
- **Integrate your participants' expertise and experience:** It's generally easier to follow the workshop and learn when it is based on local knowledge and experience, where participants can also talk about their daily life.
- For trainings that take place over several days, **integrate feedback and evaluation** in order to keep track of the understanding, learning progress and mood of the participants. Depending on the results, stay flexible to better adapt the training to the needs of the target group.

0.4.1 Using relevant, local current and future scientific data on climate variations and vulnerability

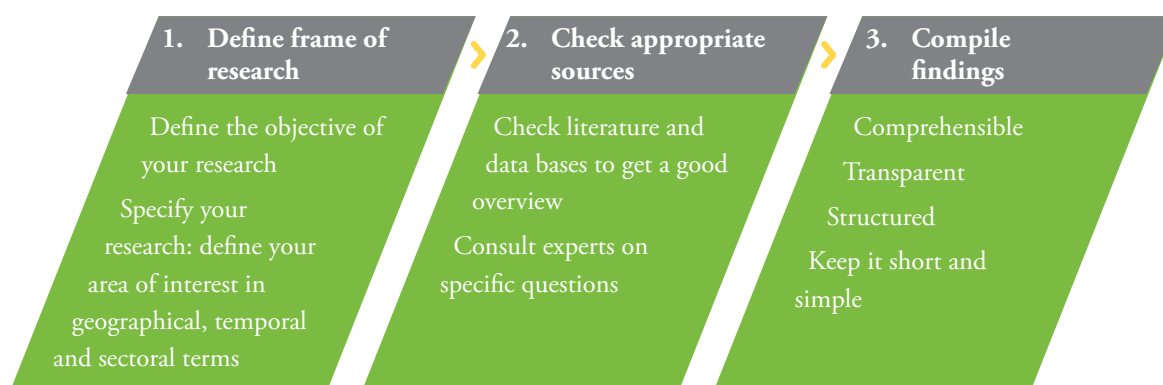
The sessions include climate data as well as examples and case studies of practical application to better understand and illustrate the theories and exercises of the sessions, which may be adapted to the context of a specific group. The provided climate data may be up-to-date at the time of the CDP's creation (2021) but may no longer be relevant in 2–3 years. It is therefore recommended to conduct a short research study on current climate scenarios and risks before conducting a training.

1. What do I need scientific climate data for?

- **Identifying key challenges** (e.g., which regions/sectors are vulnerable to climate change)
- **Selecting strategies** (e.g., how to reduce vulnerability in a region/sector? How to achieve development objectives despite climate change?)
- **Designing technical responses** (e.g., define storage capacity of a new reservoir/select irrigation technology)



2. Guiding principles for data research and management



Source: Adapted from GIZ 2009: *Climate Information for Effective Adaptation*

3. Where to access scientific climate data?

On an international level: Studying climate data on a global level helps to compare your specific situation with other regions and place it in the bigger picture. Knowing where people are facing similar challenges can help in identifying best practices.

Exemplary websites:

- **The Climate Change Knowledge Portal (CCKP) by the World Bank Group:** Online platform with access to comprehensive global, regional and country data related to climate change and development. The CCKP consists of spatially and temporally referenced historical and future data. Users can evaluate climate-related vulnerabilities, risks and actions for a particular location on the globe by interpreting climate and climate-related data at different levels of detail. Enter the platform here: <https://climateknowledgeportal.worldbank.org/>
- **Global and Regional Adaptation Support Platform (ci:grasp) by Potsdam Institute for Climate Impact Research (PIK):** Climate information service providing sound knowledge on current and projected climate stimuli, climate impacts and adaptation options at the national, sub-national and regional level.
- Enter the platform here: <http://www.pik-potsdam.de/cigrasp-2/index.html>

On a local level: It is important to study how the climate change scenario is presented for India overall and specifically for the regions of your training participants. The platforms below provide data on past and future trends of climate hazards and risks but also proven tools for adaptation. You may use this information as case studies in your trainings to guide and inspire participants in developing their adaptation strategies.

Exemplary websites:

- **Ministry of Environment, Forest and Climate Change (2017): State Action Plan on Climate Change.** For Uttar Pradesh. Available at: http://moef.gov.in/wp-content/uploads/2017/09/SAPCC_UP_final_version_0.pdf.
- **Flood Management Information System Centre of Uttar Pradesh:** Platform providing predicted and actual flood inundation maps, customized analysis outputs for planning new or strengthening existing flood protection works, river training works, emergency flood management, etc. Available at: <http://fmiscup.in>.
- **Climate Change Knowledge Portal (CCKP) by the World Bank Group:** Explore the CCKP historical and projected climate data, impacts, key vulnerabilities and what adaptation measures are being taken for India. Available at: <https://climateknowledgeportal.worldbank.org/country/india>.

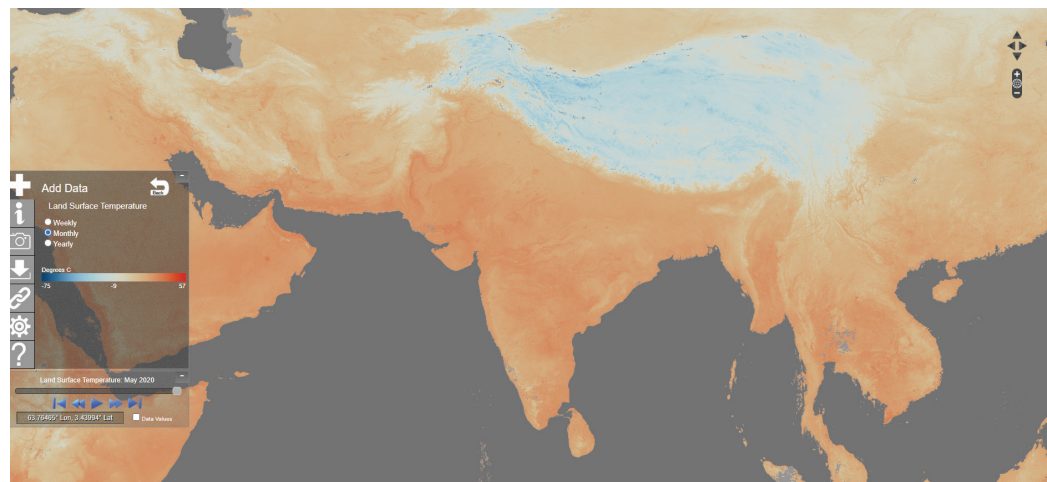
- **Indian Meteorological Department (IMD):** Historical (five years), forecast at seven-day frequency, agro-advisories are available. Available at: <https://mausam.imd.gov.in/>.

4. How to present and visualize climate data to the training group?

Maps and other illustrative material help participants to easily access scientific data. There are several online platforms and software packages available to access or generate image maps or graphs of historical climate data or future climate projections. Some free examples are presented below.

NOAA View Data Exploration Tool by National Oceanic and Atmospheric Administration (NOAA): Image map viewer with more than 60 global datasets. You can also display specific dates, animate time series and download .png images or KMZ (Google Earth) files. Available at: <https://www.nvdl.noaa.gov/view/globaldata.html>

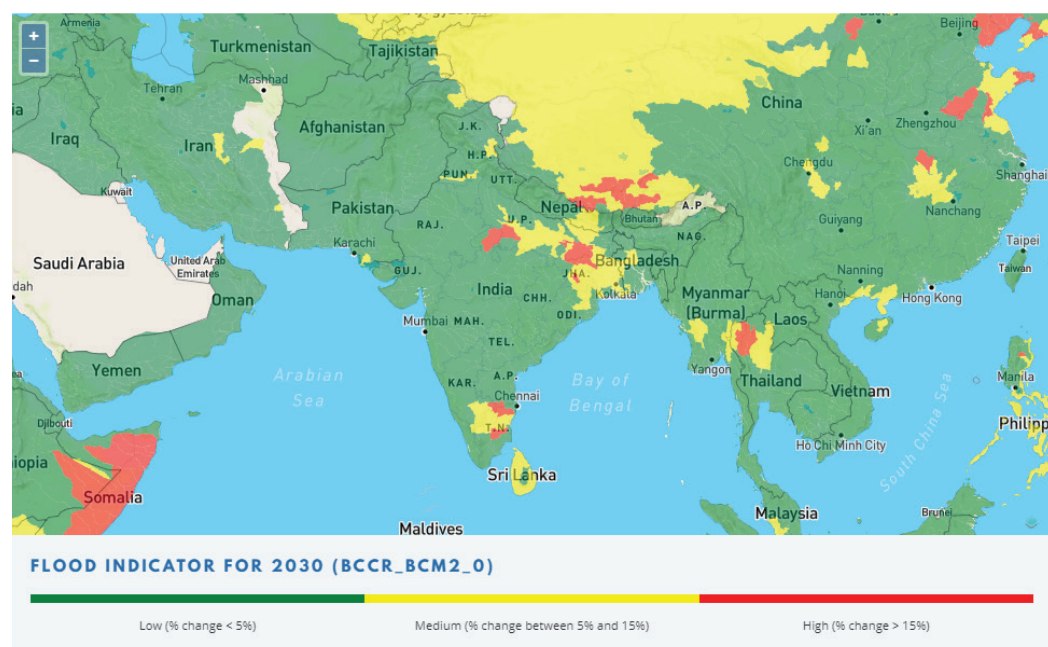
Figure 2. Monthly land surface temperature by NOAA View Data Exploration Tool



Climate Change Knowledge Portal (CCKP) by the World Bank Group: Various maps and graphs presenting past and projected climate data. Available at: <https://climateknowledgeportal.worldbank.org/country/india>

Examples are presented below:

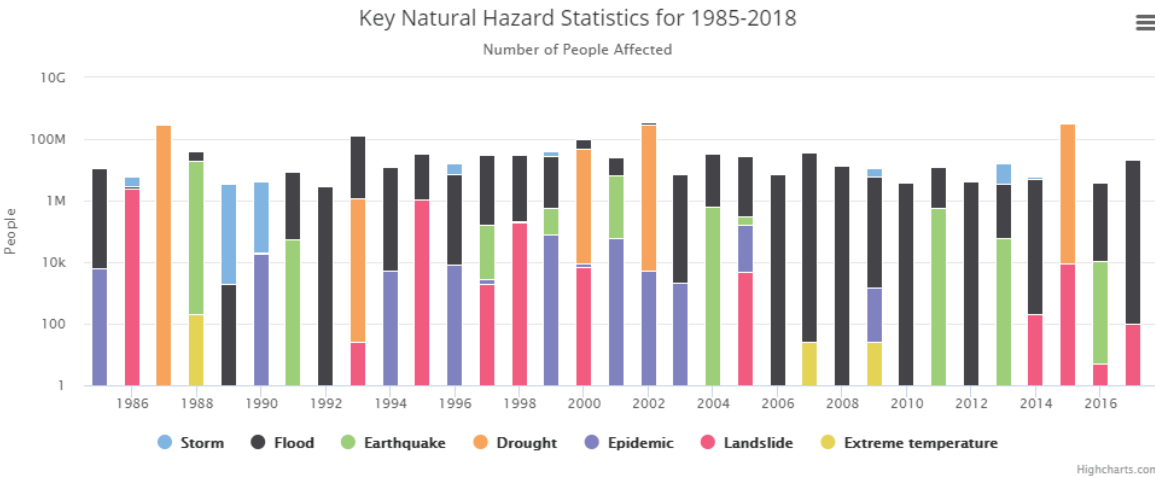
Figure 3. Flood indicator for India (and the world) for 2030



Source: World Bank Group <https://climateknowledgeportal.worldbank.org/country/india/impacts-water>



Figure 4. Bar chart presenting key natural hazard statistics for India for 1985–2018



Source: World Bank Group <https://climateknowledgeportal.worldbank.org>

- Visualization of current weather patterns can be accessed: <https://earth.nullschool.net/> -
- Visualization of historical and projected average climate data: climatevulnerability.in

0.5 Training course options

The following four calendars show options for training courses of varying durations and focus.

To successfully carry out the training courses, a participant size of about no more than 20 participants is recommended.

Half-day training

Half day
Introduction, purpose of the training (10 min)
Session 1.1 Climate change and its causes (45 min)
Session 1.2 Vulnerable regions, target groups and impacts of climate change in UP (60 min)
Session 2.1 Experience sharing on the impact of climate change on development interventions related to agriculture, water resources and DRR at village level (60 min)
Wrap-up and feedback (10 min)
Lunch break

3-day training

Day 1	Day 2	Day 3
<p>Introduction, purpose of the training, expectations (15 min)</p> <p>Session 1.1 Climate change and its causes (45 min)</p> <p>Session 1.2 Vulnerable regions, target groups and impacts of climate change in UP (60 min)</p> <p>Session 2.1 Experience sharing on the impact of climate change interventions related to agriculture, water resources and DRR in the local context (60 min)</p>	<p>Session 3.3 Step 2–3 Defining climate change adaptation needs (60 min)</p> <p>Session 4.1 Input sessions on the best practices for climate adaptation (45 min)</p> <p>Session 4.2 Step 1–2 Identifying, assessing and prioritizing adaptation measures to selected CCA needs (90 min)</p>	<p>Session 5.3 Adaptation measures that can be leveraged through GPDP/MGNREGA vis-à-vis schemes and programmes (30 min)</p> <p>Session 5.4 Use of simple spatial techniques for NRM planning (60 min)</p> <p>Session 5.5 Identifying further relevant support schemes for adaptation projects (60 min)</p>
<i>Lunch break</i>	<i>Lunch break</i>	<i>Lunch break</i>
<p>Session 2.2 Assessing the impacts of climate change and identifying related risks to the lives and livelihoods of rural communities (2h)</p> <p>Session 3.3 Step 1 Identifying CCA needs of village communities related to human development and social security (60 min)</p> <p>Summary of the day</p>	<p>Session 4.2 Step 3 Identifying, assessing and prioritizing adaptation measures to selected CCA needs (30 min)</p> <p>Session 5.1 Gram Panchayat Development Plan (GPDP) mechanism and integration of natural resource management (NRM) issues to address climate and disaster risk (90 min)</p> <p>Session 5.2 Step 2 Designing a project for selected adaptation measures that can be integrated into GPDP planning processes (60 min)</p> <p>Summary of day</p>	<p>Session 6.1 Step 1-2 Developing a communication strategy (1 h 30 min)</p> <p>Session 7.1 Step 1 Understanding the concept of operation and maintenance (30 min)</p> <p>Session 7.2 Step 1 Understanding the concept of monitoring and evaluation (30 min)</p> <p>Session 7.3 Step 1 Risk identification (30 min)</p> <p>Wrap-up and feedback (15 min)</p>



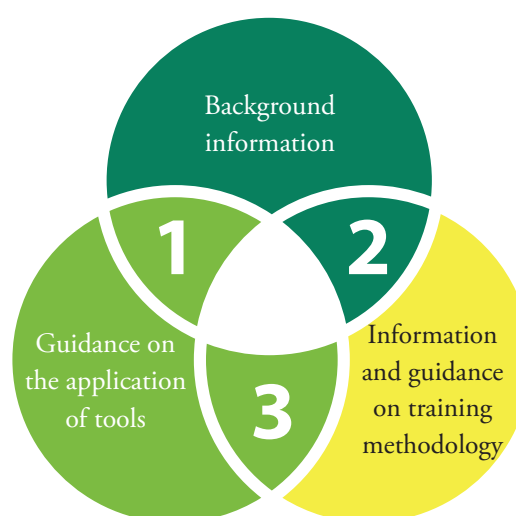
5-Day Training

Day 1	Day 2	Day 3	Day 4	Day 5
<p>Introduction, purpose of the training, expectations (15 min)</p> <p>Session 1.1 Climate change and its causes (45 min)</p> <p>Session 1.2 Vulnerable regions, target groups and impacts of climate change in UP (60 min)</p> <p>Session 2.1 Experience sharing on the impact of climate change interventions related to agriculture, water resources and DRR in the local context (60 min)</p>	<p>Session 3.2 Prioritizing identified climate risks (45 min)</p> <p>Session 3.3 Defining climate change adaptation needs (2 h)</p>	<p>Field trip (half day)</p>	<p>Session 5.2 Step 3 Design a project for selected adaptation measures that can be integrated into GPDP planning processes (2 h)</p> <p>Session 5.3 Adaptation measures that can be leveraged through GPDP/ MGNREGA vis-à-vis schemes and programmes (30 min)</p>	<p>Session 6.1 Step 1–2 Develop a communication strategy (1 h 30 min)</p> <p>Session 7.1 Operation and maintenance (O&M) plan for environmental infrastructure measures (1 h 30 min)</p>
Lunch break	Lunch break	Lunch break	Lunch break	Lunch break
<p>Session 2.2 Assessing the impacts of climate change and identifying related risks to the lives and livelihoods of rural communities (2 h)</p> <p>Session 3.1 Recently conducted needs assessment (20 min)</p> <p>Summary of the day</p>	<p>Session 4.1 Input sessions on best practices for climate adaptation (45 min)</p> <p>Session 4.2 Identifying, assessing and prioritizing adaptation measures to selected CCA needs (2 h)</p> <p>Summary of the day</p>	<p>Session 5.1 Gram Panchayat Development Plan (GPDP) mechanism and integration of natural resource management (NRM) issues to address climate and disaster risk (90 min)</p> <p>Session 5.2 Step 1–2 Design a project for selected adaptation measures that can be integrated into GPDP planning processes (90 min)</p> <p>Summary of the day</p>	<p>Session 5.4 Use of simple spatial techniques for NRM planning (60 min)</p> <p>Session 5.5 Identifying further relevant support schemes for adaptation projects (60 min)</p> <p>Session 5.6 How to apply for the relevant schemes for CCA-DRR (60 min)</p> <p>Summary of the day</p>	<p>Session 7.2 Monitoring and evaluation plan (1 h 30 min)</p> <p>Session 7.3 Risk management (1 h 30 min)</p> <p>Wrap-up and feedback (15 min)</p>

0.6 Trainer's manual: Approach and structure

The trainer's manual combines three components to enable trainers to effectively build the capacities of women farmers to plan and implement CCA measures:

- **Background information** on important terms and concepts related to climate change impacts in India and mainstreaming adaptation in local planning.
- **Guidance on the application of exercises** to plan and implement adaptation projects
- **Information and guidance on training methodology**



The methodological advice to the trainer includes:

- At the outset of each module, a **module overview** sums up the learning objective and training duration, and a “**module planner**” provides an overview of all the sessions included.
- Introduction to each session with information about the **learning objective**, necessary **prerequisites/prior knowledge for successful participation**, an overview of the different **steps**, **session duration**, **methods** employed, **materials** needed as well as their **preparation**.
- Relevant **background information** prepared for **input presentations** to help participants carry out suggested exercises, group discussions or present the knowledge material, definitions of key terms, etc.
- **Detailed guidance** on how to carry out **participatory exercises** with visualization instructions and useful hints for the trainer and **group discussions** on how to use the worksheets that are provided to the participants with the handouts.
- Each session concludes with recommendations on **useful literature and databases** that stimulate further research, **key take-aways** for participants and **debriefing questions** to collect feedback from the participants and improve the training.

0.7 Who can use the trainer's manual?

The CDP aims primarily to address trainers who will engage with local community-based organizations/communities. In UP, the following introduced training institutes will play a major role in using the CDP:

The State Institute of Rural Development (SIRD) and its trainers related to PRIs and SRLM.

SIRD is an apex institute of the State Government of UP dedicated to the activities of training, research and consultancy for enhancing the effectiveness of the implementation of various rural development programmes. SIRD organizes a range of training programmes on different thematic areas concerning rural development such as agriculture-based livelihood promotion, integrated watershed management, disaster management and so on. The institute also organizes capacity development programmes for functionaries responsible for the implementation of various government schemes and programmes such as MGNREGA, Indira Awaas Yojana, SRLM, Saansad Adarsh Gram Yojana, etc.

State Panchayati Raj Institute of Training (PRIT) for the training of PRI-members.

Block, district and the state government officials of identified departments, namely, agriculture, horticulture, animal husbandry, water resources, rural development and disaster management, especially dealing with the relevant identified schemes. An overview of these schemes able to integrate and use the CDP is provided in Table 4.



Table 1. Support schemes offered by departments that are suited to integrate and use the CDP

Department suitable to use and multiply CDP	Existing programme in which the CDP could be integrated	Target group or departments trained	Thematic focus/ identified needs addressed
Panchayat Raj department	<ul style="list-style-type: none"> • Relevant sectors under Finance Commission Grants • Pradhan Mantri Krishi Sinchai Yojana • Programme on Water Security and Climate Adaptation in Rural Areas (WASCA) • Atal Bhujal Yojana under National Groundwater Management Improvement Scheme • Swachh Bharat Mission • Nirmal Bharat Abhiyan • National Rural Drinking Water Programme • State Finance Commission 	PRI-members	Integrating resilient agriculture, water management and DRR aspects in GPDP
Rural development (MGNREGA)	<ul style="list-style-type: none"> • All 29 sectors of XI Schedule under MGNREGS • All permissible work under MGNREG Act 2005, Schedule-1 • Deendayal Antyodaya Yojana-National Rural Livelihoods Mission (DAY-NRLM) • Pradhan Mantri Awas Yojana-Gramin (PMAY-G) • Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) • Saansad Adarsh Gram Yojana (SAGY) • Pradhan Mantri Gram Sadak Yojana, Deendayal Upadhyay Gram Jyoti Yojana 	PRI-members	Planning and utilization of MNREGA resources for improving ecosystem services and a risk-informed GPDP

0.8 References

UNEP DTU Partnership, World Adaptation Science Programme (WASP) (2020): Adaptation Gap Report. Retrieved 21 June 2021. Available at: <https://www.unep.org/resources/adaptation-gap-report-2020>.

Germanwatch: Global Climate Risk Index 2020. Retrieved 21 June 2021. Available at: <https://germanwatch.org/de/19777>.

1 TRAINING DIDACTICS: GUIDING PRINCIPLES FOR TRAINERS



When designing a training session, it is important to plan a good mix of input and interactive exercises and energizers. This not only helps at the beginning to get to know the participants better but also creates the necessary variety and movement during the training, which helps to:

- boost concentration,
- consolidate the input learnt and
- contributes to better networking among the participants

This chapter presents:

- 1.1 Energizers** – gets participants moving and having fun and ensures that the energy level of the group is high.
- 1.2 Participatory training methods** – puts the theoretical input into practice, or you may further develop the input by doing it yourself.
- 1.3 Visualization** – facilitates the communication of a message through images, diagrams or animations. The connection to the senses increases the learning potential.
- 1.4 Feedback and evaluation** – support you as a trainer to get feedback from the participants: What key messages could the participants take away from the session? Were the participants' expectations and learning objectives met? How can you improve your training?

Learning level

It is already well known that adults have a greater capacity to learn and absorb what is transmitted when it is not just heard, but also seen, discussed and practised. Have the right table in mind when you conduct your session.

Table 2. Learning level

Learning competence of adults, when they...	
Only read	10%
Only hear	20%
Only see	30%
See and hear	40%
Discuss	50%
Experience (see, hear and implement)	70%
Teach	90%

Source: United nations 2001

Inform learners of the learning objectives

Setting clear goals is the key to successful training. It is necessary that participants stay on track throughout the training session. Remind them regularly of the learning objectives (described at the beginning of each session).

1.1 Energizers

Why use energizers?

Icebreakers and workshop introduction

- Break the ice and give participants the opportunity to get to know each other.
- Create a pleasant working atmosphere.
- Uncover the participants' levels of knowledge and their expectations.

During the training

- Wakes up the group when they seem tired and unfocused.
- Helps with concentration.
- Lets people connect and thereby qualifies the group work.

Introduce your neighbour: Opening a workshop

Material needed: Cards or flip chart with questions and additional cards for the participants to write something down on.

Steps:

- Ask each person in the group to pair up with one of their immediate neighbours.
 - Each person has three minutes to introduce themselves before mentioning their name, age, background, where they are from and their reason for participating in the training.
-
- Then each pair has one minute to introduce each other to the group.

Hints:

- Write down the questions on a flip chart or cards pinned to a wall. This helps the participants remember what to talk about.
-
- Depending on what you want to find out, adapt or modify the questions.
-
- You can have participants write key information on cards, pin them on the wall and leave them there during the training/workshop.

Benefits:

- Participants have direct contact.
- Active listening is necessary because they have to reproduce the knowledge.
- This is a good exercise when you work with the topic of communication.

Limitations:

- Time-consuming.
- Participants might get distracted during the presentation round.
- Unsuitable for a group size of more than 10.

Throw a ball: Opening a workshop

Material needed: A ball, cards or flip chart with questions.

Steps:

- Form a standing circle.
- Explain that the person receiving the ball will introduce themselves and tell the group their name, what they expect from the training and what they know about CCA interventions.
- Then throw the ball to the next person until everyone has been introduced.

Hints:

- Write the questions on a flip chart or cards pinned to a wall. This helps the participants remember what to talk about.
- Depending on what you want to know and how much time you have, adjust the questions.
- If there are people who cannot stand, you can also do the method sitting down.

Benefits:

- Participants interact with the whole group.
- Physical movement and quick interaction.
- Suitable for indoors and outdoors.
- It is fast.

Limitations:

- Not very profound.
- People could have difficulties catching the ball.

Bingo

Material needed: Prepared bingo cards for each participant.

Example of a Bingo sheet:

Has five or more children	Knows to sing the national anthem	Enjoys snowfalls in the hills and meadows	Likes Cherries
Has already worked on a CCA project	Believes in horoscope	Knows to stand on two hands	Has a vegetable garden at home
Had to walk for more than an hour to get here	Has a rainwater harvesting system

Steps:

- Distribute the prepared bingo sheets to each participant.
- Ask the participants to talk to other participants to see if they can answer “yes” to the items in the boxes on the sheet.
- If “yes”, the other participant must write their name in the corresponding box.
- Have all the participants do the same thing at the same time. The participant who gets signatures in all the boxes first must announce the names of those who must prove their “competencies” and is declared the winner.

Hints:

- Design a sheet with local information.
- It is better to include aspects where people need to question and talk to each other.

Benefits:

- Vast and not just technical information of the participants is provided.
- Very interactive.
- Good to lighten the mood.

Limitations:

- Time-consuming.
- Not useful for leveling expectations.

Blind mathematics

Material needed: A long rope forming circles, scarves to cover eyes.

Steps:

- Have the group form a circle and blindfold themselves with scarves.
- Give each person the rope to hold in their hand.
- Now ask them to form a square.
- Then reflect with the group: What was easy, what was difficult, what helped, what made the situation more difficult?

Hints:

- If the group is large, form two or three groups.
- For more difficulty, have the participants do the exercise without speaking.
- Use the exercise to assess roles within the group. In general, it is easier if the group listens to each other or if there is a leader who gives instructions that the others follow. It is also possible to reflect on gender roles and dominance.
- Try to compare the course of the exercises with CCA projects.

Benefits:

- Helps the group build trust.
- Active listening will be trained.
- Training of group cooperation and observation.
- Cheers up the mood and helps with concentration.
- Trains the tactile skills of the group (listen, feel, smell).

1.2 Participatory training methods

Participatory training methods are an educational strategy in which learners are active participants in the training and their needs, questions, reflections, analyses, and strategies for change carry the process forward.

Roleplay

Objective: A roleplay is a structured activity, usually in the form of a dramatic performance that re-enacts a real-life situation. Roleplay can be used to analyse a problem and identify its causes and solutions. It is also useful in making comparisons between ideal and real-life conditions.

Material needed: The “script” or scenario should be prepared with a clear focus on the selected topic or theme.

Steps:

Before the roleplay:

- Select the topic or theme and identify the key points to be depicted.
- Prepare the play scenario and develop the roles to be played in light of the key points.

During the roleplay:

- Explain the roleplay, the play scenario and its purpose.
- Distribute the different roles among the group. There can also be observers.
- Ask performers to prepare for the performance.

After the roleplay:

- Ask performers and observers to express what they learned from the performance (ask questions based on the theme of the performance and encourage discussion).
- Summarize the findings of the discussion.

Hints:

- You can note central information on cards or flip charts around the room.
- Ask the participants to dive into their roles, maybe even using some accessories or props.
- Help the performers act out their parts if needed.
- There are different forms of role play: silent role play, statue theatre, theatre of the oppressed, etc. – do some further research if you like the concept of roleplays.

Benefits:

- Increases self-perception and enhances the ability to identify real-life problems.
- Enhances learning because the participants dive into the topic and convert knowledge into practice.

Limitations:

- Time-consuming (for both preparation and realization).
- Self-conscious or quiet participants may not want to take part in the role play.
- The impact of the role play upon the participants depends on the capacity of the performers.
- To reduce preparation time and avoid observer boredom, a roleplay exercise should not be too long.

Scales

Objective: Identify the opinions or knowledge of the group.

Material needed: A line on the floor, cards marking positive and negative positions.

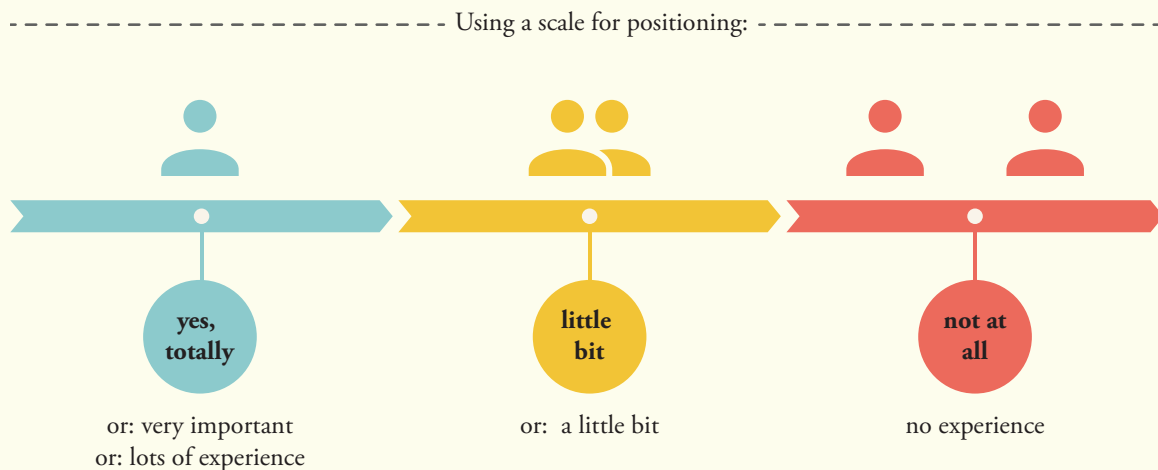
Steps:

- Draw or stick a line on the floor and mark one side with the agreeing phrase, the other line with the disagreeing phrase.
- The trainer asks a question and the group members must position themselves according to each person's opinion or knowledge.
- Then the trainer asks some of the participants why they are positioning themselves where they are.

Examples:

- *"What topic under the training programme interests you the most?" (You may offer different spots in the room as the 5 thematic modules).*
- *"What role do climate change adaptation measures play in your life?" (Can be a scale from "no role" to a "very important role").*
- *"Do you have previous experience with project development?" (Can be a scale from "no experience" to "lots of experience").*

Using a scale for positioning:



Hints:

- If the trainer observes that there are strong (opposite/differing) opinions, the group may be engaged in a more profound discussion.

Benefits:

- Provides an overview of the opinions/ knowledge of the whole group.
- The method is interactive.
- Discussion is possible – can motivate the group to get involved in a profound discussion.
- Not time-consuming.

Limitations:

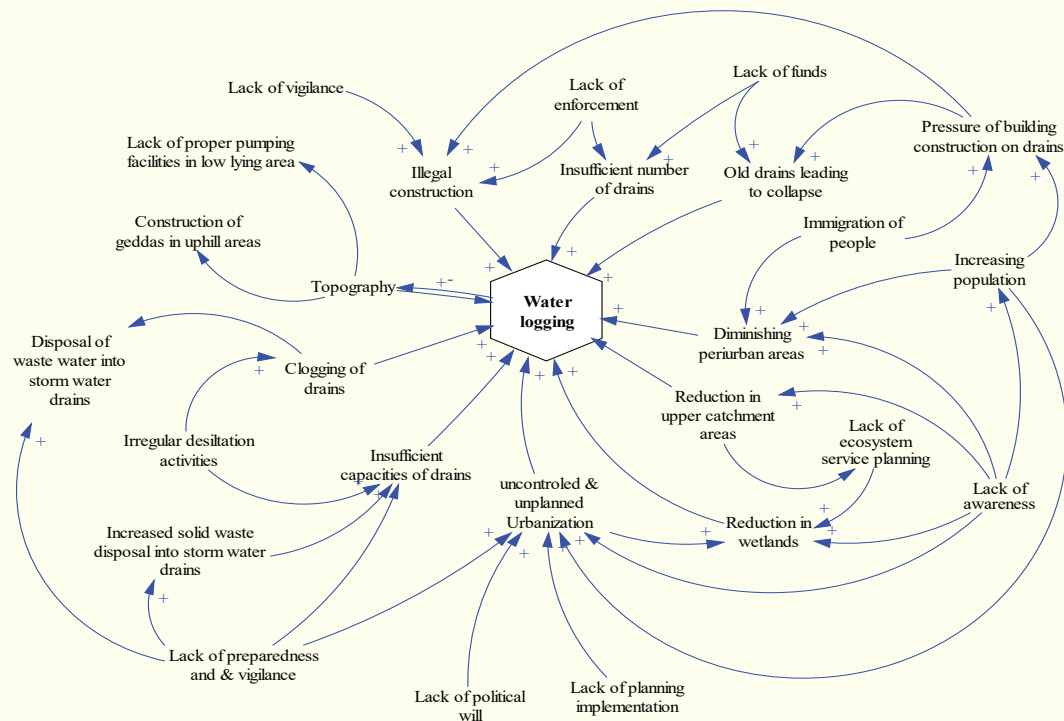
- People sometimes follow the opinion of the group because they don't want to be exposed.

Causal loop diagram

Objective:

- To visualize how different variables in a system are interrelated.
- Participants themselves identify the various reasons for an issue that are directly or indirectly linked to the problem and its intensity.

Materials needed: Flip chart, pen



Steps:

- Define a topic/problem for which a causal loop diagram shall be developed, e.g., let the participants identify the most significant changes observed during the last 10–15 years (e.g., migration, changes in cropping patterns, changes in water situations) and write them out in the centre of the flip chart.
- Ask the participants to identify primary reasons/causes of the defined problem. Write them on cards and pin them on the flip chart, then draw an arrow with a “+” in the direction of the problem as done in the figure above.
- Do the same for identified secondary causes (of primary causes, e.g., income-reduced outputs in farming, livelihood – not much work in the village, etc.) and tertiary causes, etc., creating a system of nodes and relations.
- If participants identify something that has a positive impact on the problem (reduction of climate impact causing water scarcity), draw an arrow indicated with a “-”.
- Open discussion. In the context of climate change, for example, discuss linkages of the identified causal loops to climate change. Put a different coloured card on all causes that are linked to climate change. Also, discuss who (vulnerable groups) is most affected by the problem and its causes.

Hints:

- This exercise can be used more openly as mind-mapping of a specific topic.
- The diagram consists of a set of nodes and edges. Nodes represent the variables and edges are the links that represent a connection or a relation between the two variables.

Benefits:

- Participants themselves identify the various direct and indirect causes of a defined problem.

Limitations:

- Very complex exercise.
- Time-consuming.

Transect walk

Objective: A transect walk is a walk through a geographical area with one or more participants and the documentation of what is seen and heard. There are three standard types: Village, Resource and Cultural transect walks. Resource transects seek to document the resources available to a particular society that could be used for developmental purposes. Village transects deal with infrastructure and describe the living space of the community of interest. Cultural transects are mostly focused on human activities.

Material necessary: Paper, camera

Steps:

- Define the route and goal.
- Follow the defined route/transect walk with the participants noting everything that is observed during the walk referring to the defined objective.
- Review and analyse materials with the participants.

Hint:

- If time is short, the transect walk can also be recorded beforehand.

Benefits:

- Very participatory.
- Literacy is not necessary.
- Easily applicable in a village context.

Limitations:

- Time-consuming.
- Need to be at the place of interest.

Seasonal analysis (e.g., seasonal calendar)

Objective: Find out community perceptions on time- and season-related variations on indicators such as climate impacts, production patterns (crops), food security, etc.

Material needed:

- Drawing on the ground: soft ground, stones, sticks and other available material to produce symbols.
- Drawing on a paper: a big sheet of paper, pencils, markers.

Steps:

- Preparation of the matrix: Let the participants draw a matrix with horizontal linear time-scale (e.g., month of a year) and indicators (e.g., crop patterns, rainfall patterns) along the vertical axis.
- Identify the starting event with the participants.
- Prepare questions in advance to guide the participants in completing the calendar.
- Discuss the results with the group.

Hints:

- Forming groups of different genders or ages to fill out their own calendars can draw insights into how different groups function within a community (or household).
- Several themes can be combined within a calendar, e.g., plant growth and rainfall patterns. Use one column for each theme.
- It is possible to designate symbols for the months and events rather than writing (e.g., when the calendar is drawn on the ground).

Benefits:

- Very participatory.
- Can provide important information on gender- or age-based views.
- Very relevant to analyse CC impacts.
- Easy applicable in a village context.



1.3 Visualization

What:

- Use images and diagrams to facilitate communication and learning.
 - Express ideas emerging from dialogue and reflect and share ideas.
-

When:

- During the training session to record what has been done – useful in the subsequent days.
-

Why:

- Enhances the learning process and ensures that information stays in the minds of participants for a longer time.
- Facilitates communication and learning.
- Assists the people who may initially be hesitant to speak.

How:

For trainers:

- Draw images and diagrams.
 - Use a combination of presentation tools for one session, e.g., display diagrams on a **pinboard**, present the details in a **PowerPoint presentation** and write down the main points in a **flip chart**.
 - Picture, charts and drawings are more expressive and memorable.
-

For participants:

- Present the results in bold, big print letters that are legible from 6–8 metres away.
 - Each card can only have one idea.
 - Colour-code to differentiate between different aspects of the exercise.
 - Follow the instructions in the handout.
-

Hints:

People cannot simultaneously read and listen, thus, limit wordy PowerPoints. Instead, use flip charts, pinboards and moderation cards.

1.4 Feedback and evaluation

Feedback and evaluation in training is a method to get feedback from participants on whether they liked the training (e.g., in terms of methodology, content, setting, etc.) and to determine the level of learning. Feedback guides the trainer to stay “on track” and to regularly improve the training to better achieve its goal or purpose. Effective feedback is usually descriptive rather than evaluative. Feedback can come through a formal critique or method or be perceived through informal responses.

Hints:

- Ask participants for daily feedback or at the end of each session (see debriefing questions) for better adapting the training to the participants’ needs. Guiding questions: “*What did you like today?*”, “*What could be improved upon in tomorrow’s training?*”
- Trainers should avoid responding to the feedback or defending themselves. However, they are allowed to ask for clarification.

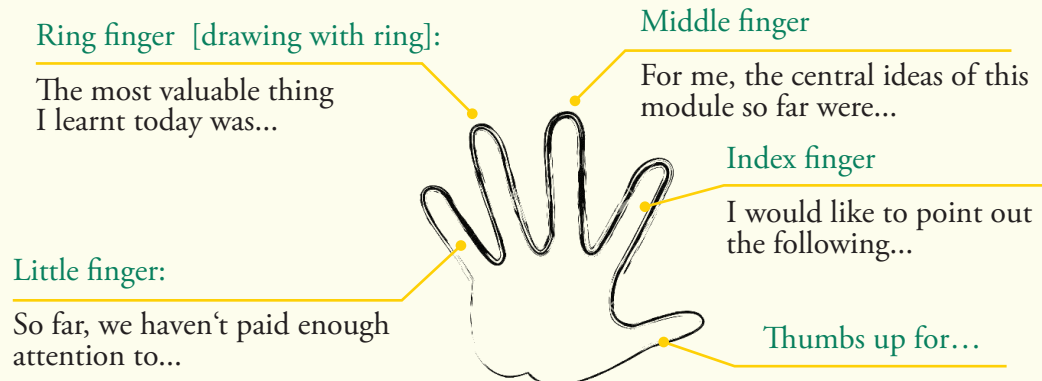
Five-finger-feedback

Objectives:

- To receive feedback about the different aspects of your training and perception of the state of mind of the participants.

Steps:

- Two possibilities to conduct this type of evaluation:
 - » Individual: You provide a paper to every participant and ask them to draw their hand on the paper.
 - » Group: Draw a big hand on a whiteboard or the flip chart.
- On each of the fingers, write the questions below. Then discuss the day’s training and write key points on the board or flip chart.



Hints:

- Individual evaluation is a good method to ensure the receipt of everybody's feedback.
- The group method is fast and the focus is on central points because people generally don't repeat a lot.
- To receive detailed or complex feedback.

Benefits:

- The individual method is time-consuming.
- The group method involves potentially losing some individuals' opinions. Some people could be too shy to answer.
- Reading and writing are necessary.

Evaluation gallery

An effective and complex way of receiving feedback is the evaluation gallery.

Steps:

- Draw the following pictures and write the questions on a flip chart, pinning the sheets to the walls of the training room to make a sort of gallery:
 - Drawing of a light bulb: What was new to me? What important information and ideas did I get out of the training?
 - Drawing of a computer: What did I learn that I can apply in my work?
 - Drawing of a rubbish bin: What would I like to leave behind? What was not relevant to me?
 - Name of each trainer: How did I like the trainers in this module? What did they do well? What could they have done better?
 - Did the group work well together? What was the atmosphere like?
 - What else would I like to add?
- Place pens next to each sheet and ask the participants to write their views anonymously. When everybody has finished writing, the gallery is open for viewing.
- At the end of the session, the trainer reads out some of the comments, asking for clarification where appropriate and summarizing the results.

Hints:

- Take photographs of the gallery for documentation purposes.

Hints:

- Focus on your evaluation topic.
- Good for documentation purposes.

Benefits:

- Reading or writing is necessary.
- Time-consuming.

2 TRAINING COURSE FOR PRI-MEMBERS



Module 1. Understanding climate change and its impacts

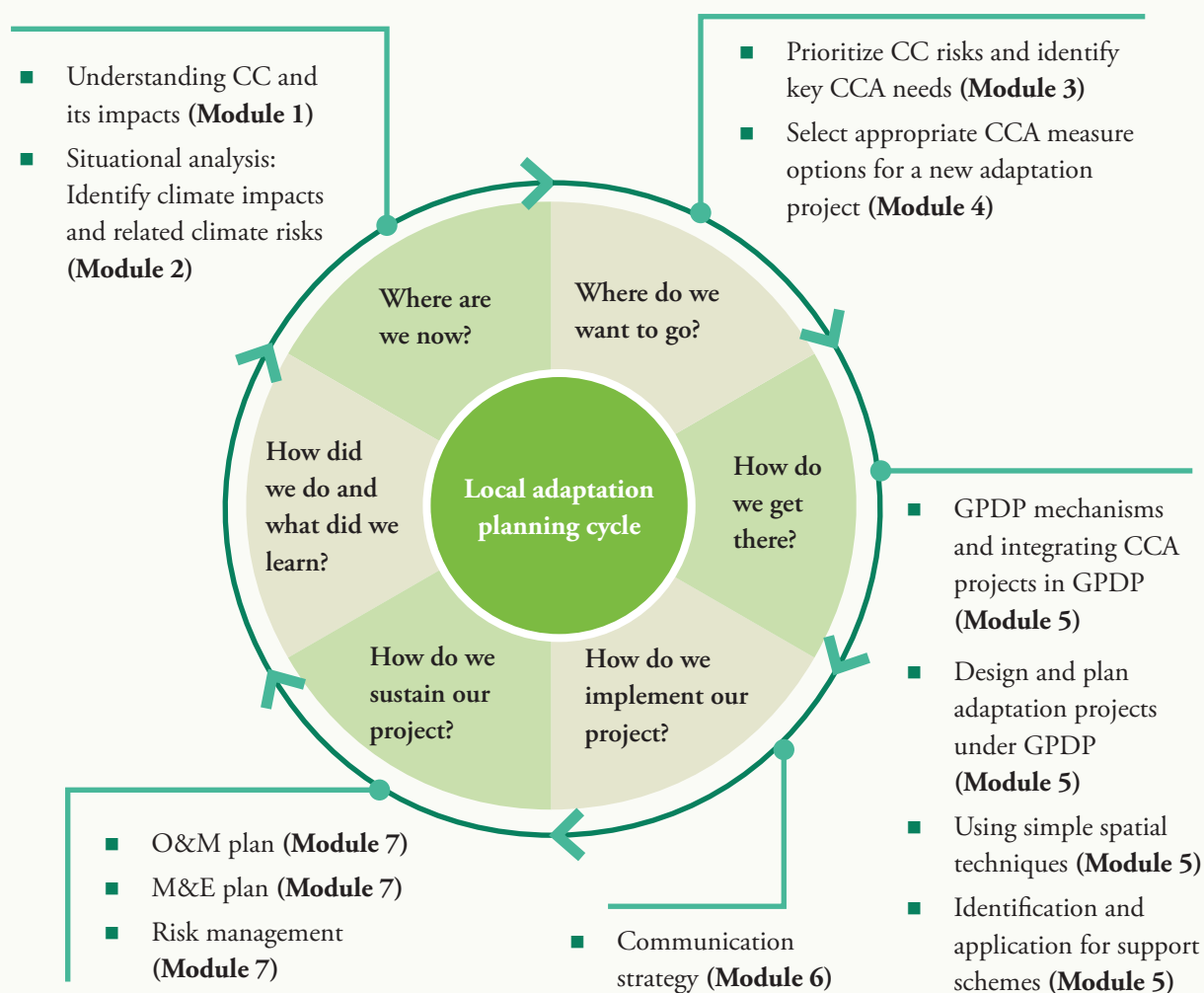
Learning objective	To understand climate change, scenarios and impacts in different agro-climatic regions of UP
Duration	Shortest version: 45 min Complete version: 1 h 45 min At the field level (including site visits): 2 h 30 min

Module planner

Duration	Sessions	Shortest version	Complete version
45 min	Session 1.1 Climate change and its causes	x	x
60 min	Session 1.2 Vulnerable regions, target groups and impacts of climate change in UP		x

Integration of Module 1 along the local adaptation planning cycle

The methodology used by the capacity-building package follows the logical sequences of local adaptation planning. The right figure shows the arrangement of the CDP's modules, their key steps and methods employed. The colour yellow indicates that you are in Module 1 and Step 1 of the local adaptation planning cycle, which provides participants with an understanding of climate change and its impacts. In the ExcelTool you will find a tab in the same yellow. Here you can document the results achieved by your group of participants in Module 1.



Session 1.1 Climate change and its causes

Learning objective	To understand climate change and its causes in general.	
Prerequisites/prior knowledge for successful participation	Exposure and ground experience on weather and climatic changes; hands-on experience of agriculture and farming.	
Steps (duration)	Step 1. Why you should know about climate change	5 min
	Step 2. Weather and climate change	5 min
	Step 3. Evidence of climate change	5 min
	Step 4. Causes of climate change	10 min
	Step 5. Climate change scenarios in the past and projections for India and UP	20 min
Total duration	45 min	
Methods/exercises	Input presentation, discussing past and future climate variations	
Material	PowerPoint presentation 1.1, Handout 1.1, laptop, LCD projector	
Preparation	You may update past global climate change scenarios and projections for UP if they are no longer up-to-date (status 2021).	

Step-by-step approach

This session focuses on understanding climate change and its causes in general. Participants will learn to distinguish between weather and climate (**Step 1**) and understand what climate variability and extreme weather events are (**Step 2**), and how they affect the planet and their causes, looking at natural and anthropogenic factors (**Step 3**). Finally, they analyse how past and projected global climate change scenarios affect the Earth and its livelihoods, with a regional focus on UP (**Step 4**). At the end of the session, participants discuss their learnings from the session, referring to experiences in their local contexts.

Step 1. Why you should know about climate change

Input presentation

- Present Slide 3 (Presentation 1.1 – Climate change and its causes) to the participants

According to IPCC's fourth assessment report, the term "climate change" refers to significant changes in global temperature, precipitation, wind patterns and other measures of climate that occur over several decades or longer. In the last few decades, anthropogenic causes have accelerated the rate of change in the climate significantly. Consequently, the pattern of precipitation and temperature has changed, the incidences of water and vector-borne diseases have increased, the air quality has deteriorated, and extreme events have gotten enhanced. In a nutshell, it has not remained a global phenomenon; rather, it has become a layman concern to understand how the climate is changing, what the causes are behind it and how it will make an impact on the lives of people. Understanding the concept of climate will help people prepare for the future.



Step 2. Weather and climate change

Input presentation

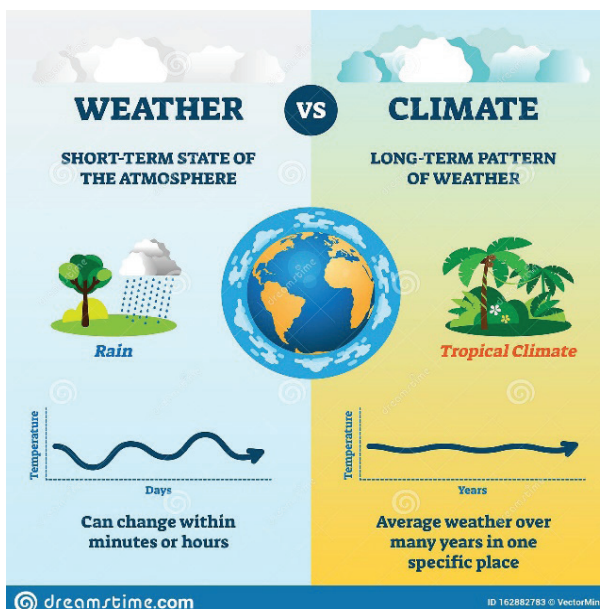
- Present Slide 4 (Presentation 1.1 – Climate change and its causes) to the participants

We hear about weather and climate all the time. Most of us check the local weather forecast through our newspapers, TVs, radios, etc. to plan our days. Sometimes, we tend to use the terms “weather” and “climate” interchangeably and confuse the two.

Weather is the hour-to-hour, day-to-day condition of the atmosphere. Weather can change dramatically from day to day.

Climate represents the average weather condition of a place for a longer period. Scientifically, a minimum of 25 to 30 years of weather data have to be considered for reliable statistical determination of the characteristic of a climate. Climate is never static; it is subject to fluctuation. Thus, the term “**climate change**” is defined as the climatic variations in historic time over a few thousand years.

Figure 5. The difference between weather and climate



Source: <https://www.dreamstime.com/weather-versus-climate-vector-illustration-educational-differences-diagram-nature-measurement-scheme-temperature-days-image162882783>

Step 3. Evidence of climate change

Input presentation

- Present Slide 5 (Presentation 1.1 – Climate change and its causes) to the participants

Recent climate change vs natural climate variations

Planet Earth has witnessed many variations in its climate since the beginning. Geological records show alteration of glacial and interglacial periods. The geomorphological features, especially in high altitudes and high latitudes, exhibit traces of advances and retreats of glaciers. The sediment deposits in glacial lakes also reveal the occurrence of warm and cold periods. The rings in the trees provide clues about wet and dry periods. Historical records describe the vagaries in climate. All these pieces of evidence indicate that changes in climate are a natural and continuous process. Historical records of crop yield or crop failures, floods and migration of people are very telling of the effects of the changing climate.

However, despite natural periodic climatic changes over millions of years, since the mid-20th century, humans have been exerting an unprecedented influence on the Earth's climate system, causing changes on a global scale.

IPCC 2007: “Climate change is a global phenomenon. Climate change refers to changes in the climate that are directly or indirectly attributed to human activities. This causes changes in the composition of the Earth's atmosphere, which are over and above the natural variability in climate.”

There is a widespread consensus in the scientific community that recent climate change is caused to a large extent by greenhouse gas emissions caused by human activities. Natural factors play only a secondary, minor role (e.g., volcanic eruptions, changes in solar irradiation or changes in the Earth's rotational path). To mitigate the ongoing climate change, human beings all over the world will have to drastically reduce greenhouse gas emissions.

Gradual climate change vs. extreme weather events

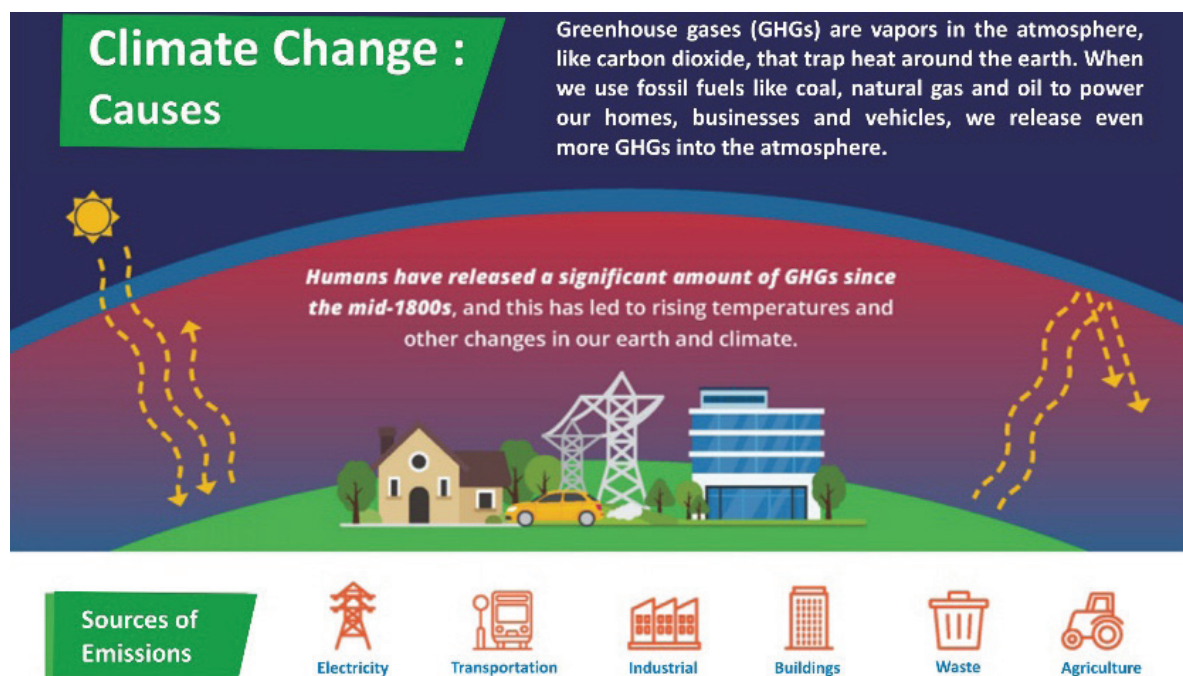
In addition to the gradual changes in trends (of temperature, precipitation, humidity, sea level, etc.) over longer periods of time, the increase in extreme weather events is another facet of climate change. There is a widespread understanding that these extreme weather events are influenced by higher average temperatures and are thus indirectly linked to human greenhouse gas emissions. Extreme weather events include floods and droughts, cyclones, hurricanes and tornados, heatwaves, thunderstorms, hailstorms and dust storms, fog or cold waves.

Step 4. Causes of climate change

Input presentation

- Present Slide 6 (Presentation 1.1 – Climate change and its causes) to the participants

Figure 6. Climate change causes



Source: GEAG's illustration, 2021

Natural factors: can be grouped into astronomical and terrestrial causes. The astronomical causes are the changes in solar output associated with sunspot activities. Like the Moon, the Sun also has sunspots. Sunspots are dark and cooler patches on the sun which increase and decrease cyclically. According to meteorologists, when the number of sunspots increases, cooler and wetter weather and greater storminess occur. A decrease in sunspot numbers is associated with warm and drier conditions. Yet, these findings are not statistically significant. Under terrestrial causes, volcanism is considered another cause of climate change. Volcanic eruptions throw up lots of aerosols into the atmosphere. These aerosols remain in the atmosphere for a considerable period of time, reducing the sun's radiation from reaching the earth's surface. After the volcanic eruptions, the average temperature of the earth fell to some extent for some years.



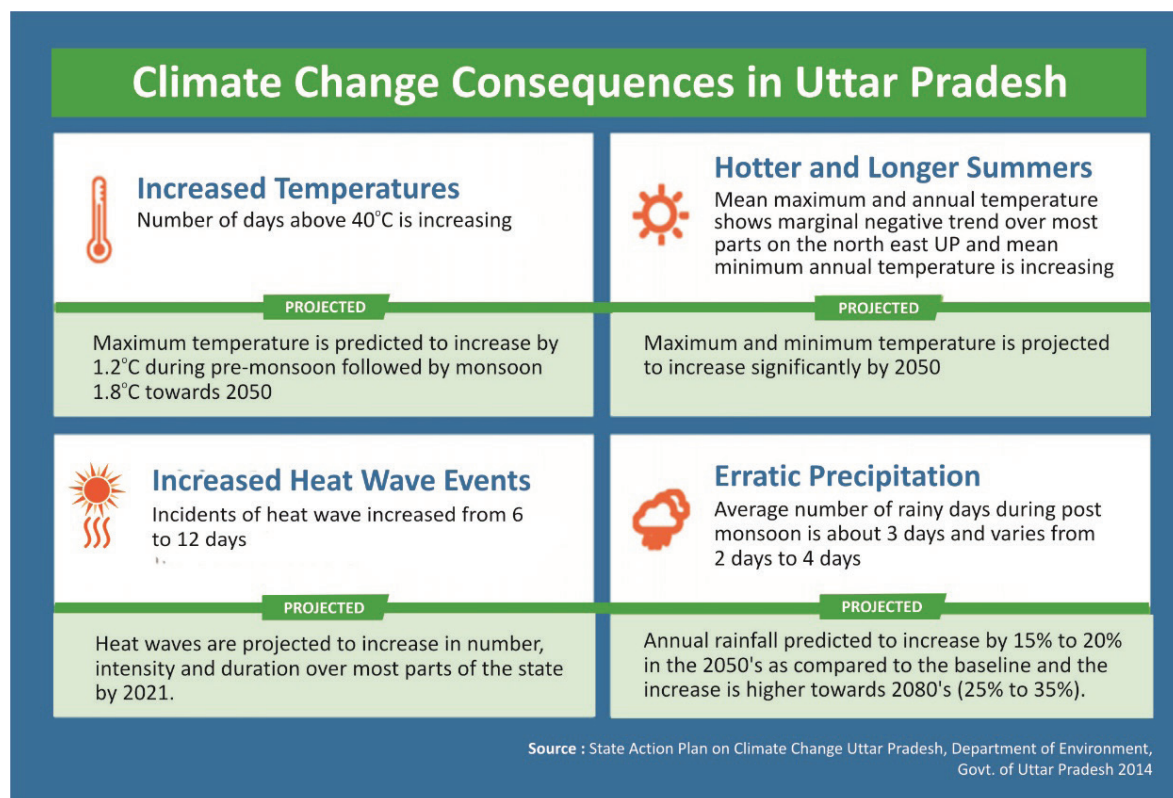
Anthropogenic factors: Anthropogenic (man-made) causes are majorly responsible for the ongoing climate change. The unplanned convergence of infrastructure along with improper land use has exacerbated the levels of greenhouse gases (GHGs) in the atmosphere, which is causing global warming. This rise in GHGs is causing a rapid shift in the climate pattern of a region, which is followed by the creation of a scenario for the occurrence of extreme weather events like untimely and incessant rainfall, drought, hailstorm, flood etc. leading to the devastation of farm and livelihood. The above-mentioned events disrupt the healthy environments of villages because rural areas are the most unprepared and underdeveloped sections of a community.

Step 5. Climate change scenarios in the past and projections for India and UP

Input presentation

- Present Slide 7 (Presentation 1.1 – Climate change and its causes) to the participants

Figure 7. Climate change consequences in Uttar Pradesh



- If time allows, you can show the video on “Global climate change scenarios in the past and projections for India”. Please find the video online here:

<https://www.youtube.com/watch?v=O5bWYMAAduU&t=95s>

Group discussion

- Encourage the participants to discuss gradual climate change and extreme weather events that they have observed in their regions in the past.

Guiding questions:

1. Were you experiencing the consequences of climate change a decade ago in the same way you are now?
2. What is impacting the village more adversely – instantaneously changing weather or gradually changing climate?
3. You are going to put efforts into controlling: What type of anthropogenic factors will you control at the local level to help reduce climate change?

Useful literature

- National Ocean Service: What is the difference between weather and climate? Available at: https://oceanservice.noaa.gov/facts/weather_climate.html.
- Lester Barber: What is the difference between weather and climate? Available at: <https://slideplayer.com/slide/10161379/>.
- National Council of Educational Research and Training (2020-21): Fundamentals of physical geography. Chapter 12: World climate and climate change. Available at: <https://ncert.nic.in/textbook.php?kegy2=12-16>.
- Rural Agricultural Development Authority (RADA) of Jamaica: Adapting to climate change: a training manual for farmers. Available at: <https://rada.gov.jm/sites/default/files/documents/Adapting-to-Climate-Change-Farmer-Instruction-Manual.pdf>.
- Intergovernmental Panel on Climate Change: Climate Change (2007). Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_full_report.pdf.

Key take-aways

At the end of this session, participants will be able to understand:

- Difference between climate and weather.
- Various causes of climate change.
- Past and future local climate change relevant to UP.

Debriefing questions

- What are your important take-aways/messages from this session?
- Which of the presented facts do you find most relevant to your situation?
- Did the session help you understand the key scenarios and their causes for climate change? Are there any questions left unanswered?
- What is the difference between weather and climate change?



Session 1.2 Vulnerable regions, target groups and impacts of climate change in UP

Learning objective	To understand the target groups possessing vulnerability towards climate change.
Prerequisites/prior knowledge for successful participation	Knowledge on impact of climate change on Panchayat Raj Institutions (PRIs).
Total duration	60 min
Methods/exercises	Input presentation, discussing climate impacts on the lives and livelihoods and the vulnerability of the participants.
Material	PowerPoint presentation 1.2, Handout 1.2, laptop, LCD Projector
Preparation	You may update the given facts and figures on climate change and vulnerability should they no longer be up to date (status 2021).

Approach

The Scoping Assessment of Uttar Pradesh 2020 undertook a rigorous analysis of climate- and disaster-related data along with socio-economic and developmental indicators to identify the most vulnerable agro-climatic regions in UP impacted by climate change. Further, the assessment also looked at identifying key sectors and the target groups that are most vulnerable to the impacts of climate change. This section explains the regions, sectors and target groups that are vulnerable to climate change impacts in UP.

Input presentation

- Present Slides 3–13 (Presentation 1.2 – Vulnerable regions, target groups and impacts of climate change in UP) to the participants

General introduction: Identification of vulnerable regions, target groups and impact of climate change on village development (Slides 3–4)

The increase in temperature which leads to an increase in aridity index and decrease in rainfall caused by climate change leads to a significant level of socio-economic disruption and environmental degradation of the rural areas. On the basis of the recorded timeline of extreme events due to climate change, researchers claim a shortage of availability of water, energy and food in the future in the state of Uttar Pradesh. The Panchayat Raj Institution (PRI) are not only left with the brunt of managing human impacts of extreme events like heat waves, cold waves, floods, droughts, etc. in the form of disaster response, but the PRIs are also responsible for executing efforts for the management of long-term impacts of hazards like vector- and water-borne diseases in extreme events, food shortages in droughts, livelihood losses caused to farmers in case of floods or droughts, pest attacks, fires, etc.

The PRIs are the key to enhancing the climate resiliency of a village by integrating the measures of mitigation and adaptation and aligning the concerns of climate change resiliency into the development activities. The Gram Panchayat Development Plan (GPDP) is the basic unit of developmental planning which is a platform for the convergence of various schemes and programmes. Appropriate planning and capacity building on GPDP is crucial for PRI-members. The utilization of large-scale resources of the National Rural Employment Guarantee Act (MGNREGA) on the basis of GPDP priorities by PRI-members can upscale village development by enhancing disaster and climate resiliency of the village.

Impacts of climate change on rural development in Uttar Pradesh (Slide 5)

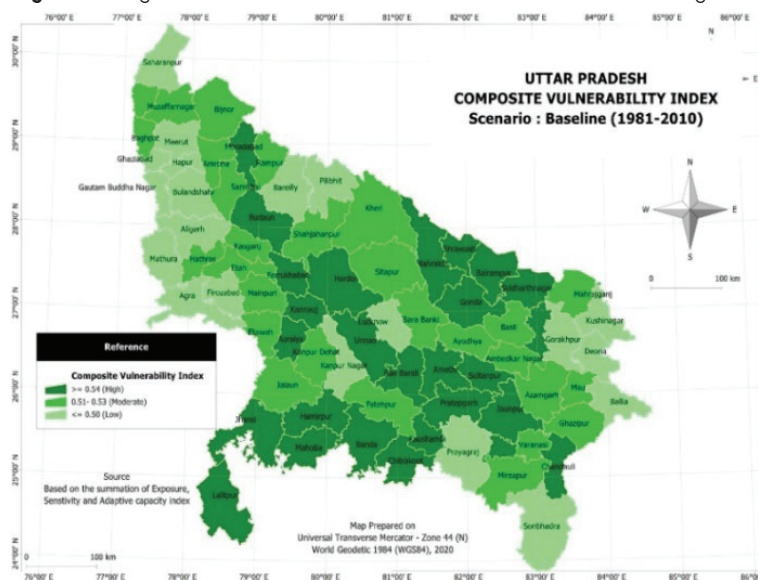
Increasing vulnerabilities due to climate change are multi-dimensional and interlinked. It varies across locations, sectors, communities, households and individuals (gender). Over the past decades, Uttar Pradesh has witnessed recurrent hydro-meteorological hazards like floods, droughts, heatwaves, cold waves and extreme rainfall that have not only impacted the people but also have dragged behind the development of the state.

Owing to the dependency of villages on the utilization of natural resources for their livelihoods, they are more at risk because climate change is consistently causing a decline in the availability of natural resources. Some of the commonly encountered impacts of climate change experienced in villages of Uttar Pradesh are: decline in the availability of drinking water and irrigation water as freshwater streams and groundwater are adversely impacted in drought, discontinuation of education and damage to school infrastructure, damage to the communication network and power supply, livelihood risk due to shortage of natural resources, health risk due to changes in water-borne & vector-borne diseases, damage to assets – housing and infrastructure. The above-mentioned impacts of climate change are experienced in urban as well as rural areas but rural areas, being underdeveloped, are more heavily impacted due to extreme events. These increasing impacts of climate change in villages can be countered by PRIs through the adoption of a few steps like – sensitization of the Village Disaster Management Committee (VDMC) to how climate change impacts their livelihoods in the form of floods, droughts, rainfall, etc.; availability of water, food and energy as VDMC is the most important player in enhancing the disaster resiliency of villages, ensuring the maintenance of water supply and drainage system in the village before the flood season, developing spatial and temporal databases for water quality surveillance and evaluation, bolstering national health schemes and programmes in the village through GPDP for curbing the spread of diseases in extreme events, etc.

Regions of Uttar Pradesh vulnerable to climate change (Slides 6–10)

Uttar Pradesh is one of the most vulnerable states in India in terms of climate change impacts. As per the scoping assessment report of 2020 conducted under the aegis of Directorate of Environment, Govt of Uttar Pradesh, different categories of vulnerability were determined to all the 75 districts of the state to the climate-induced risks. About 27 districts are categorized as highly vulnerable to climate risk, 28 districts as moderately vulnerable, and 20 districts as less vulnerable (see Figure 2). This categorization of districts was made based on analysis of past observation data of climate exposure (30 years) and future scenario of climatic components of precipitation and temperature (2050), current level sensitivity and adaptive capacity of the respective districts.

Figure 8. Regions of Uttar Pradesh vulnerable to climate change



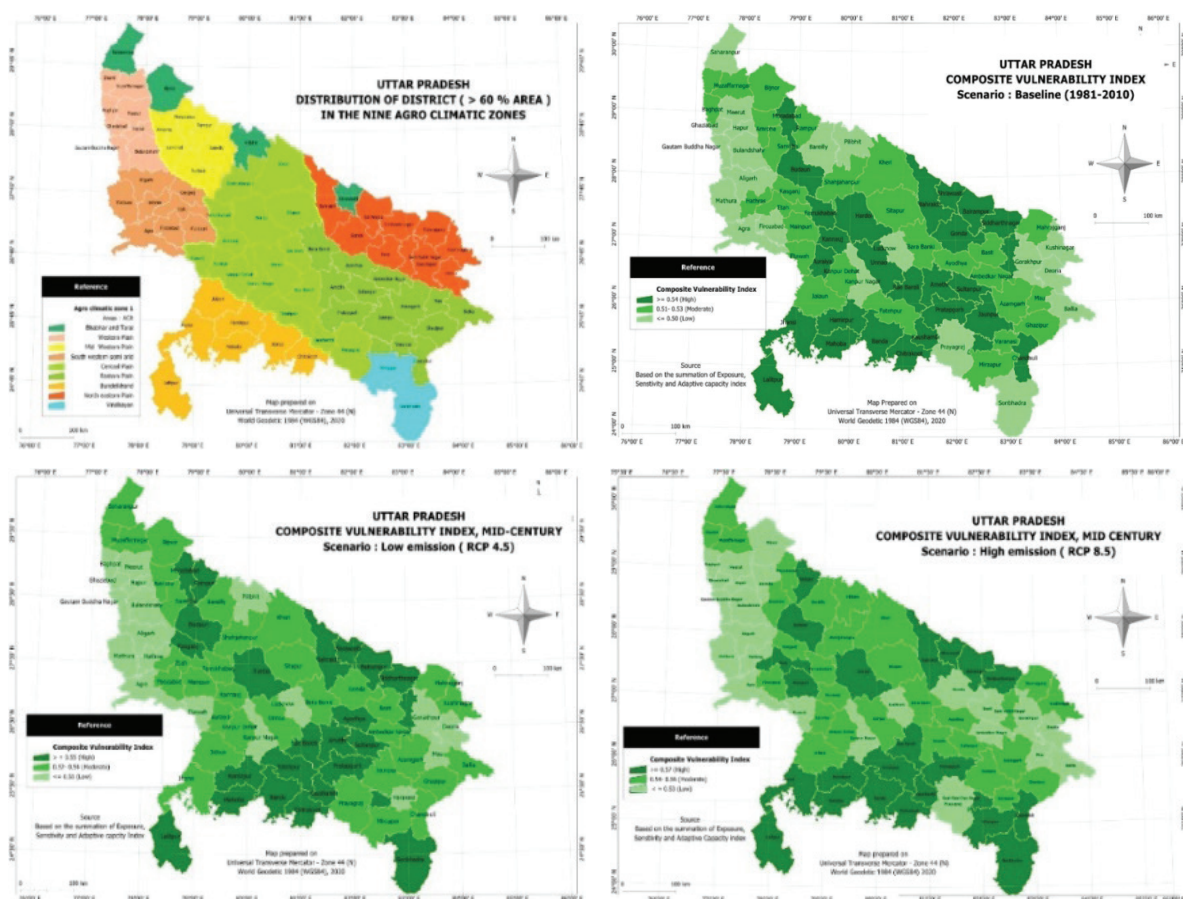
Source: Scoping Assessment of Uttar Pradesh, 2020

As per the scoping assessment report, currently, the Bundelkhand region and north-eastern plains are the most vulnerable regions of the state in terms of climate-induced risks. About 85.41% area of the total Bundelkhand region is above the state average CVI (0.53). In the north-eastern plains, the percentage value of vulnerable areas above the state average is about 67.68%.

At the district level, the Chitrakoot district of the Bundelkhand region is the most vulnerable in the state. Its composite vulnerability index (CVI) is 0.60. The district Bahraich, Shravasti and Siddharthnagar of the north-eastern plain region collectively ranked the second-most vulnerable areas in the state having a CVI of 0.59. The reasons behind the higher vulnerability score of these districts are its higher sensitivity index and lower adaptive capacity to respond to climate change impacts. The district Muzaffarnagar, Shamli, Baghpat of the western plain region, Sambhal, Rampur, Amroha, Shahjahanpur of the mid-western plain region, Hathras, Etah, Kasganj and Mainpuri of the south-western semi-arid zone, Etawah, Kheri, Sitapur, Kanpur Dehat, Fatehpur of the central plain zone, Barabanki, Ayodhya, Ambedkarnagar, Azamgarh, Mau, Ghazipur and Varanasi of the eastern plain region, Jalaun and Mirzapur of Bundelkhand, Basti and Maharajganj of the north-eastern plain zone are categorized as moderately vulnerable.

In the low vulnerability category, there are 18 districts. Districts like Saharanpur, Ghaziabad Hapur G.B Nagar, Bulandsahar, Aligarh, Mathura, Agra, Firozabad, Bareilly, Pilibhit, Kanpur Nagar, Prayagraj, Gorakhpur, Kushinagar, Deoria, Ballia and Sonbhadra have a higher adaptive capacity. Consequently, they are less prone to climatic risks.

Figure 9. Agro-climatic regions of UP and Current and Future Composite Vulnerability Index



(Source: Scoping Assessment of Uttar Pradesh, 2020)

Targets groups of vulnerable regions possessing vulnerability towards climate change (Slide 11)

The vulnerability assessments done for all 75 districts of UP with respect to sensitivity and adaptive capacity by computing CVI in different agro-climatic regions of UP have indicated that the impact on vulnerable groups has been at various levels – household, community, farm, village and ecosystem levels. One of the target groups most impacted by climate change at the village level is Panchayat Raj Institutions (GPDP – agriculture and allied, water resources and DRR). At the target group level of PRI, the most affected sectors due to climate change are the agriculture and allied (animal husbandry, horticulture, agriculture) after getting impacted by floods and drought causing a threat to food security and livelihood opportunities; second is the water resources sector comprising of groundwater, surface water and irrigation water, which gets adversely impacted in the regions of Bundelkhand & Vindhyan due to drought; third is the cross-sectoral component of disaster management – which after the occurrence of extreme events – disrupt the healthy run of the entire village.

Group discussion: Participants' experiences of felt climate change impacts in their villages (Slide 12)

- Ask the participants to share their experiences of felt climate change impacts in their lives and livelihoods. For this, group the participants according to their home districts (place a chart beforehand with the names of districts under different agro-climatic regions (see Presentation 1.2 Slide 7) and encourage the group to discuss:
 - a. How are you going to identify the target groups and vulnerable regions in your village (by using your observational and past experience-related skills)?
 - b. What are the climate change impacts your village is facing?
 - c. What are the geophysical reasons (topography, spatial location, gradients/drainage, water conditions/regimes, etc.) that enhance the impact of climate change?
- After a 10-minute discussion, ask the participants to present one example/story of how they have felt about climate change in the last 10 years (in terms of festivals, dressing, marriages, times of fruiting, etc.) to the other groups.

Useful literature

- GEAG (2020): Report of the Scoping Assessment in Uttar Pradesh. Available on request from GIZ.

Key take-aways

- At the end of this session, participants will be able to understand how climate change is impacting different agro-climatic regions of UP, e.g., in the dry regions of Bundelkhand or the flood-affected areas of Terai/NE plains, etc.

Debriefing questions

- What are your important take-aways/messages from the session?
- Which of the presented facts do you find most relevant for your situation?
- Did the session help you understand the key impacts of climate on different agro-climatic regions of UP? Are there any questions left unanswered?



Module 2. Climate change impacts and related risks

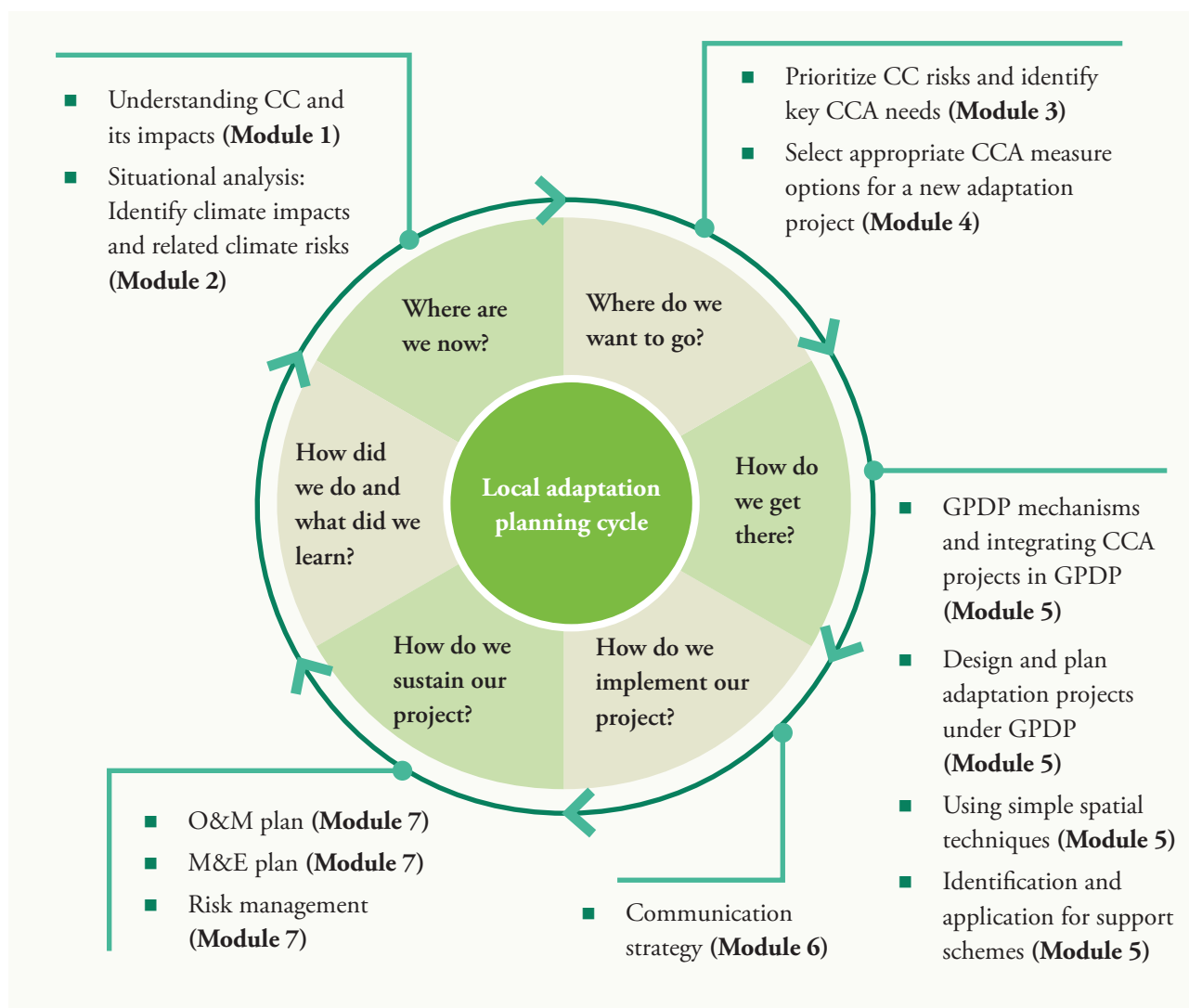
Learning objective	To understand and identify climate risks for developmental activities related to the agriculture and allied sector, water resources and disaster risk reduction (DRR) at the Gram Panchayat (GP) level
Duration	Shortest version: 60 min Complete version: 4 h Potential complete version at the field level (including site visits): 6 h

Module planner

Duration	Sessions	Shortest version	Complete version
60 min	Session 2.1 Experience sharing on the impact of climate change on development interventions related to agriculture, water resources and DRR at village level.	x	x
3 h	Session 2.2 Assessing the impacts of climate change and identifying related risks to the lives and livelihoods of rural communities.		x

Integration of Module 2 along the local adaptation planning cycle

The methodology used by the Capacity-Building Package follows the logical processes of local adaptation planning. The figure on the right shows the arrangement of the modules of the CDP, their main steps and methods employed. The yellow colour indicates that you are in Module 2 and Step 2 of the Local Adaptation Planning cycle, which guides participants to understand and identify climate risks to developmental activities related to agriculture and allied sectors, water resources and disaster risk reduction (DRR) at the Gram Panchayat (GP) level. Through the sessions of Module 2, the facilitator will motivate the participants to share their experiences on the impacts of climate change interventions related to agriculture, water resources and DRR in the local context, and guide them to access the impacts and risks of climate change on the lives and livelihoods of rural communities. This will provide participants with important background knowledge that will help them identify their needs and CCA interventions in the next modules. In the ExcelTool, you will find a tab in the same yellow colour. Here you can document the results achieved by your group of participants in Module 2.



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Session 2.1 Experience sharing on the impact of climate change on development interventions related to agriculture, water resources and DRR at the village level

This session will cater to Phase-1 of the GPDP development process which focuses on environment building with communities.

Learning objective	To understand climate change impacts in different agro-climatic regions of UP and its impacts on the lives and livelihoods of rural communities (focusing on the agriculture and allied sector, water resources and DRR).	
Prerequisites/prior knowledge for successful participation	Understanding of the agriculture and allied sector, water resources and DRR.	
Steps (duration)	Step 1. Apprising about climate change in Uttar Pradesh.	40 min
	Step 2. Developing an understanding of climate impacts at infrastructure, natural resources and community level.	20 min
Total duration	60 min	
Methods/exercises	Input presentation; discussing experienced climate change variations and their impact on the infrastructure level, the natural ecosystem and the communities in the villages of the participants.	



Material	Laptop, LCD Projector, Handout 2.1, PowerPoint presentation 2.1, whiteboard, chart paper and markers.
Preparation	You may prepare a list of questions focusing on what is affected, who is affected and when they were affected, facilitating the group exercise in Step 2.

Step-by-step approach

This session will be divided into two steps:

In **Step 1** (apprising about climate change in Uttar Pradesh), the participants will learn in detail about how the climate has changed over time at a local level, what the major problems associated with cropping patterns are, the status of water resources and the nature of hydro-met disaster and how all this relates to climate variability. Building on what they have learned, in **Step 2**, participants share their own experiences of how they are affected by climate change, looking at three different levels: infrastructure, natural resources and community.

Step 1. Apprising impacts of climate change in Uttar Pradesh

Input presentation

- Present Slides 3–8 (Presentation 2.1 – Experience sharing on impact of climate change) to the participants.

Climate change impacts in UP:

- The impacts of climate change are being manifested in the form of extreme weather events, heat waves, drought, destruction of agriculture, increased risk of wildfires and flood and storm surges.
- Agriculture is the key sector to provide livelihood and employment opportunities and support in the social transformation and economic development of a society.
- Climate variability/changes affected agriculture, food supply and livestock due to frequent flooding, scarcity of irrigation water, increased pest attack, diminishing fodder availability, pastureland and deforestation.

Agro-climatic region-wise climate change vulnerabilities in UP

Table 3. Climate vulnerability in UP in different agro-climatic zones

S.No	Agro climate zones	Current % of vulnerable areas	Future Vulnerable area % in 2050 (4.5 emmision scenario)	Future Vulnerable area % in 2050 (8.5 emmision scenario)
1	Western plain zone	0	30.58	0.0
2	Mid western plain	36.32	56.03	63.9
3	Central Plain zone	52.40	46.06	57.7
4	Bundelkhad	85.41	85.41	85.4
5	Eastern Plain zone	50.89	35.06	25.6
6	North eastern Plain zone	63.68	41.63	36.4
7	Bhabhar and Tarai	12.08	12.08	12.1
8	South Arid zone	0	8.72	31.9
9	Vindhayan	0	61.05	100.0

(Source: Scoping Assessment of Uttar Pradesh, 2020)

Table 4. Linkages between climate change exposure and adaptation

Exposure	Sensitivity	Adaptation
<ul style="list-style-type: none"> • Number of heavy rainfall days (in days). • Extremely wet days. • Percentage of warm days. • Number of consecutive dry days (in days). 	<ul style="list-style-type: none"> • Percentage of landholding below 1 hectare. • Number of critical, semi-critical and overexploited blocks in groundwater utilization. • Percentage of net sown area to reporting area. • Percentage of gross irrigated areas to gross area sown. • Dependency on agriculture sector in percentage. 	<ul style="list-style-type: none"> • Percentage of the population dependent on non-farm activities. • Crop insurance. • Crop diversity. • Percentage of forest coverage. • Total length of pucca roads per lakh population (in km). • Livestock development centre per lakh of livestock.

Impact of climate change: Priority sectors in different agro-climatic regions of UP

Bundelkhand: The increasing number of consecutive dry days, depleting groundwater table, low percentage of irrigated areas to the gross sown area, low urbanization rate, higher dependency on agriculture and poor financial inclusion index are the key factors in making this region the most vulnerable in the state. Bundelkhand region clearly shows that the agriculture, disaster management and water resources sectors are majorly impacted by climate change and need urgent attention. The horticulture and animal husbandry sectors also emerged as vulnerable sectors in the region. Both these sectors are closely linked with agriculture as allied activities so these were clubbed under agriculture and allied activities. Due to changes in the rainfall pattern and increasing maximum temperature, irrigation systems in the region are severely impacted; thus, Bundelkhand emerged as an important vulnerable sector. Since the water resources sector was prioritized as one of the most vulnerable sectors in the region, the irrigation sector was merged with water resources.

Vindhyan: In the Vindhyan region too, due to climate change impacts, the region experiences drought and floods both due to the increasing trend of heavy rainfall episodes in a short period and increasing dry spells during the monsoons. Both these factors have affected rural livelihoods and the resources utilization pattern in the region harshly. The changes in future projections of the rainfall pattern (more dry days and erratic rainfall) and the increasing maximum and minimum temperature show up prominently. Altogether, increasing climate exposure and higher dependency on agriculture, poor irrigation systems and low levels of urbanization, etc. have further exacerbated the vulnerability of the region. Thus, from the sector vulnerability analysis done in the Scoping Assessment of UP 2020, Agriculture, disaster management and water resources were identified as major sectors impacted by climate change that need to be prioritized for planning climate interventions. Horticulture and animal husbandry were also identified as vulnerable sectors which were clubbed under agriculture and allied activities. Irrigation also emerged as one of the climate affected sectors and clubbed with the water resources portfolio which included surface and groundwater and irrigation.



***Bundelkhand and Vindhyan** regions are similar in agro-climatic characteristics and hence, the climate change impacts on the priority sectors – Agriculture, Water Resources and Disaster Management – in these two regions are also not different. Marked by being water-stressed with scanty rainfall and low groundwater recharge, both the regions suffer from droughts, hitting the agriculture sector the hardest. High evapotranspiration due to the increase in temperature leads to an increase in the aridity index-which ultimately adversely impacts water availability. The declining trend in rainfall leads to increase in migration, public adversities and bad agricultural growth. Not only is a decrease in the amount of rainfall observed but the number of rainy days has also decreased significantly in the regions that urgently call for efficient irrigation practices. The increase in dry spells have adversely impacted the soil quality in the regions.*

(Source: Regional Expert Consultations in Bundelkhand and Vindhyan regions).

North-eastern plains: This region is prone to recurrent floods and is highly dependent on the agriculture sector. The sectoral analysis done in the Scoping Assessment in UP, 2020, in the north-eastern plains identified agriculture and horticulture as the most vulnerable sectors which were clubbed under agriculture and allied activities including horticulture and animal husbandry. Disaster Management was another sector that emerged in this region which needed priority attention. The third affected sector was water resources including irrigation which was impacted by climate change and requires interventions.

Group work: “My village” (Slides 7–8)

- Divide the participants into four groups and each group will deal with one question each as shown below (they can use the table on worksheet 1 of handout 2.1 to collect the results of the group work):
 1. **Group-1:** Ask participants to brainstorm on their experiences of having felt the change in climate over the past several years. For this, ask them to list out the main festivals celebrated by them across the year (at least four festivals to cover all four seasons). Ask the participants to write their observations on how the change in weather is being felt now in comparison to what it was 10–15 years ago.
 2. **Group-2:** Ask the participants to list the problems that they come across in farming. Once listed, facilitate the participants to see which problems relate to climate variability.
 3. **Group-3:** Ask the participants to list down water-related problems in the village, for instance, waterlogging, water scarcity, quality issues, degrading underground water table, etc. Once listed, facilitate the participants to see which problems relate to climate variability.
 4. **Group-4:** Ask participants to list down the major hydro-met problems in village, for instance, flash floods, long dry-spells/droughts, etc. Once listed, facilitate the participants to see which problems relate to climate variability.
- Finally, ask the participants to present their group discussions in the plenary and see how all the four aspects are connected and have an influence because of climate variability.

Climate observations Month	Earlier			Now		
	Temperature	Rainfall	Humidity	Temperature	Rainfall	Humidity
Jan (Khichadi)						
Feb						
Mar (Holi)						
Apr						
May						
Jun						
Jul						
Aug (Janmashtami)						
Sep						
Oct (Dussehra)						
Nov (Diwali)						
Dec						

Step 2. Developing an understanding of climate change impacts at infrastructure, natural resources and community level

Group exercise (Slides 10–14)

Rural areas are prone to climate-induced disasters due to their dependency on weather and primary production activities for their livelihoods. Observation records from macro- to micro-level have provided a lot of evidence showing that climate change has negatively impacted agriculture, food production, natural resources and livelihoods in rural areas. In this session, the participants will be guided to identify the impacts of climate change on infrastructure, natural resources and most importantly at a community level with a participatory way of interaction. In Step 1, the participants have learnt in detail about how the climate has changed at a local level over time, what the major problems associated with cropping patterns are, the status of water resources and the nature of hydro-met disaster and how it is connected to climate variability.

- Now with this background information, ask the participants to recall the major hydro-met signature events (floods, droughts, extreme rainfall, hot waves, cyclonic storms, etc.) that have occurred in the respective regions of the participants over the last five years (it may be year-wise) and write them on a whiteboard in a tabular format. To collect their results, participants can use Worksheet 2 of Handout 2.1.
- Finally, ask the participants to compile the information for further reference and discussions.

Major hydro-met disasters in the last five years	
Year	Nature of signature disaster events
2020	
2019	
2018	
2017	
2016	



- With this initial information, divide the participants into three smaller groups of 5–10 persons for further discussion. They should be provided with chart paper and markers and a list of questions (focusing on what is affected, who is affected and when they were affected) to discuss in their groups the impact of disasters noticed over the last five years on the following three levels (examples of facilitating the discussion are given below):
 - At the infrastructure level
 - At the natural resource level and
 - At the community level
- Encourage each group to jot down inferences of their discussions on the chart paper. To collect their results, participants can use Worksheet 3 of Handout 2.1
- Once all the groups have finished their assigned group task, invite them individually to present their conclusive points. During the group presentation, encourage other group-members to express their views on that particular subject and ask the presenter to incorporate their points in their exercise sheet. Repeat the same process with other groups and then finally, the facilitation should compile the information into the format of the following table for further processing.

Impact of disaster on the following three levels:

Disaster-1: Flood (Example)

What?	Who?	When? (Month)	How were they impacted?
Infrastructure level			
Roads	Village residents, especially vulnerable people, e.g., women, children, elderly people	July, August	Submergence of low line roads, damaged, fully washed out, transport networks affected
Drains	Local drainage channels/systems		Inundated/damaged
Electricity	Village residents, mainly weaker groups who don't have any other option of electricity, e.g., solar light		Power supplies disrupted due to damage of electric polls
Houses	Village residents, especially those HHs having kaccha house		Several houses were inundated, damaged (fully/partially)
Buildings	Community buildings like AWC, Panchayat Bhawan, schools, etc.		Several houses were inundated, damaged (fully/partially)
Natural ecosystem			
Water bodies	Ponds, natural water streams, etc.		Contaminated floodwater polluted the water bodies
Natural vegetation	Trees, plants, scrubs, etc.		Trees uprooted by high-velocity water flow, other vegetation also either washed out or destroyed
Groundwater level			Contamination of groundwater due to waterlogging
Open land	Grazing land, common land etc.		Inundated, loss of grazing land

What?	Who?	When? (Month)	How were they impacted?
Agriculture land	Farms/fields of villagers, backyard land		Inundation, crop loss, silt and sediment destroyed crops on farms
Community			
People	Most vulnerable groups (socio-economic, gender, age, location etc.)		People injured or killed by the flooding, services disrupted such as hospitals, schools etc., workload has been increased on women due to male migration, food insecurity, drinking water unavailability
Income	Agricultural labour		Unavailability of daily wages caused distress migration
Own land/ house	Village residents		House/Property losses
Agriculture activities	HHs		Agricultural activities were forced to shut down due to inundation in the farm field

Useful literature

- Panchayati Raj Department, Govt of UP (2019–19): GPDP Training Guidelines. Available at: http://panchayatiraj.up.nic.in/pblc_pg/Schemes/GramPanchayatDevelopmentPlan.
- GEAG (2020): Scoping Assessment of Uttar Pradesh, 2020. Available on request from GIZ.

Key take-aways

- At the end of this session, participants will have an understanding of the impacts of climate change on their lives and livelihoods, on the agriculture and water sectors and also the linkage between hydro-met disasters and climate change.

Debriefing questions

- What are your important take-aways from this session?
- Which outcomes of the session do you find most relevant to your work?
- How did the session and exercise support you in understanding climate change impacts and associated risks relevant to your work? Are there any questions left unanswered?

Session 2.2 Assessing the impacts of climate change and related risks to the lives and livelihoods of a village community

This session caters to Phase 2 of the GPDP development process, which focuses on situational analysis of the village.

Learning objective	To identify climate risk impacts in a specific agro-climatic context on the lives and livelihoods of a village community
Prerequisites/ prior knowledge for successful participation	Hands-on experience and earlier participation in village development in a specific agro-climatic setting



Steps (duration)	Step 1. Identifying relevant climate hazards	30 min
	Step 2. Determining the negative impacts of climate hazards	75 min
	Step 3. Identifying the risk of climate change impacts	15 min
Total duration	2 h	
Methods/exercises	Identifying past and future climate hazards, transect walk, causal loop diagram, creating a climate impact chain	
Material	PowerPoint presentation 2.2, Handout 2.2, laptop, LCD projector, flip chart, post its, markers, cards, transect walk video	
Preparation	Prepare a transect walk video showing a common village to facilitate the exercise in Step 2	

Step-by-step approach

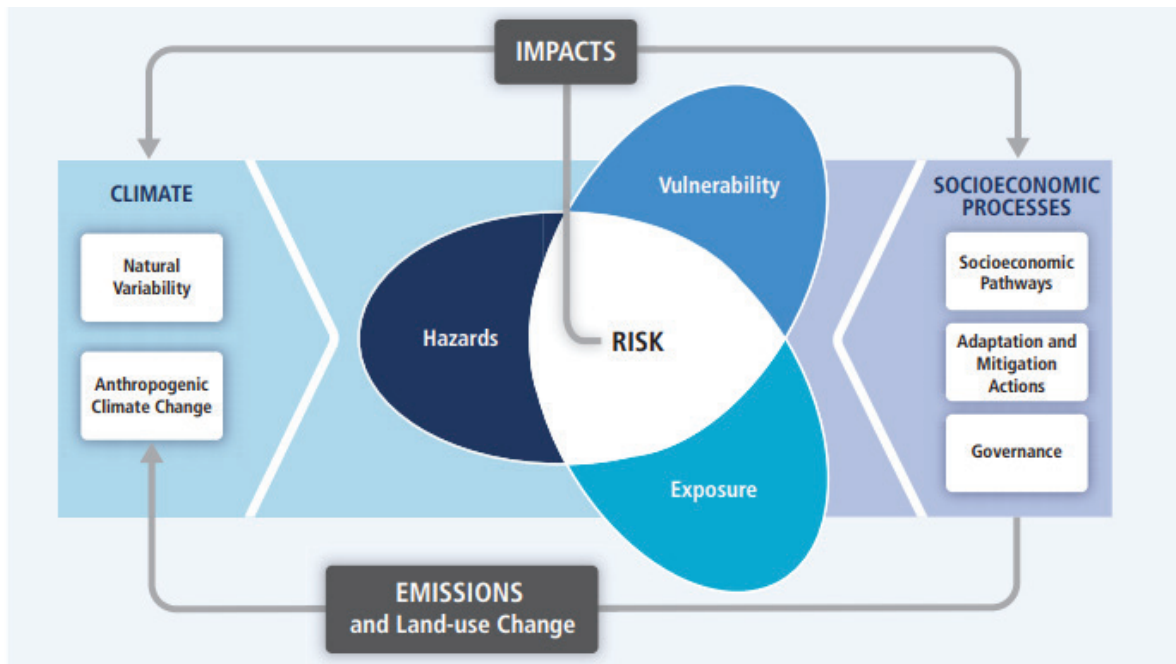
After learning about past and future climate hazards and the vulnerability of village communities in Module 1, participants are guided through the essential steps to determine their own climate impact chain and assess related climate risks for their own lives and work environments. In **Step 1**, relevant climate hazards are identified based on which climate impacts are determined in **Step 2**. Two approaches are used for this: first, the negative climate impacts are identified by assessing the exposure of different elements in one's own village as well as the exposure of different seasonal farm activities.

Input presentation

- Present Slide 3 (Presentation 2.2 – Identifying climate impacts and related risks) to the participants.

The figure below shows the interrelationship of climate change risks/impacts at the intersection of hazards, vulnerability and exposure. The risk of climate-related impacts increases with increasing climate-related hazards (including hazardous events and trends) (left side of the figure) in relation to the vulnerability and exposure of human and natural systems. Socio-economic processes (right side of the figure) cause additional emissions and land-use changes and can thus exacerbate climate change. On the other hand, socio-economic processes such as adaptation and mitigation measures can reduce vulnerability and exposure and thus reduce climate risk.

Figure 10. The risk of climate-related impacts results from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems.



Source: IPCC 2014

Climate impact: Consequences that result from the climate event or change or climate-related modifications of ecosystems. There are two types of impacts: direct impacts that are immediate consequences of climate change trends and events, e.g., a greater number of drought events mean water scarcity and crop loss; and indirect impacts, which are a result of direct impacts, e.g., water scarcity leads to water-borne diseases (human and livestock health), crop loss leads to food insecurity and migration, indebtedness, etc.

Risks: The potential for consequences of hazards [= impacts] where something of value is at stake and where the outcome is uncertain.

The risk of climate-related impacts results from the interaction of climate-related hazards (=climate change trends and extreme events) with the vulnerability and exposure of human and natural systems. Risk = F (Hazard, Exposure, Vulnerability).

Climate hazards: A physical process or event resulting from climate change (e.g., heat, flooding, landslides) that cause negative impacts on people, their assets and their livelihoods.

Exposure: Who/what element is under threat/impacted by the hazard? Examples: smallholder farmers, village XY.

Vulnerability: Why is the element susceptible to this threat? Examples: poverty, lack of knowledge. Vulnerability has two parts:

- Sensitivity: Attributes that determine whether/how strongly a hazard will affect the element under consideration (e.g., drinking water availability, poverty, water quality).
- Capacity: Focusing on the a) *coping capacity*: ability to respond to current/future hazards and b) *adaptive capacity*: ability to prepare for current/future hazards.



Step 1. Identifying relevant climate hazards

Input presentation

- Present Slides 4–6 (Presentation 2.2 – Identifying climate impacts and related risks) to the participants.

Climate hazards: A physical process or event resulting from climate change that causes negative impacts on people, their assets and their livelihoods.

Hazards include:

- climate signals, e.g., heavy rain, change in monsoon patterns, temperature increase;
- direct physical impacts of climate signals on geophysical systems, e.g., flooding, drought, sea-level rise.





India is particularly exposed to flooding (rivers and coasts), landslides, cyclones, water scarcity, extreme heat and wildfire (for more information see Module 1).

Participatory exercise

- Ask the participants to list climate hazards that they have observed or anticipate as hazardous for their daily lives (e.g., frequent droughts, increase in dry spells, flooding, landslides, a greater number of hot days) and let them insert relevant climate hazards in the table below. To collect their results, participants can use Worksheet 1 of Handout 2.2
- If the participants get stuck, introduce them to local climate databases (for more information, find some recommendations for international databases at the end of the session.)
 - Ministry of Environment, Forest and Climate Change: State Action Plan on Climate Change. For Uttar Pradesh, available at: http://moef.gov.in/wp-content/uploads/2017/09/SAPCC_UP_final_version_0.pdf
 - Irrigation and Water Resources Department of Uttar Pradesh. Flood Management Information System Center. Available at: <http://fmiscup.in>
 - World Bank Group: Climate Change Knowledge Portal (CCKP). Available at: <https://climateknowledgeportal.worldbank.org/country/india>
 - Indian Meteorological Data, Govt of India. Available at: <https://mausam.imd.gov.in/>
- In order to assess the relevance of the listed climate hazards (e.g. drought, floods, landslides, heatwaves, dry-spells), ask the participants to put in each column /for each selected climate hazard dots for the number of villages in their home district that have been highly impacted by the climate hazard
- Give some examples, in case the participants get stuck
- After completion, ask the participants to present and discuss their findings in plenary. Ask them to analyse what climate variations they could observe in their regions and villages in the near past and currently that negatively affected their lives and livelihoods. This can be a good basis to analyse future hazards.

Hints for the trainer:

- Keep in mind the chosen geographical scope as this will likely affect the range of climate-related hazards.

Year	Droughts (Example 1)	Rain/ Floods (Example 2)	Cold waves (Example 3)	Heat waves (Example 4)	Other relevant climate hazards
					
20 years ago	•			• •	
10 years ago	• • •	• •		•	
Last year	• •	• • • •	•		•
This year		• • • •			
Anticipated for the future	•	•	•	•	

Step 2. Determining the negative impacts of climate hazards

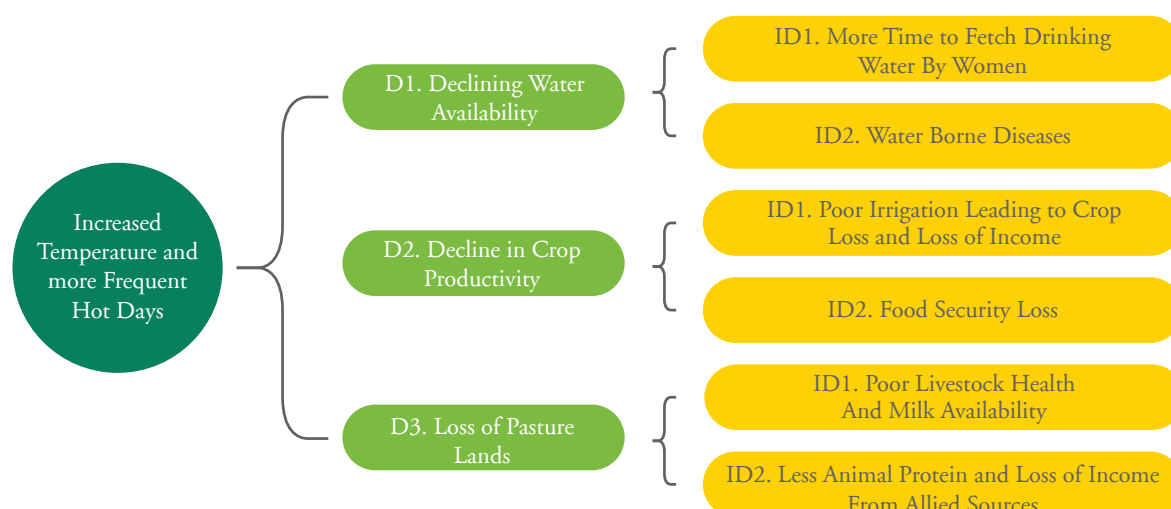
Input presentation

- Present Slides 7–11 (Presentation 2.2 – Identifying climate impacts and related risks) to the participants.

After past and future climate hazards in the participants' regions have been identified, Step 2 will guide the participants through two approaches to determine negative climate impacts on their lives and livelihoods. With the help of the results of Steps 2.1 and 2.2, the participants will be able to create their own climate impact chain (see example below). If the participants want to develop adaptation measure(s) together as the goal of the whole training course (e.g., if they come from the same village), it may make sense to create a joint impact chain. In this case, to save time, the group can be divided into two groups so that the next Steps 2.1 and 2.2 can be conducted in parallel.

Impact chain: A climate impact chain is a general representation of how a given climate trend affects, directly and indirectly, a system of interest.

Example of an impact chain:



Step 2.1 Identifying climate impacts by assessing elements under exposure to climate hazards

Input presentation

Exposure is the presence of people, ecosystems, assets or other valuable elements in places that could be negatively affected by climate-related hazards. Hence, assessing exposure is about identifying people or things in your region that are/will be threatened by climate-related hazards.

How to best identify and assess exposure

A large number of elements will be affected by hazards. Start with those that are of most value to you. Further exposure elements can be added later on.

In addition, a “**transect walk**” is highly recommended to help the participants identify people or things in their regions that are/will be threatened by climate-related hazards. A transect walk is a walkthrough of people in a given location to identify different places, people and their interaction with the environment and their experiences. This activity is usually done in a village setting and is extremely useful for local-level planning exercises like Gram Panchayat Development Plan (GPD). In the classroom, a prototype of the same may be attempted. Ideally, the facilitator may collect a 5-minute video of a particular village that can be shown to the participants during training.

Examples of different elements that may be exposed/impacted by climate hazards:

Impacts of climate change include damage to infrastructure, village-level services, production facilities or agricultural areas from floods, health impairment during heat waves, lack of drinking water for people and livestock, etc.

Table 5. Examples of different elements that may be exposed/impacted by climate hazards

Impact areas		Exposed elements
Physical infrastructure	Electricity supply and communication	Damage to supply system and communication lines
	Roads	Transport of inputs and outputs
	Ponds	Drying of ponds, reduced streamflow, less water availability
Exposed stakeholders	Small and marginal farmers	Poverty and indebtedness
	Women and children	Health and hygiene affected
Economic infrastructure	Markets	Access to market and opportunities of daily wages
	Financial institutions	Access to institutions

Group exercise: The transect walk (Slides 11–12)

- Ask the participants to watch the prepared video and evaluate the places shown from their village according to the following criteria (if the video shows another village, the participants should associate similar places from their village with the ones shown):
 - What is shown (people, objects) and
 - how are they exposed to extreme climate change weather events or changes in resource availability?
 - Guiding questions: How are households socio-economically affected by waterlogging or drought? How does water scarcity increase the cost of irrigation? How are forest dwellers and women more affected? (e.g., they need more time to fetch drinking water due to poor water availability).
- List the exposed elements/groups and the direct and indirect impacts (high, moderate, low) they face from climate change hazards using Worksheet 2 of Handout 2.2. Focus on the climate hazards that were considered most relevant by the participants in Step 1.
- After completion, encourage the groups to present their results.

Hints for the trainer:

- For the transect walk, ideally, participants from the same village are grouped together. If there are too many different villages represented among the participants, take a video of one village as an example and apply it to all villages.

Climate hazard (insert the hazards identified in Step 1)	Settlement	Forest	Barren	Settlement	Home garden	Dense forest	Canal/kul
Extreme rain events	Direct impacts on the selected element: flash floods, etc. Indirect impacts: Damage to houses and infrastructure.	Direct impacts: ... Indirect impacts: ...					

Step 2.2 Identifying climate impacts on the village and vulnerable groups

Input presentation

- Present slide 13-14 (presentation 2.2 – Identifying climate impacts and related risks) to the participants.



Group exercise: The three changes exercise

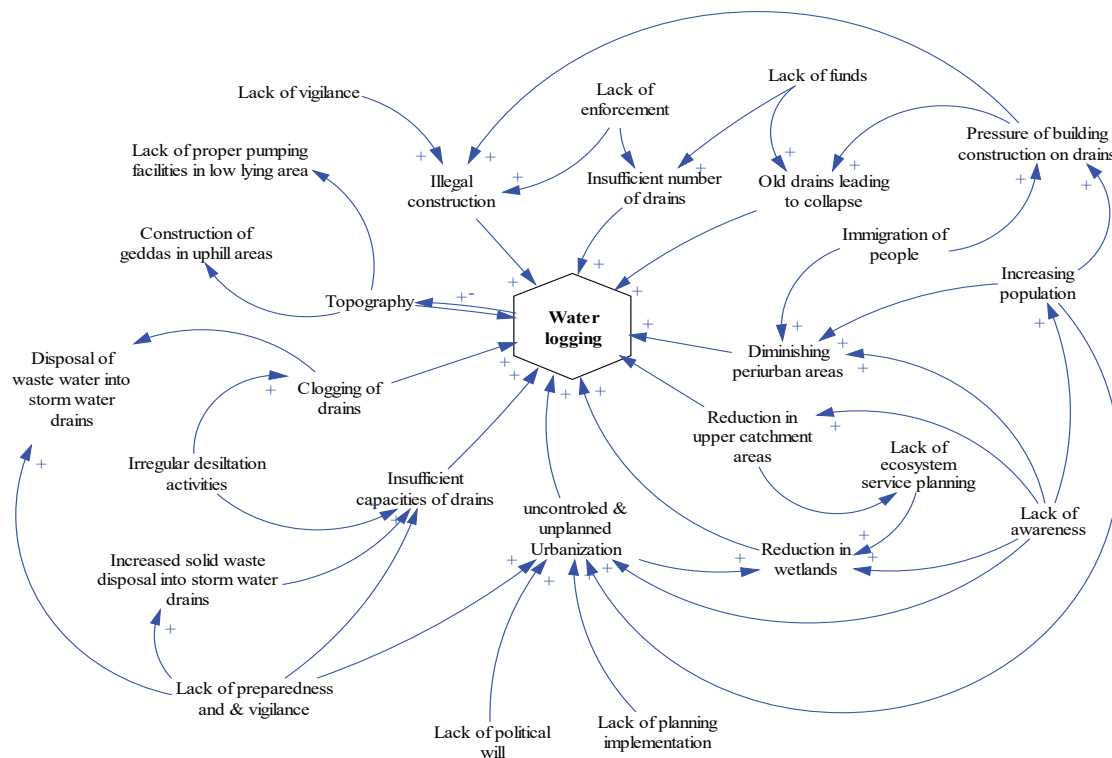
Causal loop diagrams are used to identify the primary, secondary and tertiary causes of a specific problem. It is a participatory tool where participants themselves identify the various reasons for the problem, which are directly or indirectly linked to the problem and its intensity. Although these factors may not directly link to the problem, it is important to address these factors for solving a specific problem on a sustainable basis.

This exercise will provide an understanding to participants of how climate change impacts have affected the village and a list of all the points (primary, secondary and tertiary causes) which are linked to climate change and need to be addressed in village development planning.

A causal loop diagram is one of the most important tools in visualizing how different variables in a system are interrelated. The diagram consists of a set of nodes and edges. Nodes represent the variables and edges are the links that represent a connection or a relation between the two variables. A link marked positive indicates a positive relation and a link marked negative indicates a negative relation. A positive causal link means the two nodes change in the same direction, i.e., if the node in which the link starts decreases, the other node also decreases. Similarly, if the node in which the link starts increases, the other node increases as well. A negative causal link means the two nodes change in opposite directions, i.e., if the node in which the link starts increases, the other node decreases and vice versa. Several linked causes to a particular problem related are analysed through this tool.

- Ask the participants to identify the three most significant changes which communities of the villages in the area have observed during the last 10–15 years. For example, it may be the following (or any other):
 1. Migration to cities (long-term and short-term)
 2. Major changes in cropping pattern
 3. Major change in water situation (stress, waterlogging, drying of water bodies, etc.)
- Let the participants divide into 3 groups and each of the above “changes” assigned to a group.
- Ask the participants to identify what the main reasons/causes of these problems are (e.g., income, livelihood, health, etc. for migration). This will identify the primary level of the cause of the problem (migration).
- Now ask what the cause of each of the first level of causes is (secondary causes). E.g., Income – reduced outputs in farming, livelihood- not much work in the village, etc.
- The same exercise to be continued for tertiary causes (of each of the secondary cause) for example reduced outputs in farming- lesser irrigation water, damages and losses in crops; not much work in village- agriculture labor work reduced due to machines, aquaculture not possible etc.
- Now let the participants discuss and see if any of these primary, secondary or tertiary causes are linked to climate change. Put a different color card on that cause and enlist all the causes that are linked to climate change. Also, discuss who (vulnerable groups) is most affected due to these problems and causes. They may see the example of worksheet 3 of handout 2.2.

Example of a causal loop diagram



Step 3. Identifying the risks of climate change impacts

Participatory exercise (Slides 15–17)

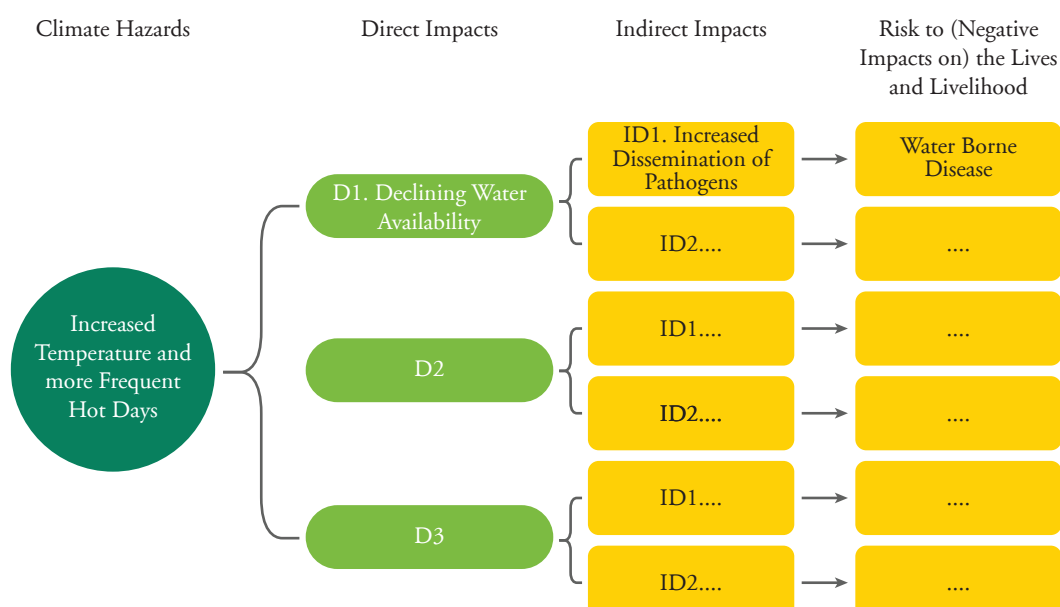
Step 3 aims at identifying relevant climate risks to the lives and livelihoods of village communities under the determined climate change scenarios and impacts in Step 2.

- Ask the participants to insert their findings from Step 1 and Step 2.1 and 2.2 in the graphic below in order to create their own climate impact chain.
- 4. Select the most relevant climate trend or event they've observed or anticipate for the future on the round field on Worksheet 4 of Handout 2.2 (use the prior discussed trends identified in Module 1).
- 5. Ask the participants to use the rectangular cards to add direct impacts and indirect impacts of the selected climate trend as done in the impact chain example.
- Finally, ask the participants to determine the climate risks to, or negative effects on, the lives and livelihoods of women farmers resulting from the identified climate impacts. Note: Depending on the indirect impacts identified, these may already be the negative effect for which adaptation strategies can be developed. In this case, reformulate the identified indirect impact or leave this column out.

Hint for the trainer:

- When talking about hazards, instruct participants to focus not only on past hazards, but to also think about what the most important future climate variations/hazards and their impacts/risks might be in their village, neighbouring villages and the whole region.





Useful literature and databases

- IPCC, Climate Change (2014): Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: <http://www.ipcc.ch/report/ar5/wg2/>.
- GIZ and EURAC (2017): Risk Supplement to the Vulnerability Sourcebook.
- Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk. Bonn: GIZ. Available at: https://www.adaptationcommunity.net/wp-content/uploads/2017/10/GIZ-2017_Risk-Supplement-to-the-Vulnerability-Sourcebook.pdf.
- GIZ: Toolkit to Develop Climate Adaptation Strategies for Small and Medium-Sized Enterprises (SMEs): Climate Expert. Available at: <https://www.climate-expert.org/en/home/>.
- Rural Agricultural Development Authority (RADA) of Jamaica: Adapting to Climate Change: A Training Manual for Farmers. Available at: <https://rada.gov.jm/sites/default/files/documents/Adapting-to-Climate-Change-Farmer-Instruction-Manual.pdf>.
- ActionAid (Village Book): Community-Led Planning and Development Processes: A Training Manual. Available at: https://actionaid.org/sites/default/files/village_book_training_manual_english__0.pdf.

Local climate databases:

- Ministry of Environment, Forest and Climate Change (2014): State Action Plan on Climate Change. Available at: http://moef.gov.in/wp-content/uploads/2017/09/SAPCC_UP_final_version_0.pdf.
- Flood Management Information System Centre of Uttar Pradesh: <http://fmiscup.in>.

International climate databases:

- World Bank Group: Climate Change Knowledge Portal providing global data on historical and future climate, vulnerability, and impacts. Available at: <https://climateknowledgeportal.worldbank.org/>.
- World Bank Group: Historical data on CO₂ Emissions. Available at: <https://data.worldbank.org/topic/climate-change>.

Key take-aways

- Identifying climate impacts and risks is the starting point of local adaptation planning.
- Developing a climate impact chain that helps understand that physical climate hazards and experienced risks are interrelated.
- After the session, the participants should be aware of relevant risks their villages face from climate change as well as of the most vulnerable places and people.

Debriefing questions

- What are your important take-aways from this session?
- Which outcomes of the session do you find most relevant to your work?
- How did the session and exercise support you in understanding the climate change impacts and associated risks relevant to your work?

Hints for the trainer

- Ensure that participants start with the same knowledge about fundamental concepts of climate change for successfully participating in the training.
- The duration of the session can be adapted as needed. For example, it is recommended to spend more time in the on-field work (e.g., a transect walk can ideally take 1 to 1.30 h).



Module 3. Climate change adaptation needs

Learning objective	To prioritize the identified climate risks and evolve the CCA needs of village communities to be addressed first
Duration	Shortest version: 20 min Complete version: 3 h 20 min

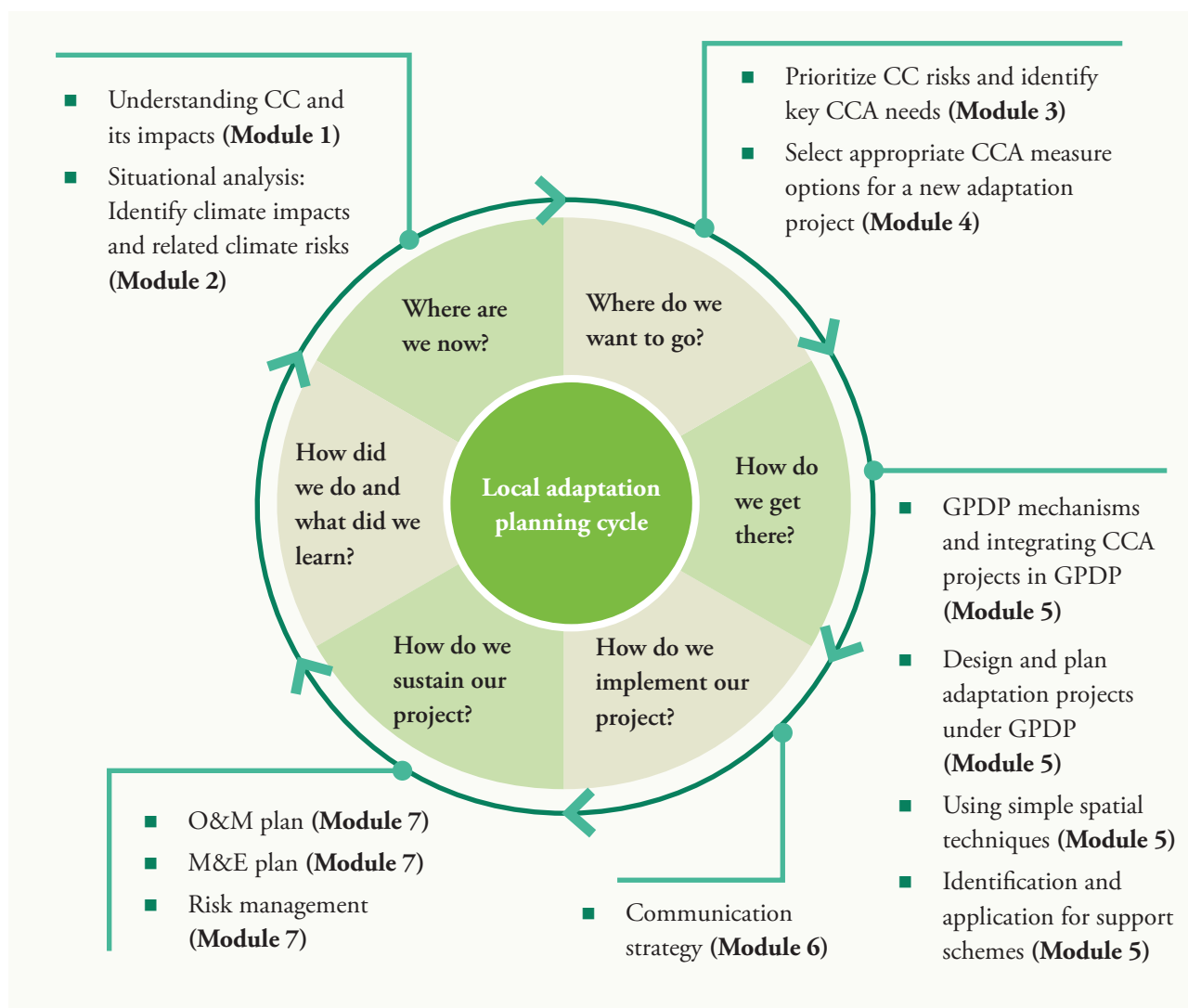
Module planner

Duration	Sessions	Shortest version	Complete version
20 min	Session 3.1 Recently conducted needs assessment	X	x
45 min	Session 3.2 Prioritizing identified climate risks		x
120 min	Session 3.3 Defining climate change adaptation needs		x

Integration of Module 3 along the local adaptation planning cycle

The methodology used by the Capacity-Building Package follows the logical processes of local adaptation planning. The right figure shows the arrangement of the modules of the CDP, their main steps and methods employed. The colour orange indicates that you are in Module 3 and Step 3 of the Local Adaptation Planning cycle, which provides different methods for working with PRI-members to assess their climate change adaptation needs. The sessions in this module will include the results of a recent needs assessment, the prioritization of climate risks and identification of adaptation needs. This will enable participants to identify and assess locally adapted CCA measures in Module 4.

In the ExcelTool, you will find a tab in the same orange colour. Here you can document the results achieved by your group of participants in Module 3.



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Session 3.1 Recently conducted needs assessment

Learning objective	To be informed on recently conducted needs assessment study and identified adaptation needs for PRI-members
Prerequisites/prior knowledge for successful participation	Hands-on experience in climate-resilient village developmental activities
Total duration	20 min
Methods/exercises	Input presentation
Material	PowerPoint presentation 3.1, Handout 3.1, Laptop, LCD projector

Approach

Based on a recent needs assessment, this session will provide participants with an overview of the interventions needed for agricultural system resilience, improved ecosystem services, resilient extension and linkages with relevant regulations and programmes.

Input presentation

- Present Slide 3 (Presentation 3.1: Recently conducted needs assessment) to the participants.



The scoping assessment in Uttar Pradesh and field experiences indicate that the climate resilience of PRI-members with a focus on GPDP (agriculture and allied sector, water resources and DRR) need several interventions that can be grouped as follows. The adaptive measures will need to be evolved in consultation with PRI-members in the specific agro-climatic context:

- Participatory climate risk analysis and the identification of mitigation and adaptation actions that can be leveraged through MGNREGS resources (e.g., plantation, drainage improvement, check dams, water bodies).
- Identifying activities under the relevant schemes and programmes of the GPDP concerning the agriculture and allied sector, water resources and DRR, which have scope for CC integration and expected climate benefits (developing a glossary) including the creation of resilient infrastructures.
- Integration of CC components into Gram Panchayat Development Plans. Developing (CC-Disaster) risk-informed GPDP.
- Capacities at the Gram Panchayat level to be developed for maintaining a GIS-based database generation on groundwater levels, rainfall and water quality for water budgeting and preparation of water security plans (especially in drought-prone areas).
- Integration of natural resource management for long-term GPDP planning.
- Capacity building on disaster-resilient agriculture and water management techniques.

Useful literature

- GEAG (2020): Scoping Assessment of Uttar Pradesh. Available on request from GIZ.

Key take-aways

- Participants will be provided with an overview of identified key adaptation needs of PRI-members in Uttar Pradesh.

Session 3.2 Prioritizing the identified climate risks

Learning objective	To assess and prioritize the key climate risks identified in Module 2 based on the determined climate impacts	
Prerequisites/prior knowledge for successful participation	Basic understanding of climate change scenarios and their impacts. Climate risks are identified (Module 2, Session 2.2)	
Steps (duration)	Step 1. Understanding prioritization methodology	5 min
	Step 2. Prioritizing the identified climate risks	
	Step 2.1 Assessing probability and time horizon	15 min
	Step 2.2 Assessing vulnerability of the exposed elements	15 min
	Step 3. Comparing the final scores of the assessed risks	10 min
Total duration	45 min	
Methods/exercises	Prioritizing the identified risks with a probability–time horizon matrix and sensitivity–capacity matrix	
Material	PowerPoint presentation 3.2, Handout 3.2, laptop, LCD projector, flip chart, post-it notes	
Preparation of the material	You may prepare some examples and hints to facilitate the group exercises. Support the participants in conducting the risk assessment with available literature and regional studies. Seek expert advice when necessary and possible to validate assessments and clarify assumptions.	

Step-by-step approach

In this session, participants assess and prioritize the key climate risks identified in Module 2, guiding them through different aspects and participatory exercises (Step 1). The prioritization is done under the criteria of probability and time horizon (Step 2) and sensitivity and coping capacity (Step 3) of the climate hazard and the impacts on the target group. A final summary matrix (Step 4) gives participants a basis for developing further steps to adapt to climate change.

Step 1. Understanding prioritization methodology

Input presentation

- Present Slides 3–5 (Presentation 3.2: Prioritize identified climate risks) to the participants

Before deciding on adaptation measures (Module 4), it is important to compare and prioritize the identified climate risks according to their relevance for the participants.

Risks do not have the same relevance and urgency to act upon them as there is always uncertainty involved when estimating the impacts of climate change. The relevance of the risks depends on:

- **Probability:** How likely it is that the identified climate hazard occurs?
- **Time horizon:** When are the hazards and consequent negative impacts expected to occur? Which of the identified climate risks arise from past/current climate variations and which are expected to arise from future climate variations?
- **Vulnerability:** How vulnerable are the exposed elements to the climate hazards?

For example, if the probability of a drought and the vulnerability of crops are high and impacts are observed now, i.e., farmers already face crop and harvest loss resulting in lower production levels. Therefore, the climate-related risks from droughts require immediate attention, for example, through the implementation of soil water conservation measures.

The proposed assessment provides a targeted approach for the subsequent design and selection of appropriate adaptation measures.

Step 2. Prioritizing the identified climate risks

- Present slides 6–10 (Presentation 3.2: Prioritize identified climate risks) to the participants.

Participatory exercise: Prioritizing the identified climate risks



- The facilitator should prepare prior identified climate risks for women farmers from Session 2.1.4 and 2.2 Step 3 written on cards and pin them on a flip chart so they can be used in this session. A short discussion round can be held so that the group remembers what was previously identified and is aware of their climate impact chain (hazards that occurred and the climate impacts/risks caused).
- For each of the risks identified in Module 2, ask the participants to assess their relevance by reflecting on:
 - Step 2.1: the probability and the time horizon of occurrence
 - Step 2.2: the vulnerability of the exposed elements / persons to the climate risk
- They can use Worksheets 1–2 of Handout 3.2.

Hints for the trainer:

- As the assessment of risks is always fraught with uncertainty, it is crucial to ask the participants to make uncertainties and personal assumptions transparent within the assessment. This helps them to validate made assumptions and decisions taken in the future.

Step 2.1 Assessing probability and time horizon

- Prepare the matrix below on a flipchart or draw it on the ground depending on the setting.
- Ask the participants to define:
 - if there is a low, medium or high probability that the impact occurs; and
 - the time horizon for the climate hazard causing the identified risk (observed now, expected in 5 or 10 years).
- Depending on the answers, let the participant place the climate risk cards (that have been prior prepared) on the matrix.
- Go through the assessment process for all risks relevant to the participants. Final results will be compared in Step 3 of this session. As this exercise is time-consuming, it is recommended to ask the participants to assess not more than 3 selected, relevant risks.
- The participants can note their results using Worksheet 1 of Handout 3.2.

Guiding questions:

- Probability:
 - How likely it is that the identified climate hazard impact occurs?
 - Ask the participants the last time the climate hazard occurred and what kind of impact it caused: Was it always the same? When was the impact more or less severe?
- Time horizon:
 - When is the hazard and its negative impact expected to occur?
 - When was the last time it occurred and before that?
 - What could be the signals of this hazard?

High probability Medium probability Low probability	Immediate attention required	Immediate attention required	Attention required in the next years
	Immediate attention required	Attention required in the next years	Caution over the long term
	Attention required in the next years	Caution over the long term	Caution over the long term
	Impacts observed now	Impacts expected in next 10 years	Impacts expected mid-century

Step 2.2 Assessing vulnerability of the exposed elements

Participatory exercise

Vulnerability has two elements:

- **Sensitivity:** Attributes that determine whether/how strongly a hazard will affect the element under consideration. One way of determining the damages caused by impacts is trying to quantify the possible damage in monetary values (INR), e.g., how much would it cost to repair the damage to the houses by flooding?
- **Capacity:** Focusing on the ability to respond to current/future hazards (in terms of knowledge/skills, technology, financial/economic).

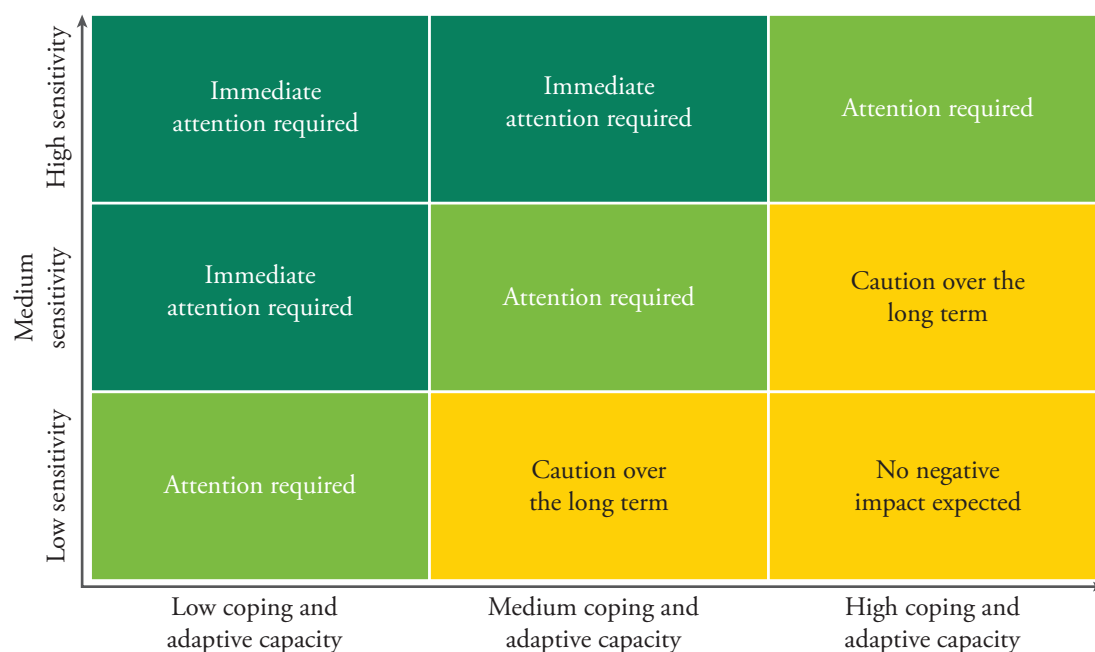
Ask the participants to follow the same instructions as before:

- Prepare the second matrix below on a flip chart or draw it on the ground depending on the setting.
- Ask the participants to define:
 - if there is a low, medium or high sensitivity to the impacts and
 - if they have a low, medium or high coping and adaptive capacity
- Depending on the answers, let the participants place the climate risk cards (that have been prior prepared) on the matrix.
- Go through the assessment process for all risks relevant to the participants. Final results will be compared in Step 3 of this session. As this exercise is time-consuming, it is recommended to ask the participants to assess not more than three selected, relevant risks.
- The participants can note their results using Worksheet 2 of Handout 3.2.

Guiding questions:

- **Sensitivity:**
 - How vulnerable are you to the impact of climate hazards?
 - How strong are the negative impacts after a climate hazard?
- **Coping/Adaptive capacity:**
 - How well can you manage?/Are you prepared to cope with the impacts of climate hazards?
 - What kind of best practices for adaption do you know from your region?





Note: In case the participants assessed the vulnerability of more than one exposed element, calculate the final vulnerability score by: sum vulnerability scores/number of exposed elements

Step 3. Comparing the final scores of the assessed risks

- Present slides 6–10 (Presentation 3.2: Prioritize identified climate risks) to the participants.

Participatory exercise

Climate risks	Probability	Time horizon	Vulnerability		Final score
			Sensitivity to the climate hazard	Vulnerability of the exposed elements	
Risk 1: Small and marginal farmers facing water stress					
Risk 2: ...					

Useful literature

- GIZ: Toolkit to Develop Climate Adaptation Strategies for Small and Medium-sized Enterprises (SMEs): Climate Expert. Available at: <https://www.climate-expert.org/en/home/>
- GIZ and EURAC (2017): Risk Supplement to the Vulnerability Sourcebook. Guidance on How to Apply the Vulnerability Sourcebook's Approach with the New IPCC AR5 Concept of Climate Risk. Bonn: GIZ. Available at: https://www.adaptationcommunity.net/wp-content/uploads/2017/10/GIZ-2017_Risk-Supplement-to-the-Vulnerability-Sourcebook.pdf
- IPCC, Climate Change 2014: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: <http://www.ipcc.ch/report/ar5/wg2/>

Key take-aways

- Risks do not have the same relevance and urgency to act upon them as there is always uncertainty involved when estimating the impacts of climate change.
- The relevance of the risks depends on the probability of occurrence, extent and time horizon of the climate hazard and thus climate impacts and the vulnerability of the exposed elements.

Debriefing questions

- What are your important take-aways from this session?
- How did the tool support you in identifying the most relevant climate risk for your local context?

Session 3.3 Defining climate change adaptation needs

Learning objective	To identify climate adaptation needs at the PRI level to address the identified climate risks	
Prerequisites/prior knowledge for successful participation	Hands-on experience on various developmental works done by PRIs at the village level	
Steps (duration)	Step 1. Identifying the CCA needs of village communities related to human development and social security	60 min
	Step 2. Identifying the CCA needs of village communities related to structures, environment and disaster management	30 min
	Step 3. Identifying the CCA needs of village communities related to income, employment and economic aspects	30 min
Total duration	120 min	
Methods/exercises	Defining climate change needs for identified risks on different levels	
Material	PowerPoint Presentation 3.3, Handout 3.3, laptop, LCD projector, chart papers, markers, cards	
Preparation	You may adjust the given examples and hints for the group exercises to the participants' contexts	

Step-by-step approach

This session will be divided into three steps:

In **Step 1** (identify the CCA needs of village communities related to human development and social security), the participants will learn to assess the needs of various sectors related to human development and social security based on climate change impacts on those sectors. Similarly, in **Step 2** (identify the CCA needs of village communities related to structures, environment and disaster management), participants will assess the CCA needs on those aspects that are related to infrastructure, ecosystems and environment. In **Step 3**, they will learn to assess the CCA needs of village communities related to income, employment and economic aspects.



Step 1. Identifying the CCA needs of village communities related to human development and social security

- Present Slides 3–6 (Presentation 3.3: Defining climate change adaptation needs) to the participants

Climate-induced disasters affect human development and social security issues. In the previous sessions, participants learnt about the key issues of climate change and its impacts at the macro and micro levels. They also learnt how the changing climate and its variabilities have affected the livelihood of a poor and marginalized community, natural resources and infrastructure at the village level. In this session, the focus of the discussion will be to understand and identify the needs of the village communities related to human development and social security; a strategy to achieve those needs and appropriate actions that are needed at the individual and community level to mitigate the impacts of climate change and hydro-met disasters. Before starting the group work of Step 1, encourage the participants to review the learning of the previous sessions.

Group work

- Divide participants into following four thematic groups:
 - Water resources (source, hand pumps, etc.)
 - Hygiene and sanitation (toilets- individual, community, waste management: solid, liquid, etc.)
 - Health and nutrition (diseases, facilities and related infrastructure, etc.)
 - Education (schools, attendance, female education, etc.)
- Provide key hint points to the participants and support the participants to find out the impacts of climate change at village level and what actions are needed. They should also be provided with chart paper and markers for listing out the final inferences. To collect their results, participants can use Worksheet 1 of Handout 3.3.
- Once all the groups have finished their assigned tasks, invite them one by one to present their conclusive points. During the group presentation, encourage other group members to express their views on that particular subject and ask the presenter to incorporate the points in their exercise sheet. Repeat the same process with other groups and then finally compile the information into the format of following table for further processing.

A few examples for hints and facilitation are given in the table below:

Table 6. Examples of the CCA needs of village communities related to human development and social security

		Impacts due to CC (flooding, waterlogging, drought, groundwater depletion)	CCA needs
Water resources	Ponds/ Water bodies	<ul style="list-style-type: none"> In flood-prone areas, extreme events cause inundation in surrounding low-lying areas while drought-prone areas lack water bodies/ ponds reduce groundwater recharge and means of irrigation. 	<ul style="list-style-type: none"> Quick draining of water from the inundated field. Ensure groundwater recharge.
	Hand pumps	<ul style="list-style-type: none"> Submerged during floods, dry during summer. 	<ul style="list-style-type: none"> Ensure safe drinking water availability throughout the year especially during the stress period.
	Freshwater wells	<ul style="list-style-type: none"> Water contamination and siltation due to flood water, dry due to depletion of the groundwater table in drought-prone areas. Damage of shoreline during floods. 	<ul style="list-style-type: none"> Ensure repair and Maintenance, Ensure groundwater recharge.
Hygiene and sanitation		<ul style="list-style-type: none"> Access to safe drinking water gets affected. Deterioration of drinking water quality. Depletion of water and access to water in drought-prone areas affect personal hygiene. Toilets get defunct in water inundated and water-stressed areas. 	<ul style="list-style-type: none"> Ensuring access to safe drinking water, disposal of garbage, access to water for the toilet.
Health and nutrition		<ul style="list-style-type: none"> Clogging of water and Intake of contaminated water causes vector- and water-borne diseases in children. Health systems/services disrupted due to flood, damage of crops affects food security. Cases of malnutrition in children and women increases. 	<ul style="list-style-type: none"> Ensure proper functioning of health centres, PDS system. Ensure uninterrupted health services during the disaster.
Education		<ul style="list-style-type: none"> Damage or inundation of school's building and other infrastructure due to extreme events rainfall or flood. Access to school affected. Enrolment of children in school reduces. Continuity of school days interrupted. Attendance of children in school affected. Dropout increases. 	<ul style="list-style-type: none"> Ensure uninterrupted functioning of the school. Ensure access to safe drinking water, toilets for children. Ensure all-season road connectivity. Ensure safety and security measures.



Step 2. Identifying the CCA needs of village communities related to structures, environment and disaster management

- Present Slides 7–10 (Presentation 3.3: Defining climate change adaptation needs) to the participants

The socio-economic disruption and environmental degradation caused due to weather extremes are leading to substantial loss of life and property. In the previous steps, participants learned about the CCA-level actions at the level of village communities in relation to human development and social security for mitigation of the impact of climate-induced hazards on water resources, sanitation, education and health. In this step, the participants will be trained on the identification of the CCA needs of the village communities for mitigation of the impact of climate-induced hazards on village infrastructure and environment/natural resources/ecosystem services.

Group exercise

- Encourage the participants to recap the learning of the previous sessions and extend the group work exercise by grouping the participants into following two thematic groups:
 - Village infrastructure
 - Environment/natural resources/ecosystem services
- Provide key hint points to the participants and support the participants to find out the impacts of climate change at the village level and what actions are needed.
- In addition, provide the participants with chart paper and markers to list out the final inferences. To collect their results, participants can use Worksheet 2 of Handout 3.3.
- Once all the groups have finished their assigned group task, invite them one by one to present their conclusive points. During the group presentation, encourage other group members to express their views on that particular subject and ask the presenter to incorporate the points in their exercise sheet. Repeat the same process with other groups and then finally compile the information into the format of the following table for further processing.

A few examples for hints and facilitation are given in the table below:

Table 7. Examples of CCA needs of village communities related to structures, environment and disaster management

Thematic group	Impacts due to CC (floods, drought, etc.)		CCA needs
Village infrastructure	Embankments	Rainfall erosion and wave erosion often cause embankment failure in flood-prone regions.	<ul style="list-style-type: none"> • Ensure periodical monitoring of embankments passing through villages. • Strengthened embankment to avoid failure.
	Gram Panchayat Bhawan and Anganwadi centres	Owing to the low-lying presence of Gram Panchayat Bhawan and Anganwadi centres – they often get damaged in floods.	<ul style="list-style-type: none"> • Needful maintenance of GP Bhawan and Anganwadi centre as they might act as a relief shelter. • Shifting of GP Bhawan and Anganwadi centres at a higher elevation within the village.
	Transformer and electric poles	<ul style="list-style-type: none"> • Transformers often get short-circuited and cause damage to equally elevated structures like schools, GP Bhawan, community meeting halls. • High-tension pole wires many times get short-circuited with lightning and rainfall. 	Shifting of transformers and HT wire/cables away from public gathering infrastructures like schools, etc.
	Creeks, culverts and roads	<ul style="list-style-type: none"> • Creeks and culverts often get choked in floods and heavy rainfall. • Village roads get damaged in floods and heavy rainfall. 	<ul style="list-style-type: none"> • Periodic cleaning of creeks and culverts in pre-flood season. • Proper maintenance of village roads in pre-flood season.



Thematic group	Impacts due to CC (floods, drought, etc.)		CCA needs
Environment/ Ecosystem and natural sources	Ponds and wetlands	<ul style="list-style-type: none"> Wetlands and ponds get dried up in droughts. Dried water sources of villages cause depletion of groundwater level in drought. Damaging of compost pits and farmland with excessive mud deposition post-flood. 	<ul style="list-style-type: none"> Applicability of measures for rainwater harvesting and maintenance of ponds, wetlands, wells, etc.
	Green infrastructure	Green infrastructures like trees and plants often get damaged in stormy winds and cyclones.	<ul style="list-style-type: none"> Monitoring and maintenance of green infrastructures across the village. Applying measures for sensitization of villagers on
	Farmland	Farmland lying close to a river in a village often gets damaged in floods.	<ul style="list-style-type: none"> Identification of farmland located at a low level for ensuring its regular maintenance and cleaning post-flood. Ensure granting of needed ex-gratia assistance for damage caused due to flood as per government norms.

Step 3. Identifying the CCA needs of village communities related to income, employment and economic aspects

- Present Slides 11–13 (Presentation 3.3: Defining climate change adaptation needs) to the participants

Climate change and induced disasters affect the income and employment aspects of people, which has a direct bearing on their economic situation. In this step, the discussion will be focused on identifying the needs of the village communities related to various sectors that contribute to income and employment such as agriculture, livestock, horticulture (including medicinal plants) and skill-based livelihoods.

Group exercise

- Divide the participants into four groups and ask them to work for any one village (few examples are given below) using any of the following aspects, using Worksheet 3 of Handout 3.3.
 - Agriculture (including irrigation, agro-forestry)
 - Livestock
 - Horticulture (including medicinal plants)
 - Skill-based self-employment
- To collect their results, participants may use Worksheet 3 of Handout 3.3.

Hint for the trainer:

- A 2-hour visit may be organized to assess the situation in any village.

A few examples for hints and facilitation are given in below table:

Table 8. CCA needs of village communities related to income, employment and economic aspects.

	Impacts due to CC (flooding, waterlogging, drought, groundwater depletion)	CCA needs
Agriculture – crops	<ul style="list-style-type: none"> • Crop inundation due to waterlogging/flooding • Crop losses due to long dry spells/droughts • Pests and disease incidence • • 	<ul style="list-style-type: none"> • Crops that can stand waterlogging or drought conditions • Mechanisms to reduce pest attacks •
Livestock	<ul style="list-style-type: none"> • Morbidity and Mortality • Impact of fodder quality • • 	<ul style="list-style-type: none"> • Good quality fodder • Reduce morbidity and mortality in animals •
Horticulture	<ul style="list-style-type: none"> • Crop inundation due to waterlogging/flooding • Crop losses due to long dry spells/droughts • Pests and disease incidence • • 	<ul style="list-style-type: none"> • Crops that can stand waterlogging or drought conditions • Mechanisms to reduce pest attacks •
Skill-based self-employment	<ul style="list-style-type: none"> • Distressed migration • 	<ul style="list-style-type: none"> • Reduce migration •



Key take-aways

- Participants will be able to identify the needed actions related to human development and social security, structures, environment and disaster management, and income, employment and economic aspects.

Debriefing questions

- What are your important take-aways from this session?
- Which outcomes of the session do you find most relevant for your work?
- How did the session and exercise support you in understanding climate change impacts and associated risks relevant to your work?

Hint for the trainer

- Adaptation needs should be fairly broad at this stage. Help participants see the “big picture” at this point in the process so that they do not inadvertently skip some steps in adaptation planning.



Module 4. Climate change adaptation measures

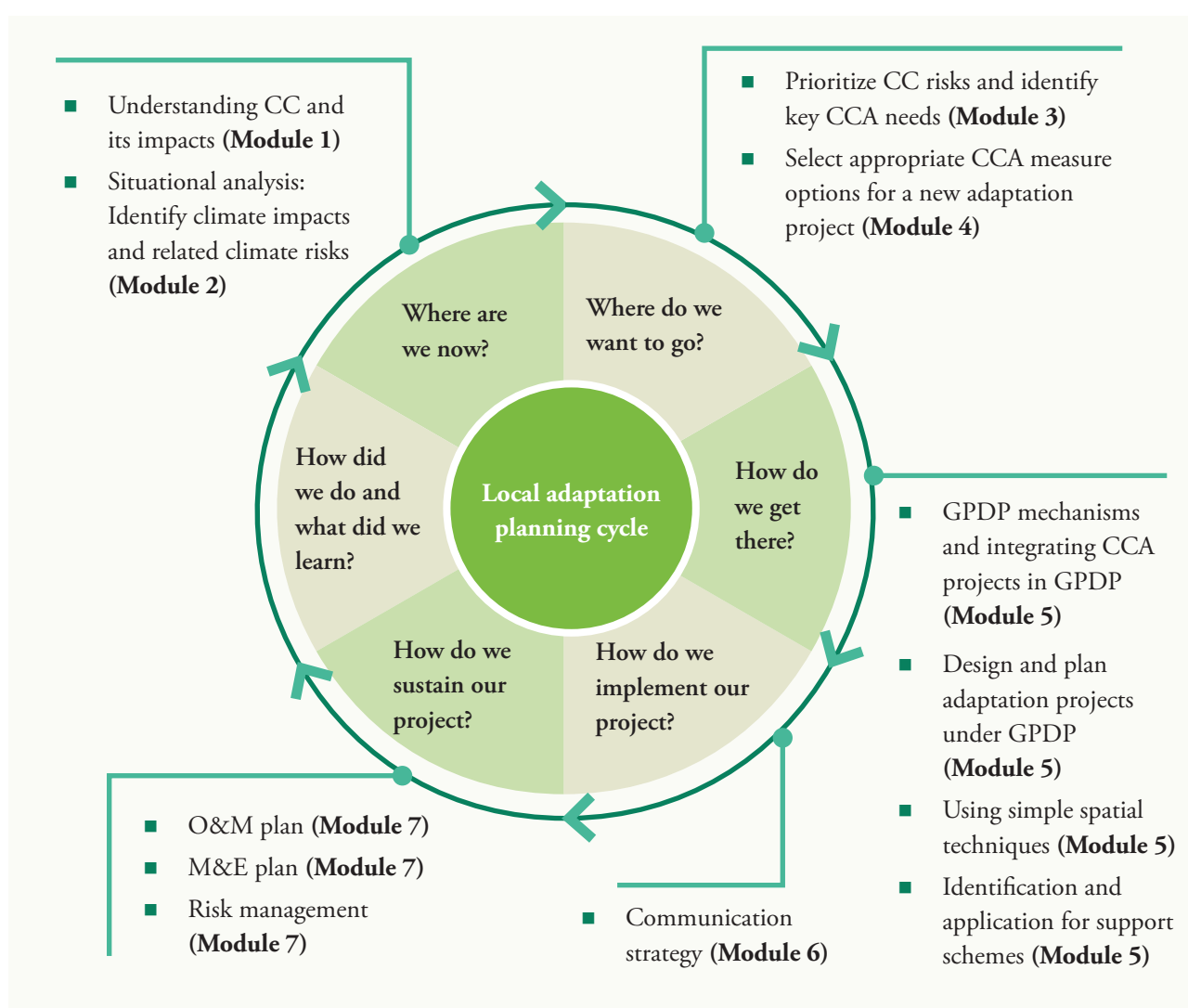
Learning objective	To understand and select CCA actions based on risk analysis, identified challenges and needs
Duration	Shortest version: 1 hr 30 m Complete version: 3hr 30 m

Module planner

Duration	Sessions	Shortest version	Complete version
45 min	Session 4.1 Input sessions on best practices for climate adaptation	X	x
120 min	Session 4.2 Identifying, assessing and prioritizing adaptation measures to selected CCA needs	Step 2 (60 min)	X

Integration of Module 4 along the local adaptation planning cycle

The methodology of the Capacity-Building Package follows the logical processes of local adaptation planning. The figure below shows the arrangement of the modules of the CDP, their main steps and



methods employed. The colour dark orange indicates that you are in Module 4 and Step 4 of the local adaptation planning cycle, which guides PRI-members to assess and select appropriate CCA measures based on their climate risk and adaptation needs identified in the previous modules. The results from Module 4 are the foundation and prerequisite for developing CCA projects.

In the ExcelTool you will find a tab of the same colour. Here you can document the results achieved by your group of participants in Module 4.

Session 4.1 Input sessions on best practices for climate adaptation

Learning objective	To learn about adaptation measures and best practices
Prerequisites / prior knowledge for successful participation	Prior knowledge on climate risk and vulnerability and PRA exercises
Duration	45 min
Methods/Exercises	Input presentations
Material	PowerPoint presentation 4.1, Handout 4.1 chart paper, markers, laptop, LCD projector
Preparation of the material	You may prepare actual case studies relevant to the participants' contexts

Approach

This session gives an overview of the best local practices for climate change adaptation providing a general understanding of how vulnerable systems can be transformed into resilient systems. Presented best practices include:

- Decentralised Wastewater Treatment System (DEWATS)
- Water budgeting
- Rainwater harvesting systems
- Organic farming for enhancing farm adaptation
- Climate-resilient agriculture
- Gradient-based cropping system
- Farm ponds
- Water conservation and recharge
- Reinforcing drainage line by converging MGNREGA

Decentralised wastewater treatment system (DEWATS) (Slide 4)

Wastewater is the sewage and non-potable water that flows back into the environment and most of it is untreated. In the majority of rural areas in UP, untreated wastewater is discharged directly into the local surroundings and water bodies. This leads to the contamination of surface as well as sub-surface water, having negative effects on the environment and human health. Since the water supply for domestic purposes in rural areas has improved considerably over the years, the quantity of wastewater that is disposed of has also increased. Hence, **effective wastewater management systems need to be introduced in rural areas to mitigate the problem of contamination.**

Wastewater management in rural areas aims at treating and managing sewage and water used for non-potable purposes. The purpose is to avoid pollution and damage to the environment and sustain the water table and water sources. This would result in a continued and clean supply of safe drinking water to the masses and lead to improved hygiene and sanitation.

While there are several technologies for treating and recycling wastewater in rural areas, the Decentralised Wastewater Treatment System (DEWATS) is a sustainable treatment system for

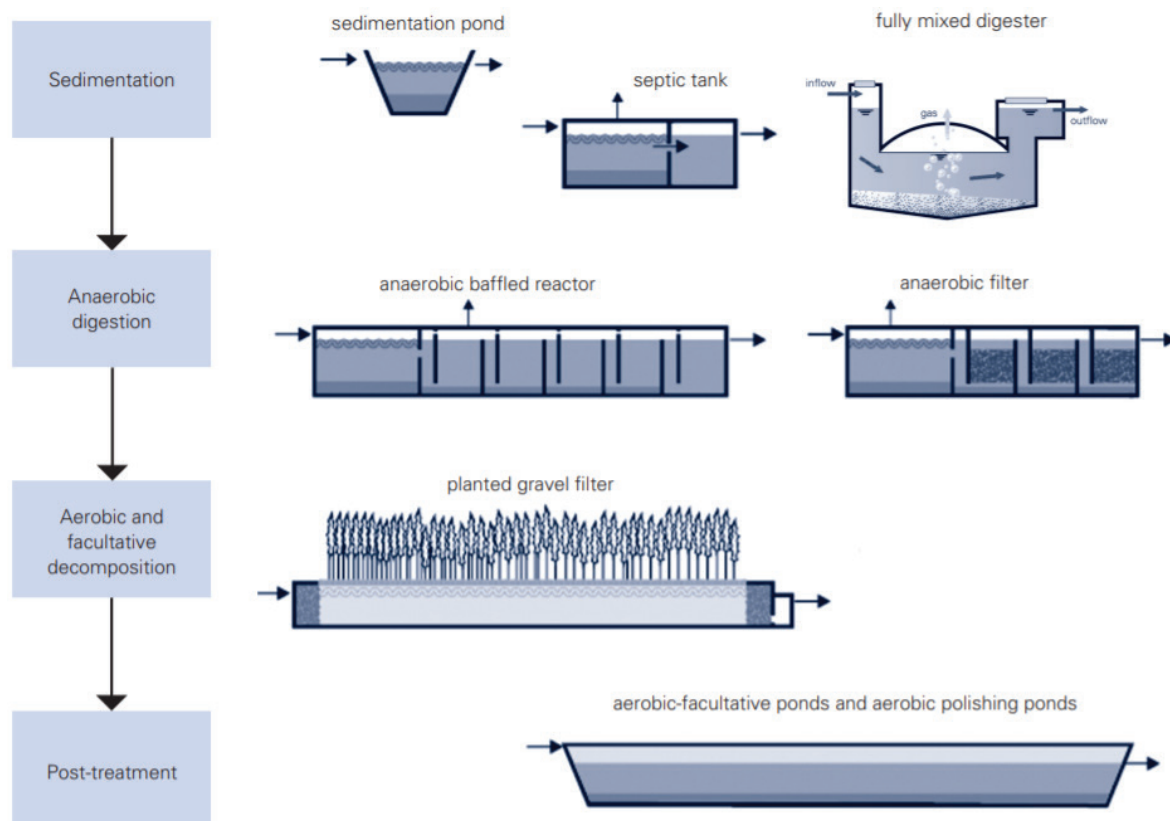
wastewater at the local level. A DEWATS provides primary, secondary and tertiary treatment for wastewater from sanitation facilities, housing colonies, public entities like hospitals, and those involved in food production and processing. DEWATS is based on a set of design and layout principles. Reliability, longevity, tolerance towards inflow fluctuation, cost efficiency and most importantly, low control and maintenance requirements.

DEWATS design

DEWATS combine the following technical treatment steps in a modular manner:

- Primary treatment – in sedimentation ponds, settlers, septic tanks or bio-digesters.
- Secondary treatment – in anaerobic baffled reactors, anaerobic filters or anaerobic and facultative pond systems.
- Secondary aerobic/facultative treatment – in horizontal gravel filters.
- Post-treatment – in aerobic polishing ponds.

Figure 11. DEWATS design configuration

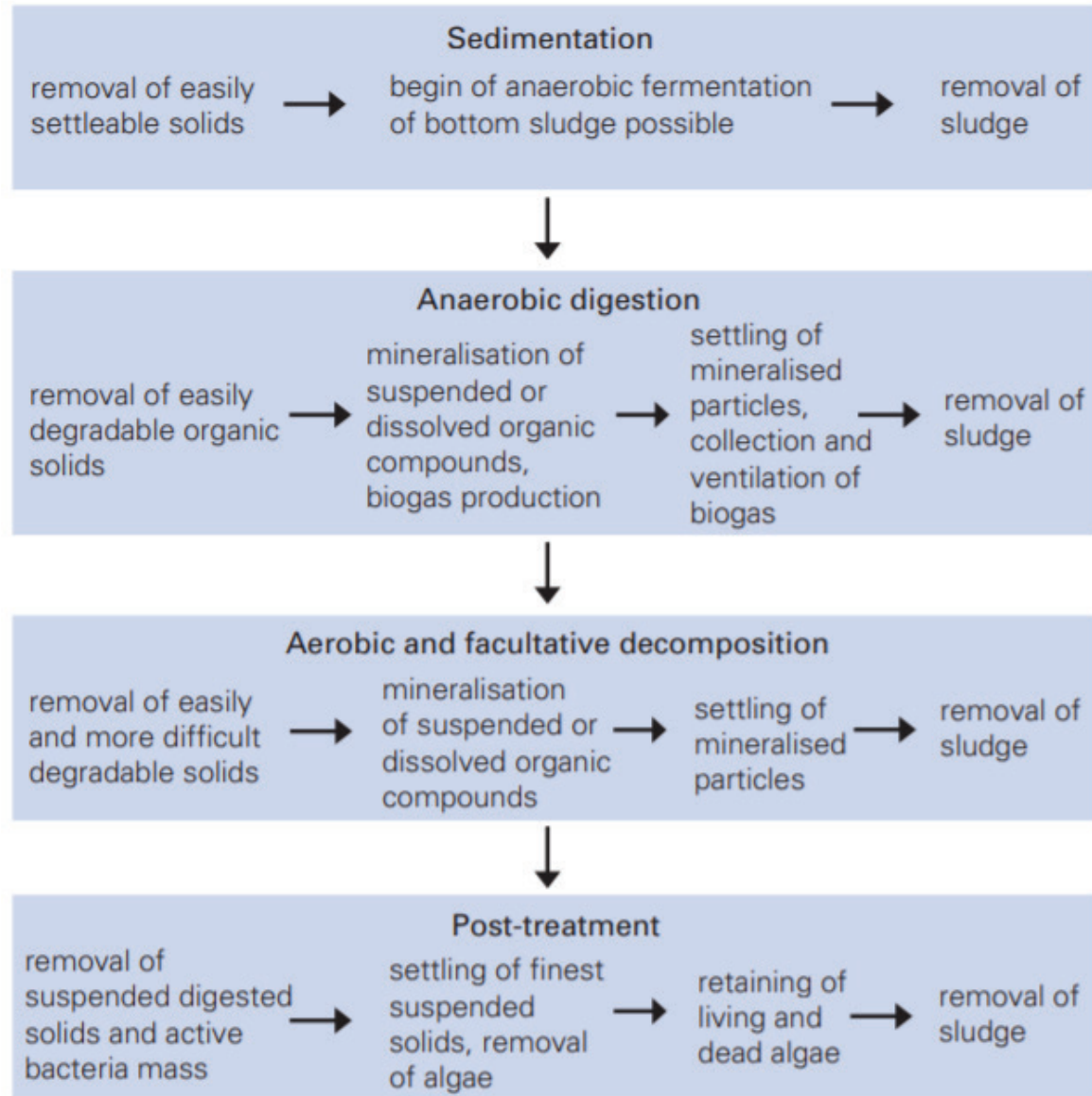


(Source: https://wedc-knowledge.lboro.ac.uk/resources/books/DEWATS_-_Chapter_03.pdf)



DEWATS rely on the same treatment processes as conventional treatment systems:

Figure 12. DEWATS treatment processes



(Source: https://wedc-knowledge.lboro.ac.uk/resources/books/DEWATS_-_Chapter_03.pdf)

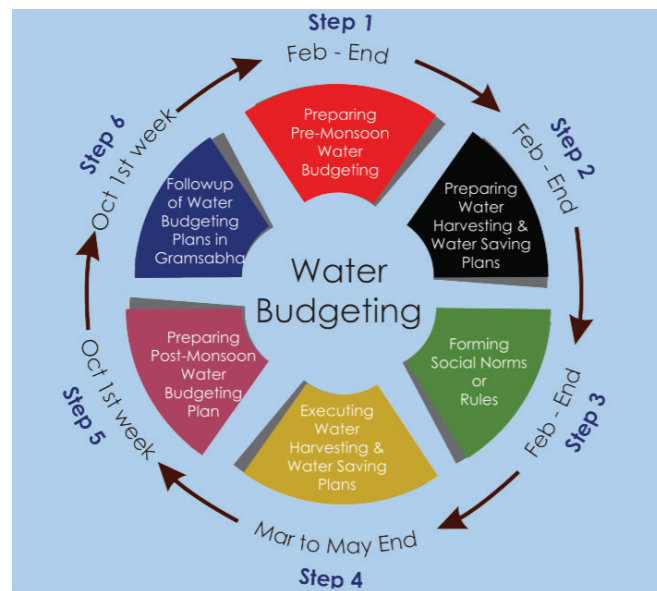
DEWATS are fit for densely populated rural areas, with adequate wastewater treatment capacity. Easy maintenance, low construction and operation costs make DEWATS suitable for poor urban and peri-urban areas, schools, hospitals, and small businesses with organic loads in their wastewater.

The DEWATS technology implemented by the BORDA network has proven itself for many years in Asia and Africa and has become an integral part of numerous government sanitation programmes.

Water budgeting (Slide 5)

Water budgeting is an estimate of the harvest of water resources and their utilization for a set period of time. It differentiates the availability of water and required water across the village on an annual basis and further prepares an action plan to cater to the demand in deficit if any. In short, the water budgeting tool helps communities understand the amount of water available for different uses and plan their water needs, mainly for drinking water and cropping, within the available amount of water. This is particularly helpful in cash crop-based agrarian economies that draw heavily from groundwater reserves for irrigation. The major challenge in the water sector lies in changing the existing mindset of people from “private ownership” to “water as a common pool” and promoting demand-side management.

Figure 13. Water budgeting



Source: NABARD and Watershed Organization Trust, WOTR

The tool of water budgeting can be used by PRIs to fill the gap between the demand and supply of water across the village in all seasons on an annual basis by integrating the water budgeting related methodology in the GPDP of the respective village.

Major data required for preparing water budget

- The total watershed area and its distribution in terms of forest land, fallow land, the area under cropping, details of all existing soil and water conservation interventions and structures, etc.
- For preparing the pre-monsoon and post-monsoon water budget, average annual rainfall for the last five years and actual rainfall in monsoon should be considered respectively.
- Technically, a micro watershed or catchment is the ideal scale for water budgeting but considering the practical implementation opportunities, water budgeting should be calculated at the village (where there is a match of village and watershed area) level.
- Water budgeting needs to be done twice a year, pre-monsoon (for Kharif season) and post-monsoon (for Rabi and summer season).
- Gram Panchayats should make necessary rules through the Gram Sabha regarding water-use and crop practices as water budgeting is not a one-time process.

Rainwater harvesting system (Slides 6–7)

Rainwater harvesting is a simple strategy by which rainfall is gathered and stored for future usage. The process involves the collection and storage of rainwater with the help of artificially designed systems, which form natural or man-made catchment areas, e.g., rooftops, compounds, slopes or artificially repaired impervious/semi-pervious





Figure 14. Rainwater harvesting pond



Source: www.facebook.com/manjunath.reddy

land surfaces. The collected rainwater may be filtered, stored and utilized in different ways or directly used for recharge purposes. With depleting groundwater levels and fluctuating climate conditions, this measure can go a long way to help mitigate the adverse effects of rising water scarcity. Reserving rainwater can help recharge local aquifers, reduce urban flooding and most notably, ensure water availability in water-scarce zones.

Advantages of implementing rainwater harvesting:

 Reduced water bills	 Ecological benefit	 An adequate means for irrigation	 Reduces demand on groundwater
Rainwater harvesting systems are cost-effective, provide high-quality water, lessen dependence on wells and are considered easy to maintain since they are not utilized for drinking, cooking or other sensitive uses.	The ecological benefits of rainwater harvesting are immense. It minimizes the impacts of flooding (both rural and urban) by funnelling the off-water into large tanks for recycling and helping to reduce the load placed upon drainage systems.	Harvesting rainwater allows the collection of large amounts of water and mitigates the effects of drought.	Rainwater harvesting (RWH) has been proved to be a sustainable option in solving the on-groundwater shortage reducing the demand on groundwater and thus fostering groundwater-level recovery (surface runoff harvesting). The harvested rainwater could be used to further help their recharge (groundwater recharge).

Two major techniques of rainwater harvesting:

1. *Surface runoff harvesting*
In this method, rainwater flows away as surface runoff and can be stored for future use. Surface water can be stored by diverting the flow of small creeks and streams into reservoirs on the surface or underground. It can provide water for farming, for cattle and also for general domestic use. Surface runoff harvesting is suitable in urban areas.
2. *Rooftop rainwater harvesting*
In this process, the roof of a house acts as a catchment and rainwater is collected there. This collected water can be stored in a tank or can be diverted to a recharge pit. This is very economical for garden irrigation and can be used for drinking purposes after proper filtration.

Rainwater in rural areas can be harvested through:	Rainwater/storm runoff can be harvested in urban areas through:
<ul style="list-style-type: none"> • gully plug • contour bund • dugwell recharge • percolation tank • check dam/cement plug/nala bund • recharge shaft 	<ul style="list-style-type: none"> • recharge pit • recharge trench • tubewell • recharge well

The surplus rainwater can be used to recharge groundwater aquifers through artificial recharge techniques. Groundwater recharge is a hydrologic process where water moves downward from surface water to groundwater. Recharge is the primary method through which water enters an aquifer. The aquifer also serves as a distribution system.

Although rainwater harvesting has been deemed to be a desirable concept for the last few years, it is rarely being implemented in rural India. Different regions of the country practise a variety of rainwater harvesting and artificial recharge methods. Some ancient rainwater harvesting methods followed in India include Madakas, Ahar Pynes, Surangas, Taankas, etc.

Organic farming for enhancing farm adaptation (Slides 8–9)

The adoption of diversified adaptive approaches by farmers tends to alleviate their risk towards the adverse impacts of climate change. The use of chemical fertilizers in farms is reducing soil fertility, reducing farm yield, increasing soil erosion and causing water pollution. Organic farming done using organic manure is a solution to problems caused by inorganic farming.

Benefits of organic manure – Organic manure reduces soil erosion and enhances its fertility. It not only increases the carbon content in the soil but also reduces the industrial greenhouse gas emissions by restricting the usage of chemical fertilizers prepared by burning fossil fuels. At the same time, it enhances porosity and soil moisture retention in the soil thereby reducing the demand for frequent irrigation. Organic manure replaces the nitrogen-rich chemical fertilizer leading to a reduction in air pollution and water pollution. A few of the methods for the preparation of organic manure have been mentioned below.

Vermicompost – It is a biotechnological process of composting in which earthworms are used to convert biodegradable waste into a better fertilizer product. The procedure for preparing vermicompost is as follows: Prepare a plastic or concrete tank depending upon the availability of raw material. Collect the biomass, place it under the sun for 8–10 days and chop it. Then sprinkle the cow dung slurry on the chopped biomass for quick decomposition. Add a layer (2–3 inches) of soil at the bottom of the tank. Now prepare fine bedding in the tank up to 0.5–1 ft by distributing the decomposed cow dung, dried leaves and other biodegradable waste on the layer of soil. After adding the bio-waste, release the earthworms and cover the pit. Sprinkle water regularly for 1–2 days to maintain the moisture in the pit. Cover the tank for 24 days and, finally, the compost is ready¹.

Figure 15. Vermicompost



Source: earth911.com

1 AGR 304: NADEP Method. (n.d.). E-course Online. Retrieved May 14, 2021. Available at: <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=108180>



Compost pit – This is a simple way of producing organic manure by digging a deep hole into the ground for the decomposition of collected biodegradable waste (kitchen waste, agricultural waste, fruit waste, plants and animal residue, wood etc.) into organic manure. This method involves digging a deep hole of size 10 ft (length) x 4 ft (breadth) x 3 ft (height) into the ground, followed by adding biodegradable waste into the pit till the piling of waste reaches ground level. Finally, cover the pit with a 30–40 cm thick layer of animal refuse and leave it for 6–8 months for the preparation of manure.

NADEP compost – It is the process of converting vegetables, other biodegradable substances and animal refuse into manure. The NADEP method of composting is the aerobic decomposition of organic matter. The procedure for making NADEP compost is to construct an aerated brick tank of size as 10 ft (length) x 5 ft (breadth) x 3 ft (height). Then, fill the tank with biodegradable waste followed by mixing of waste with cattle dung and water followed by adding a layer of dry soil. The approximate ratio of mixing of green waste to cattle dung to water to dry soil in a single layer will be 10:1:10:10. Repeat this layer formation till the compost is filled and then cover it for the next three months for the making of the final manure. The intermediary moistening of compost at an interval of 6–15 must be regularly carried out for the complete three months².

Figure 16. Compost pit



Source: earth911.com

Figure 17. Nadeb compost



Source: digitalgreenorg

Climate-resilient agriculture (Slides 10–16)

Agriculture is highly sensitive to climate change. It suffers from changes in climate variables such as changes in temperature and precipitation. It is severely affected by hazard/disaster events, fast on-setting flash floods and slow on-setting droughts. Studies show that climate change can reduce agricultural income by 10–15% on average and sometimes lead to total loss during disasters.

Climate-resilient agriculture (CRA) is an approach that includes the sustainable use of existing natural resources through crop and livestock production systems and as far as possible using modern farm advisory and indigenous methods to achieve long-term higher productivity and farm incomes under climate variabilities.

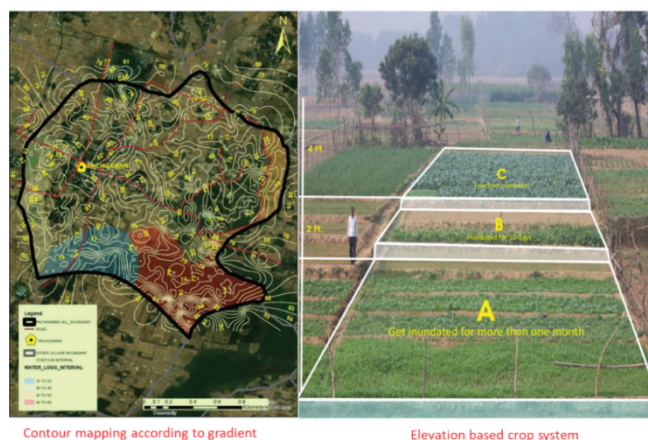
- It includes water and nutrient management; efficient use and management of water at farm and landscape level.
- Following weather and climate-related advisory for cropping system change and crop management.
- Tolerant seeds and breeds.
- Conservation agriculture.

² BYJU: How to prepare vermicompost. (n.d.). Retrieved February 15, 2021. Available at: <https://byjus.com/biology/vermicomposting/>

Gradient-based cropping system

The gradient-based farming technique is effective in undulating and low-lying areas. This is based on smart farm planning (categorizing farms based on gradient) and bunding for drainage management, checking soil erosion and minimizing crop losses. In this technique of cropping system, farmers are facilitated to understand the gradient of their farm using a GIS-based gradient map. After having the gradient map of the farm, they decide appropriate crops for low (short duration crops – coriander, spinach), medium (medium duration crops – radish, carrot) and higher elevation lands (long duration crops – cauliflower, onion, sponge gourd) according to the gradient of farms and related proneness of waterlogging and its duration. Bunding across slopes helps check soil erosion. This technique also helps the farmers in minimizing crop losses.

Figure 18. Gradient based cropping system



Source: GEAG

Constructing farm ponds by converging MGNREGA

The increased frequency of weather extremes in UP has raised the vulnerability and risk of people living in drought-stricken areas. The late onset and early withdrawal of the monsoons, lack of sufficient water in reservoirs and drying up of wells leads to crop failure and even un-sowing of crops, which ultimately curtails livelihoods and leads to migration of people.

Farm ponds are small water tanks or reservoir structures used to store surface runoff and rainwater. Farm ponds in the drought-prone areas of UP like Bundelkhand and Vindhyan

Figure 19. Farm pond



(Source: GEAG)

region can help store rainwater for irrigation at critical stages of agricultural activities, and crops in the surrounding areas will grow well owing to the retained moisture in the ground due to the presence of a farm pond. It also helps in recharging groundwater and reviving dried up dugwells. In case of heavy rainfall, farm ponds help in reducing soil erosion. In flood-prone areas, it provides ground for fish rearing and alternative livelihoods. In case of an extreme rainfall event, farm ponds help in reducing soil erosion.

Farm ponds can be developed in the needed areas by utilizing the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) scheme, as construction of farm ponds and rejuvenation of water sources are also included under the act, and funds are allocated by the Government of India for this activity. A farm pond can be constructed at the required place in the village by utilizing the MGNREGA scheme with the help of well-coordinated Gram Sabha meetings under the supervision of the Gram Pradhan. Apart from enhancing the DRR and climate change resiliency of a village, farm ponds can be instrumental in improving the financial position of the poor and marginalized



as it will not only improve their technical skills but will also provide them with opportunities to improve their incomes and livelihoods by engaging them in unskilled manual work.

Water conservation and recharge

Water scarcity is increasingly experienced in areas of lesser rainfall due to deficient rainfall patterns. Surface water, groundwater and soil moisture are decreasing at a fast rate. It is important that the water is conserved and recharged locally. There are several traditional practices of local water conservation in drought-prone areas. There have been efforts to modify such traditional practices to make them more efficient and effective. These are widely practised in the Bundelkhand and Vindhyan regions of Uttar Pradesh.

A. Rainwater conservation:

Farm pond:

Objective: Increase in groundwater recharge; irrigation, surface water conservation, drinking water for humans and cattle.

Applicability: In areas with less than 4% earth surface slope.

An appropriate place for percolation tanks: Where sub-soil structure can support absorption and soil is sandy and amorphous for seepage of water, in areas where wells and borewells are drying.

Impacts: The general impacts seen are in the form of increased water level, retention of water in wells and bore wells, increase in the irrigated area and provision of drinking water for cattle.

Earthen embankments:

Objective: Rainwater is collected in the rainy season and after the monsoon months, water is used for irrigation, drinking water, fisheries, etc. It also helps in protective irrigation. in groundwater recharge

Applicability: Bed slope should not be more than 5 per cent

Impacts: Collection of rainwater and protective irrigation, increased farm production, drinking water for human and cattle

Masonry stop dam:

Objective: Rainwater is collected in the rainy season and after the monsoon months water is used for irrigation, drinking water, fisheries etc. Also, it helps in protective irrigation and groundwater recharge.

Applicability: Streams in the vicinity, flow in streams even after the rainy season, bed slope not to be more than 5%.

Impacts: Collection of rainwater and protective irrigation, increased farm production, drinking water for humans and cattle.

B. Groundwater conservation

Underground dykes

Objectives: Checking the flow of groundwater and retention of groundwater for longer periods within the village premises, increasing the water level in wells and borewells, maintaining the flow of water in streams for longer periods.

Applicability: In the water streams that flow till at least January; it should be in the vicinity of wells, hand pumps and agriculture fields.

Impacts: Such earthen dykes check the flow of groundwater and conserve water so that the water changes its course and enters nearby wells.

Recharging

Objective: Recharging of aquifers through wells, borewells, recharge pits and shallow areas.

1. *Wells recharging* - Diverting rainwater flow through filters into wells.
2. *Borewell recharging* - Through pits of 3–4 metres and 1.25-metre diameter.

Reinforcing drainage lines by converging MGNREGA

The flood-prone villages of Uttar Pradesh often bear the brunt of clogged dykes, culverts and submerged farm fields during the monsoons, leading to disruption of livelihoods. The waterlogging of farmland during the monsoons is mostly due to the lack of maintenance of canals and a fragile drainage line that prevents the rainwater from draining into rivers. Excessive moisture from standing water in fields delays the winter sowing of crops, which further perpetuates plunder, peril and penury among villagers. Apart from the submerged farmlands during the monsoons, many of the streets, roads and village houses too get partially submerged due to uncleaned creeks and culverts in the pre-monsoon phase.

This above-mentioned risk of waterlogging could be mitigated by the maintenance of drainage lines and canals with the intervention of the Gram Pradhan. The villagers, under the supervision of the Gram Pradhan of the respective village, can prepare a work plan to draw financial resources from MGNREGA. The repair and drainage cleaning work must be completed before the monsoon for safe passage of stormwater and to prevent it from entering agricultural land. This reinforcing of drainage lines and canals by utilizing the MGNREGA scheme will not only enhance the flood resiliency of the village but will also provide employment opportunities to the villagers.

Figure 20. Reinforced drainage lines



Source: GEAG

Useful literature and databases

- People's Plan Campaign for Gram Panchayat Development Plan (GPDP)(2021–22). Available at: https://gdpd.nic.in/resources/PPC-2020_Booklet.pdf
- Department of Drinking Water and Sanitation, Ministry of Jal Shakti: Jal Jeevan Mission Presentations. Available at: <https://jalshakti-ddws.gov.in/presentations-water>
- Government of India, Ministry of Drinking Water and Sanitation and Water and Sanitation Programme (2015): Toolkit for the Preparation of a Drinking Water Security Plan. Available at: <https://www.wsp.org/sites/wsp/files/publications/WSP-India-Toolkit-for-Preparation-of-Drinking-Water-Security-Plan.pdf>
- UNFCCC: Adaptation Knowledge Portal. Available at: <https://www4.unfccc.int/sites/nwpstaging/Pages/Home.aspx>
- European Climate Adaptation Platform Climate-ADAPT: Adaptation options. Available at: <https://climate-adapt.eea.europa.eu/knowledge/adaptation-information/adaptation-measures>
- Asia Pacific Adaptation Network (APAN): Adaptation Technologies Database. Available at: http://www.asiapacificadapt.net/adaptation_technolog/
- UNEP DTU Partnership: Technology Needs Assessment Database. Available at: <https://tech-action.unepdtu.org/tna-database/>



Key take-aways

- The best practices described are indicative, more such practices can be found through discussion and interviews with lead farmers and institutions.

Debriefing questions

- What are your important take-aways from this session?
- What best practices presented do you find most relevant to your work?

Session 4.2 Identifying, assessing and prioritizing adaptation measures

Learning objective	To identify, assess and prioritize adaptation measures to selected CCA needs	
Prerequisites/prior knowledge for successful participation	CCA needs are identified	
Steps (duration)	Step 1. Understanding and identifying CCA measure options	30 min
	Step 2. Assessing adaptation options according to different criteria	60 min
	Step 3. Selecting CCA measure(s) to be implemented	30 min
Total duration	2 h	
Methods/exercises	Input presentation, identify suitable adaptation options using databases and a CCA matrix, scoring of the options according to different criteria	
Material	PowerPoint presentation 4.2, Handout 4.2, laptop, LCD projector, desirable: internet access	
Preparation of the material	You may adapt the examples provided to facilitate the exercises in this session to the participants' contexts.	

Step-by-step approach

This module provides inspiration and tools for identifying, assessing and prioritizing suitable CCA measures for adapting to the most pressing climate risks that were identified in Module 2 and prioritized in Module 3.

In **Step 1**, participants will identify suitable CCA measure options to address their prioritized CC risks and CCA needs. Knowledge material will introduce the participants to different categories of adaptation measures and will provide inspiration including in the form of local case studies. Participants are also invited to share known measures from their working environment.

In **Step 2**, participants assess the measure options identified under considering different criteria including level of risk reduction, technical feasibility, internal feasibility, costs and benefits, social and environmental impacts and acceptance of and support for the measure.

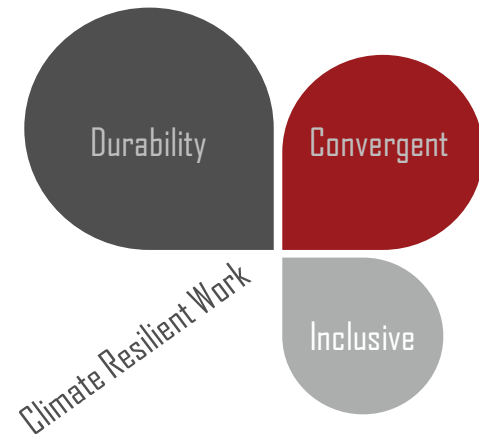
Finally, in **Step 3**, the identified measure options are compared and ranked according to the scores that they received in Step 2 for the different criteria. The best-ranked measure options will be selected for implementation.

Step 1. Understanding and identifying adaptation options

Input presentation

- Present Slides 3–7 to the participants to provide them with some general background information on adaptation/climate resilient measures.

To achieve climate resilience, new assets should be prioritized, planned, designed, built and operated to account for the climate changes that may occur over their lifetimes. Existing infrastructure may need to be retrofitted or managed differently considering climate change. Lastly, additional infrastructure needs to be constructed to address the physical impacts of climate change. This additional infrastructure can include traditional infrastructure, such as hard defences and other engineered solutions, as well as the skill and capacities to operate and maintain such infrastructures.



The key elements of climate-resilient work are:

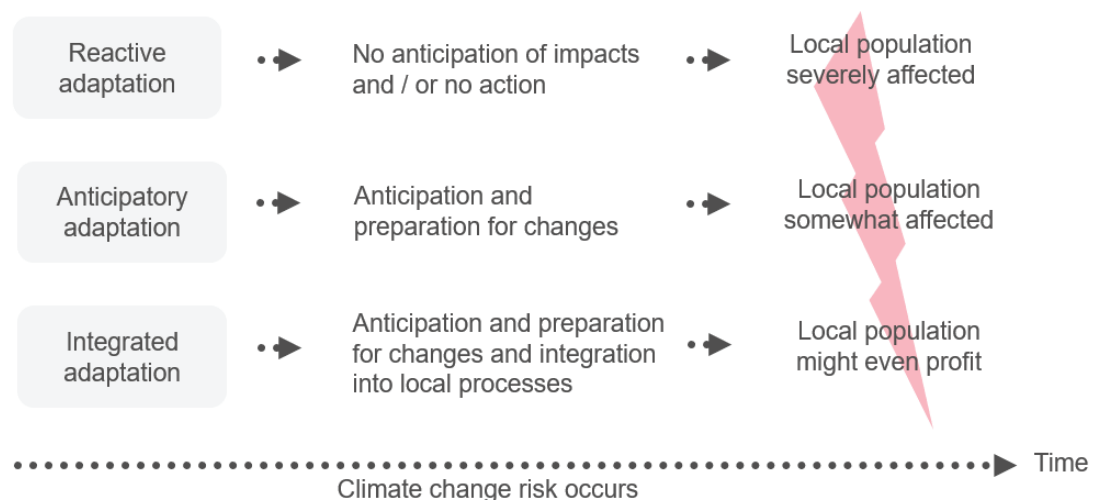
Durability: They should have the ability to endure climate change–related stress during their lifetimes. There should be tweaking of its design/retrofitting to achieve that (e.g., the LBCD structure can be tweaked considering future rainfall intensity).

Convergent: A climate-resilient outcome can only be achieved through the participation of many sectoral departments/agencies and stakeholders. Therefore, the planning for such works should have desired flexibility and complementarity for resource and technology leverage (e.g., a farm pond in a cascade should take into consideration the crop-water budgeting and cropping system change required under climate contingencies).

Inclusive: The infrastructure must provide equal opportunity to reduce climate stress for men and women and other disadvantaged social groups.

Timing and integration of adaptation options (Slide 4)

Figure 21. Timing and integration of adaptation options



(Source: adelphi)

	Reactive adaptation	Anticipatory/proactive adaptation	Integrated adaptation
Definition	Adaptation that takes place AFTER the impacts of climate change have been observed (IPCC TAR, 2001).	Adaptation that takes place BEFORE the impacts of climate change are observed (IPCC TAR, 2001).	Adaptation that takes place BEFORE the impacts of climate change are observed and has been INTEGRATED into local planning processes allowing the community to effectively manage risks, make use of synergies between measures, seize benefits and use opportunities from adaptation.
Example	Dykes were strengthened after the village was flooded several times.	Preventive installation of rainwater harvesting systems as a proactive response to the forecast of decreasing rainfall for the coming year.	Climate change indicators are included in existing monitoring concepts, irrigation schedules and/or crop harvesting schedules.
Effect	The local population is severely affected.	The local population is somewhat affected.	The local population may not be affected or might even profit.

Depending on the timing and integration of adaptation measures, the impacts of climate change at the local level (village, farm, etc.) can be very different. Both anticipatory and integrated adaptation enable proactive adaptation before damage occurs.

Reactive adaptation takes place after the impacts of climate change have been observed (IPCC TAR 2001). E.g., dykes were strengthened after the village was flooded several times.

Anticipatory/proactive adaptation takes place before the impacts of climate change are observed (IPCC TAR 2001). E.g., preventive installation of rainwater harvesting systems as a proactive response to the forecast of decreasing rainfall for the coming year.

Integrated adaptation takes place before the impacts of climate change are observed and is integrated into local planning processes allowing the community to effectively manage risks, make use of synergies between measures, seize benefits and use opportunities from adaptation. E.g., climate change indicators are included in existing monitoring concepts, irrigation schedules and/or crop harvesting schedules.

How to categorize adaptation measures? (Slides 6–8)

Grey: Technical measures

- Examples: infiltration ponds for managed aquifer recharge, rainwater harvesting systems, solar-powered irrigation systems, etc.
- Immediate risk reduction, medium- and long-term pay-offs.

Green: Measures that are based on ecosystems and their services

- Examples: renaturation of flood zones, biodiverse agroforestry systems, use of adapted crops and varieties, etc.
- Green measures are often cheaper and more flexible than technical solutions.
- Often provide additional co-benefits (e.g., water savings, energy savings, air quality improvement, carbon sequestration).

Soft: Managerial, knowledge- and capacity-based solutions

- Examples: trainings, formation of water user groups, climate risk insurance, etc.
- Often accompany grey or green measures as these may rely on particular internal/organizational capacities and abilities that are aimed at enhancing by the soft measures.

- Select relevant case studies of best practices for your participants. If the examples given in the presentation slides are not relevant to your group of participants, replace these by other examples. Make sure to name several examples to help participants get an idea of the variety of adaptation measures.
- Discuss with the group what examples of adaptation measures they know.

Group work: Identify adaptation options for the prioritized risks and needs (Slide 8)

- Identify adaptation measures with the participants to address the prioritized risks and needs using Worksheet 1 of Handout 4.2.
- Ask the participants to take a few minutes, close their eyes and freely brainstorm potential measures to the climate risks and key adaptation needs they face in their area (e.g., drought/floods).
- For inspiration, provide the participants with the CCA matrix (see Handout 4.2). If suitable for the group, you may also use existing, international databases on CCA measures. You will find some database examples with brief descriptions in the table below.

Potential case study: Your village is chronically drought-prone. You have to use the MGNREGA money to benefit your village. You know that in the next 20 years most of your existing springs will dry and your orchards and fields will not give you enough income. You have to brainstorm in the Gram Sabha various options and identify a few that can be taken up on a priority basis in the next 1–3 years.

Hints for the trainer:

- In general, it is advisable to have a good mix of solutions from all three categories (grey, green and soft) as they each have different advantages and disadvantages and complement each other.
- Look for measures that address multiple risks at the same time.
- Encourage participants to be inspired by best practices from neighbouring villages that are well known and may address similar risks.

Databases for adaptation measures

- **CCA measure matrix:** The CCA action matrix assigns appropriate adaptation measures to over 45 climate change risks including improved agricultural practices, water resource management, flood protection, infrastructure improvements, improved energy supply, ecosystem protection, etc. See Handout 4.2 annex.




		Population affected																	Livestock affected			
		IA1	IA2	IA3	IA4	IA5	IA6	IA7	IA8	IA9	IA10	IA11	IA12	IA13	IA14	IA15	IA16	IA17	IA18	IB1	IB2	IB3
ID	Potential adaptation measures																					
Liveli	MA Improve fishing livelihood																					
MA1	Fish processing technology units	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0
MA2	Drying systems for fish	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
MA21	Solar drying system for fish	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
MA3	Fish storage facilities	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0
MA31	Cold storage for fish (supported with solar energy)	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0
MA3	Community fish storage room	0	0	0	0	1	0	1	1	0	1	1	0	1	0	0	0	1	0	0	0	0
MA4	Storage facilities for nets and motors	0	0	0	0	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0
MA6	Fishing technologies for sustainable fishing	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0	1	0	0
Liveli	MB Improve agriculture (crops and practices)																					
MB1	Soil & moisture conservation measures	0	0	0	0	0	0	1	1	0	1	1	1	0	1	1	1	0	1	1	0	1
MB2	Soil fertilization	0	0	0	0	1	0	1	1	1	1	1	0	0	1	1	0	0	1	0	0	0
MB21	Utilisation of bio-fertiliser/vermi compost and pesticides	0	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1
MB2	Applying tank silts for soil fertilization	0	0	0	0	1	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	1
MB2	Black soil application	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0
MB4	Improve irrigation technique or infrastructure / channels	0	0	0	0	1	0	1	1	0	1	1	0	1	1	1	1	0	1	0	0	1
MB41	Promote sprinkler irrigation system / efficient / micro water systems	0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	1	0	1	0	0	1
MB4	Promotion of micro irrigation/water efficient use technologies by using solar	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	0	1	0	0	0
2																						
MB4	Strengthening of water irrigation channels	0	0	0	0	0	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	1
MB4	System of rice intensification (SRI)	0	0	0	0	0	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	1
MB4	drip irrigation	0	0	0	0	0	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	1
MB5	Promote drought/flood/saline/pest resistant crops and practices	1	0	0	0	1	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	0

- **European Climate Adaptation Platform Climate (ADAPT):** Climate-ADAPT aims to support the adaptation to climate change by allowing users to access and share data and information on adaptation case studies and potential adaptation options. The platform includes a database that contains quality checked information on success and limiting factors, costs and benefits, legal aspects, needed stakeholder involvement, implementation time and lifetime of each measure.

- Access database here: <https://climate-adapt.eea.europa.eu/knowledge/adaptation-information/adaptation-measures>

- **Adaptation Technology Database by Asia Pacific Adaptation Network (APAN):** APAN is a regional programme for managing and applying adaptation knowledge in the region, and supports governments and other organizations working on adaptation with a special emphasis on the management of knowledge and capacity building. It provides an adaptation technology database comprising over 140 measures. For each measure's information on the adaptation effect, needs, costs, maintenance, technology performance, etc. are provided.

- Access database here: http://www.asiapacificadapt.net/adaptation_technology/



SHARING ADAPTATION INFORMATION ACROSS EUROPE

ABOUT -

EU POLICY -

COUNTRIES, TRANSNATIONAL REGIONS, CITIES -

Climate-ADAPT search

Type of Item(Match: any)

Climate Impacts(Match: any)

Adaptation Sectors(Match: any)

Adaptation options

Droughts

Water management

Results 1 - 10 of 16 [Reset filters](#)

Conservation agriculture

Adaptation options

Conservation agriculture, as defined by the United Nations' Food and Agriculture Organisation (FAO), is "a farming system that promotes biodiversity and natural biological processes above and below the ground surface, which contribute to increased resilience to climate change and land" (2019) includes conservation agriculture among the incremental adaptation options to address climate change.

Adaptation options for hydropower plants

Adaptation options

Hydropower generation depends, by definition, on the availability of water and is therefore affected by the impacts of climate change leading to lower river flows and lower accumulation of water into dams, and hence to a lower amount of water that can pass through frequency and intensity of extreme precipitation events and accelerate snowmelt, leading to increased flood risk. Some locations are at high risk.

Reducing water consumption for cooling of thermal generation plants

Adaptation options

The most energy-efficient way of cooling thermal plants is using the once-through system, whereby "water is withdrawn from nearby water bodies and discharged back to its original source at higher temperatures. Because once-through cooling systems do not recycle the cooling water, they can consume large amounts of water. The thermal discharge downstream can also harm some aquatic life."

- Collect and cluster identified measures with the participants using the table below (see Worksheet 2 of Handout 4.2).

Table 9. Identified adaptation measure options

Risk	Need	Adaptation measure options
Scarcity of irrigation water due to droughts	Need for water-efficient irrigation system	Drip irrigation system, sprinkler irrigation system, etc.
...

Step 2. Assessing adaptation options according to different criteria

Participatory exercise

Qualitative assessment of adaptation measures (Slide 10)

A measure analysis helps identify and prioritize.

Assess measures considering their:

- Level of risk reduction
- Technical feasibility
- Internal feasibility (skills)
- Costs and benefits
- Social and environmental impacts (gender aspects, emission of GHGs).
- Acceptance and support (funding, e.g., with government scheme).



- Present the different criteria under which a measure can be assessed. Further descriptions of the different recommended criteria can be found below. The list of criteria can be shortened or extended according to the needs of the participants.
- Assess each identified measure option based on each criterion with the participants and award scores from 1–5 using worksheets 2–7 of handout 4.2. In Step 3, the scores are summed to a final score by which the adaptation measures will be ranked and prioritized (worksheet 8.1 and 8.2).
- During the assessment, it is advisable to let the participants note down critical assumptions made. These will help later when evaluating the measures during implementation or operation.

Criteria 1 – Assess the level of risk reduction (Slide 12)

Step 2. Assessing adaptation options

Criteria 1. Assess level of risk reduction

10 min, worksheet 2

- Analyse and discuss in group work how effectively the identified measure options reduce risks
Example: Drip irrigation has been shown to be more efficient in water use than sprinkler irrigation due to reduced evaporation and water runoff with additional benefits in plant disease control.
- 💡 Have in mind, combined measures are usually more effective than single measures.
- Insert your results in worksheet 2 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Scarcity of irrigation water due to droughts

Risk 2: ...

0 = no effect for reducing risk
1 = very limited effect
2 = limited effect
3 = medium effect
4 = high effect
5 = very high effect

Assumption: Clogging of irrigation emitters of the drip irrigation system can be controlled ...

Assumption: ...

The assessment of the level of risk reduction focuses on the outcomes and effectiveness of adaptation in relation to the identified risk.



Guiding questions:

- How effective would you rate the measure in reducing the identified risks?
- What would be the outcome of the measure (short-term, long-term)?
- How does the adaptation measure strengthen the resilience and adaptive capacity of the community?

- Analyse with the participants how effectively the identified adaptation measure options reduce risks by using Worksheet 2 of Handout 4.2.

Criteria 2 – Assess technical feasibility (Slide 13)

Step 2. Assessing adaptation options

10 min, worksheet 3

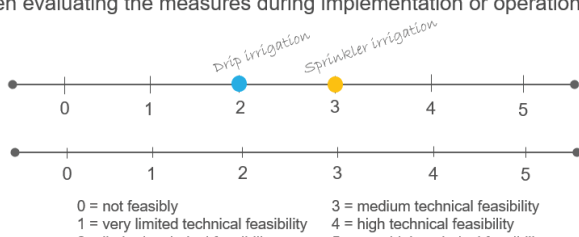
Criteria 2. Assess technical feasibility

➤ Analyse and discuss in group work how easy or difficult the implementation and operation of an adaptation measure will be regarding technical aspects (see helpful guiding questions in the handout)
Example: Drip irrigation systems may clog more easily than sprinkler systems, depending on the water quality. In addition, drip irrigation may not be the best option for all crops and soil types.



💡 If you have difficulties with the evaluation, search for case studies of the measure options in your area.

➤ Insert your results in worksheet 3 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Scarcity of irrigation water due to droughts
 Risk 2: ...



Assumption: Iron content of irrigation water is very high and thus poses a risk of clogging for the drip irrigation system.
 Assumption: ...



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The assessment of the technical feasibility focuses on the feasibility of the measure regarding technical aspects during its operation and implementation.

Guiding questions:

- How complex is the technical implementation and operation of the measure?
- What technical requirements do the measure and the location have?
- Is there a need for special tools and materials or existing infrastructure to implement or operate the measure?
- Is suitable land available?
- How time-consuming is the implementation and operation process?

- Analyse with the participants how easy or difficult the implementation and operation of an adaptation measure will be regarding technical aspects by using Worksheet 3 of Handout 4.2. The easier it is to meet technical requirements, the higher its feasibility.
- If the participants have difficulties with the evaluation, consider with them whether similar measures have been implemented before.

Criteria 3 - Assess internal feasibility (Slide 14)

Step 2. Assessing adaptation options

10 min, worksheet 4

Criteria 3. Assess internal feasibility

- Analyse and discuss in group work how easy or difficult the implementation and operation of an adaptation measure will be regarding internal aspects (see helpful guiding questions in the handout)
Example: The maintenance of drip irrigation systems requires more attention and professional staff than sprinkler irrigation systems due to risks of e.g. sunlight damaging or clogging of the drip line
- Insert your results in worksheet 4 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Scarcity of irrigation water due to droughts

Risk 2: ...

0 = not feasible
1 = very limited internal feasibility
2 = limited internal feasibility
3 = medium internal feasibility
4 = high internal feasibility
5 = very high internal feasibility

Assumption: Unfavourable conditions for drip irrigation prevail: medium irrigation water quality, high solar radiation, etc. ...

Assumption: ...

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The assessment of the internal feasibility focuses on the internal capacities required to implement and operate a measure.

Guiding questions:

- Does the implementation or operation of the measure require professional skills (e.g., maintenance of complex machines, water quality assessment)?
 - Do experiences with the technology and complexity of the measure exist within the community?
 - What organizational structures are needed (e.g., water user groups)?
- Analyse with the participants how easy or difficult the implementation and operation of an adaptation measure will be regarding internal aspects by using Worksheet 4 of Handout 4.2. The easier it is to meet internal requirements, the higher its feasibility.

Criteria 4 – Analyse costs and benefits (Slide 15)

Step 2. Assessing adaptation options

10 min, worksheet 5

Criteria 4. Analyse costs and benefits

- Analyse and discuss in group work how high or low the costs and benefits of an adaptation measure will be (see examples for costs and benefits in the handout)
Example: Drip irrigation systems usually require higher set-up and maintenance costs compared to sprinkler irrigation systems due to additional pre-treatment of irrigation water and/or additional installation of water pumps to maintain sufficient pressure throughout the drip line system.
- Insert your results in worksheet 5 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Scarcity of irrigation water due to droughts

Risk 2: ...

0 = very cost-effective
1 = cost-effective
2 = moderately cost-effective
3 = moderately expensive
4 = expensive
5 = very expensive

Assumption: The irrigation of a large field is planned. In addition, the irrigation water must be pre-treated to avoid clogging.

Assumption: ...

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The assessment of criteria 4 focusses on the qualitative analysis of the costs and benefits of a measure considering:

Costs of adaptation include:

- Is it economically viable to implement? (Investment costs: e.g., purchasing, delivery, installation)
- Is it economically viable to operate and maintain? (Operating costs: e.g., required inputs [energy, labour], regular repairs)
- Is the measure reversible/flexible, e.g., are adjustments at a later point in time at a low cost possible?



Benefits of adaptation include:

- Additional cost savings (e.g., energy/water efficiency, labour productivity).
- Additional livelihood generation (e.g., new crop).
- Is it a no- or low-regret measure (measure is beneficial even if the predicted climate impacts do not occur)?

- Qualitatively analyse how high or low the costs and benefits of an adaptation measure are by using Worksheet 5 of Handout 4.2.

Criteria 5 - Assess social and environmental impacts (Slide 16)

Step 2: Assessing adaptation options

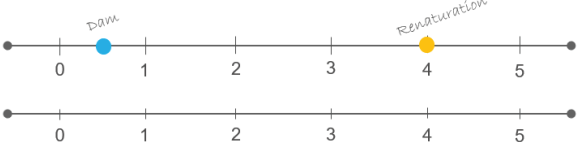



10 min, worksheet 6

Criteria 5. Assess social and environmental impacts


- Analyse and discuss in group work the risks and associated impacts of an adaptation measure by determining the degree, duration, scale and probability of change in reference to the current status of the environment and stakeholders, e.g. local communities (see helpful guiding questions in the handout)
Example: Dams are associated with a high negative impact on river ecosystems as they fragment the ecosystem, create a drier ecology downstream etc. Negative impacts on social, cultural and economic structures complete this list. In comparison, renaturation is the more attractive measure in this respect.
- Insert your results in worksheet 6 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Flooding of village



Assumption: Reforested trees grow well and takes root, ...

Risk 2: ...








Assumption: ...

0 = very high impact 3 = limited impact

1 = high impact 4 = little impact

2 = medium impact 5 = very little impact

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Environmental and social impact assessment identifies and evaluates the risks and associated negative and positive impacts of an adaptation measure on the current status of the environment and stakeholders such as local communities.

Guiding questions for assessing environmental impacts:

- What are the potential impacts of the measure on ecosystems (e.g., terrestrial, forest, marine, freshwater), biodiversity, water quality and aquatic ecosystems, soil?
- How many greenhouse gases and other harmful pollutants are emitted during the implementation and operation of the measure?
- Does the implementation of the measure cause disturbing noise for others?
- What resources/chemicals and energy are required in the implementation and operation of the measure and what impact does their production/procurement have on the environment and society?

Guiding questions for assessing social impacts:

- What are the potential impacts of the implementation or operation of the measure on stakeholder groups? To better answer this question, ask yourself, who will be involved in, affected by and/or benefit from the measure? How does the measure help the most vulnerable and address gender issues, children, and the elderly?
- What are the potential impacts on socio-economic structures? (e.g., employment, labour conditions, health systems, land ownership, cultural heritage)
- What are the potential impacts on the existing infrastructure?


- Analyse and discuss with the participants the risks and associated impacts of the measure options by determining the degree, duration, scale and probability of change in reference to the status of the environment and stakeholders, e.g., local communities (Worksheet 6 of Handout 4.2)

Hints:

- Make sure to consider both negative and positive impacts.

Criteria 6 - Assess acceptance and support (Slide 17)

Step 2. Assessing selected CCA options



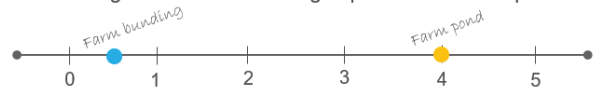
10 min, worksheet 7

Criteria 6. Assess acceptance and support

- Analyse and discuss in group work how well the measure is accepted by the local community and whether there are support programmes that can be sourced (see helpful guiding questions in the handout)

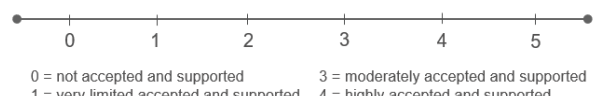
Example: *The construction of farm ponds is directly supported and promoted through the support scheme NREGA offered by the Ministry of Rural Development, this is not the case for measures such as drip irrigation.*
- Insert your results in worksheet 7 and note down critical assumptions taken for the assessment. These will help later when evaluating the measures during implementation or operation.

Risk 1: Scarcity of irrigation water due to droughts



Assumption: Less expensive

Risk 2: ...





Assumption: ...

0 = not accepted and supported 3 = moderately accepted and supported

1 = very limited accepted and supported 4 = highly accepted and supported

2 = limited accepted and supported 5 = very highly accepted and supported





The selected measure needs acceptance by decision-makers and authorities and must comply with regulations and laws. Since it can only be realized if funds are available for its implementation, it is advisable to think about appropriate funding and support schemes as early as possible.

Guiding questions for assessing acceptability:

- Is the selected measure in line with environmental pollution laws?
- Is the measure culturally appropriate and supported by the community? (e.g., religious, social, political etc.)
- Is it compatible with the actual local/indigenous practices, e.g., with past coping activities or adaptation measures?
- What is the acceptance of the measure in your community?



Guiding questions for assessing supportive schemes:

- Do you have sufficient funds for implementing the measure?
- Are there any support schemes or programmes that could be sourced? For instance, is it likely that the Panchayat will support the implementation of the measure through the MNREGA scheme and include operation and maintenance in the GPDP?

- Analyse with the participants the acceptability of and support for the measure options and insert your results in Worksheet 7 of Handout 4.2.
Brainstorm with the participants on possible support schemes.

Step 3. Selecting CCA measure(s) to be implemented

ID	Adaptation measure options	Criteria						Final score	Prio	Notes and comments
		Level of risk reduction	Technical feasibility	Internal feasibility	Costs and benefits	Social and environmental impacts	Acceptance and support			
1.	Rainwater harvesting for groundwater recharge through infiltration ponds	5	5	3	5	5	4	27	1	...
2.	...									

Useful literature and databases

- GIZ: Climate Expert: Case Studies. Available at: <https://www.climate-expert.org/en/home/case-studies/introduction-to-cases/>
- UNFCCC: Adaptation Knowledge Portal. Available at: <https://www4.unfccc.int/sites/nwpstaging/Pages/Home.aspx>
- European Climate Adaptation Platform Climate-ADAPT: Adaptation Options. Available at: <https://climate-adapt.eea.europa.eu/knowledge/adaptation-information/adaptation-measures>
- Adaptation Technology Database by Asia Pacific Adaptation Network (APAN): Adaptation technologies database. Available at: http://www.asiapacificadapt.net/adaptation_technolog/
- UNEP DTU Partnership: Technology Needs Assessment Database. Available at: <https://tech-action.unepdtu.org/tna-database/>

Key take-aways

When choosing the appropriate climate adaptation measure, it is important to consider its feasibility and impact on the environment and society in order to select the measures that best fit the local context and that can be implemented with the available resources.

- A combination of different measures from all three categories (grey, green and soft) is more effective in reducing risks than a single measure as they each have different advantages and disadvantages and complement each other.
- It is advisable to look for measures that address multiple risks at the same time.
- Local best practices serve very well for inspiration and often address risks that also concern one's own working environment.

Debriefing questions

- What are your important take-aways from this case study?
- Did the session help you select relevant CCA measures for your village/community?
- Which part of the exercise do you find most relevant to your work?



Module 5. Designing climate change adaptation projects under the GPDP

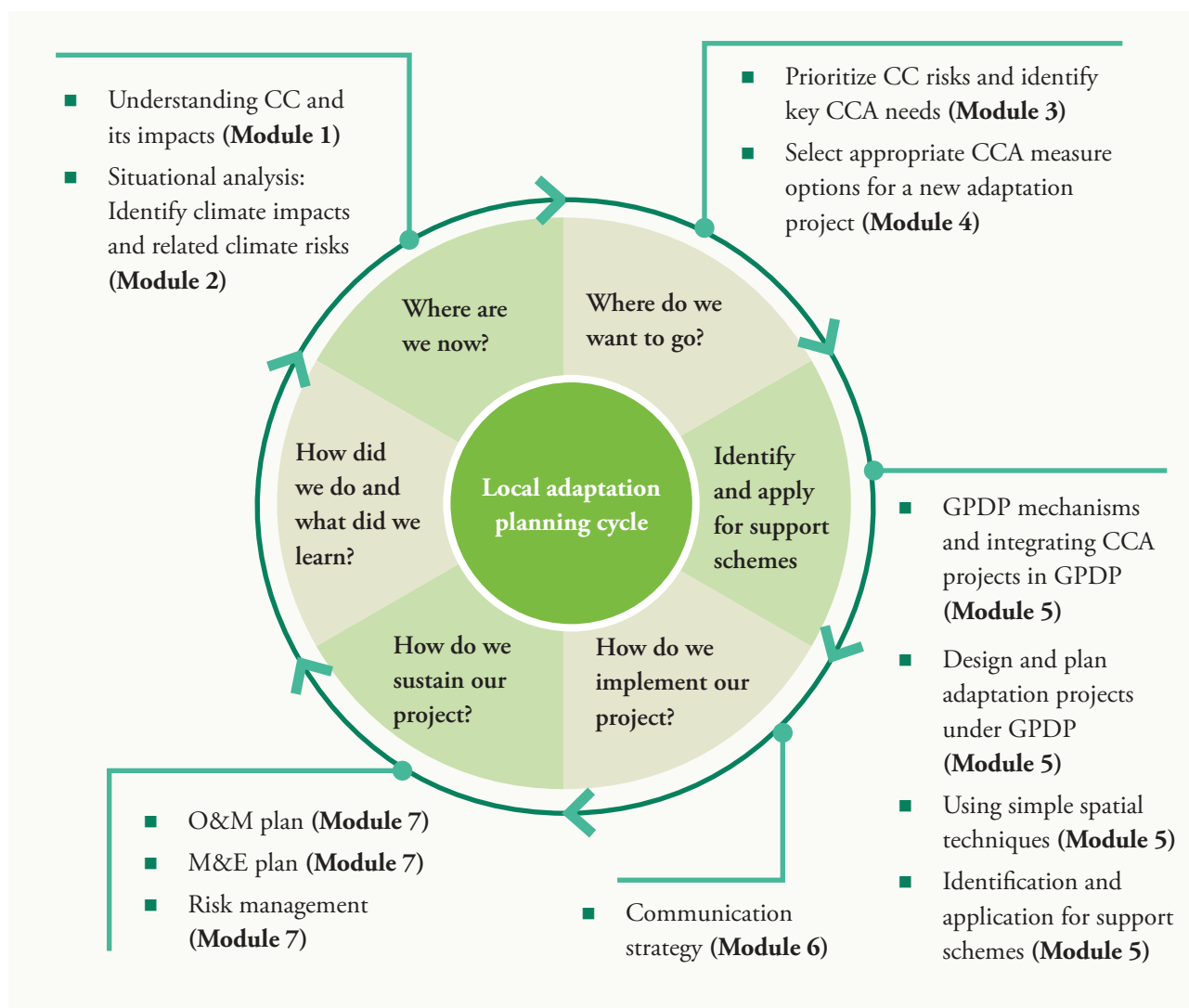
Learning objective	To know how to design an adaptation project, integrate it into GPDP planning processes and leverage various schemes
Duration	Shortest version: 7 h Complete version: 9 h

Module planner

Duration	Sessions	Shortest version	Complete version
90 min	Session 5.1 The Gram Panchayat Development Plan (GPDP) mechanism and integration of natural resource management (NRM) issues to address climate and disaster risk	x	x
3 h 30 min	Session 5.2 Design a project for selected adaptation measures that can be integrated into GPDP planning processes	x	x
30 min	Session 5.3 Adaptation measures that can be leveraged through GPDP/ MGNREGA vis-à-vis schemes and programmes	x	x
60 min	Session 5.4 Use of simple spatial techniques for NRM planning	x	x
60 min	Session 5.5 Identifying further relevant support schemes for adaptation projects	x	x
60 min	Session 5.6 How to apply for the relevant schemes for CCA–DRR		x

Integration of Module 5 along the local adaptation planning cycle

The methodology used by the Capacity-Building Package follows the logical processes of local adaptation planning. The figure shows the arrangement of the modules of the CDP, their main steps and the methods employed. The colour green indicates that you are in Module 5 and Step 5 of the local adaptation planning cycle, which enables PRI-members to design adaptation projects considering GPDP planning processes. For this, a fundamental understanding of GPDP mechanisms and their linkages to NRM will be provided. Besides guidance on project designing and planning, skilled experts will gain insight into spatial techniques for NRM-based planning. After developing a project design, participants will link their adaptation actions to relevant support schemes and institutions and learn how to apply for them. In this module, special emphasis has been placed on GPDP and DRR linkages and the flagship MGNREGA programme.



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In the ExcelTool, you will find a tab in the same colours. Here, you can document the results achieved by your group of participants in Module 5.

Session 5.1 Gram Panchayat Development Plan (GPDP) mechanism and integration of natural resource management (NRM) issues to address climate and disaster risk

Learning objective	To use the GPDP mechanism to integrate NRM plans for addressing climate and disaster risk	
Prerequisites/ prior knowledge for successful participation	Prior knowledge on climate risk, vulnerability and PRA exercises	
Step-by-step approach	Step 1. Overview of the GPDP process and linkages with NRM	30 min
	Step 2. Linkages of the GPDP to the CCA–DRR concept	30 min
	Step 3. Scientific and evidence-based adaptation planning using the GPDP	30 min
Total duration	90 min	
Methods/Exercises	Input presentation; sharing experiences linked to GPDP	
Material	PowerPoint presentation 5.1, Handout 5.1, Laptop, LCD projector	



Step-by-step approach

This session will provide PRI-members with access to the complex GPDP process and the knowledge needed to link it to the disaster (DRR) and climate change risk needs of local people.

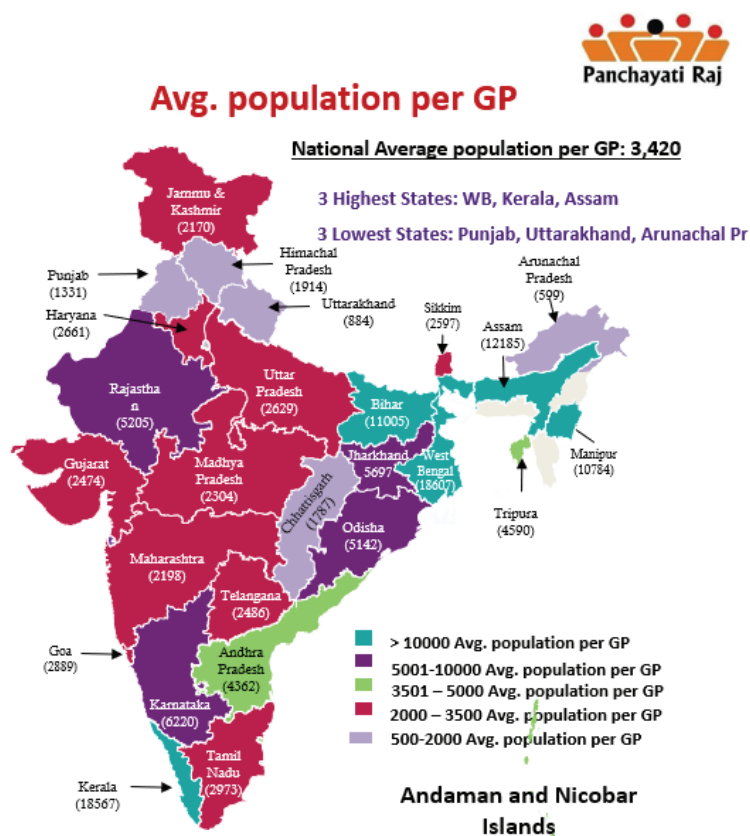
Step 1 will provide a general approach to the Panchayat and GPDP and its components, structure/plan cycle and funding options. **Step 2** focuses on the linkage between the GPDP and disaster risk management/disaster risk reduction. To conclude the session, **Step 3** uses a case study to show how scientific and evidence-based adaptation can be planned using the GPDP.

Step 1. Overview of the GPDP process and linkages with NRM

- Present slides 3–5 to the participants (presentation 5.1 – GPDP mechanism and integration of NRM) to the participants.

Panchayats are the building blocks for the decentralized planning process in India. The bottom-up approach informs the policies, programmes and priorities of the national and state governments. Increasingly, international commitments under the SDGs, the Sendai Framework for DRM and the Paris Agreement for climate change are being integrated into GPDPs.

Figure 22. Average population per GP



Source: <https://slidetodoc.com/gram-panchayat-development-plan-gpdp-peoples-plan-campaign-st>

The village plan is not a new concept – however, in recent years, the participation of people in the planning process (as opposed to top-down planning), resource devolution and convergence of schemes to avoid duplication has been the focus.

Article 243G of the Constitution provides for the “Powers, authority and responsibilities of Panchayat.” Subject to the provisions of the Constitution, the legislature of a state may, by law, endow Panchayats with such powers and authority and may be necessary to enable them to function as institutions of self-government. Such laws may contain provisions for the devolution

of powers and responsibilities upon Panchayats, at the appropriate level, subject to such conditions as may be specified therein, with respect to the preparation of plans for economic development and social justice. The implementation of schemes for economic development and social justices may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule. GPDP is a holistic and comprehensive decentralized plan at the village (Gram Panchayat) level for the people and by the people to meet local needs in 29 subjects by converging all schemes and funds.

Figure 23. Subjects of GPDP

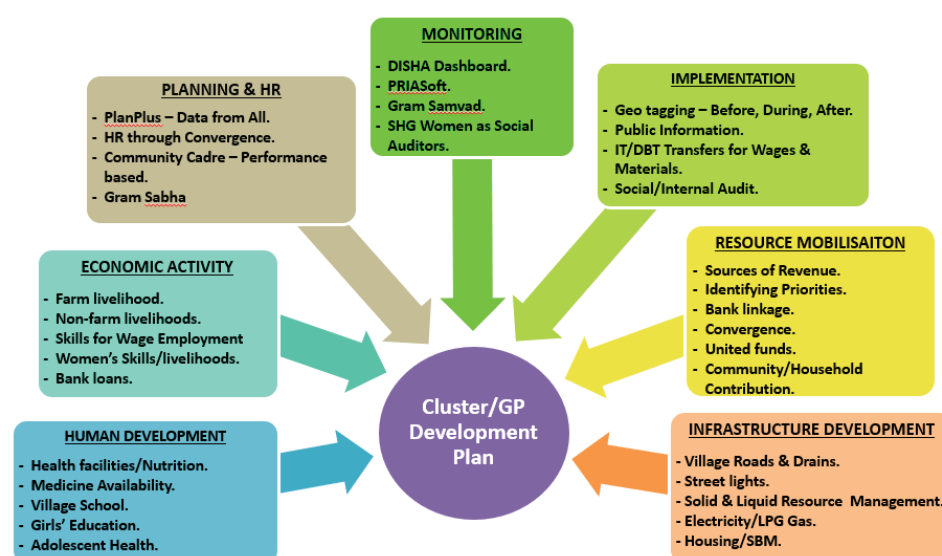


Source: <https://slidetodoc.com/gram-panchayat-development-plan-gpdp-peoples-plan-campaign/>

Linkages of the GPDP to NRM: The subjects listed from 1–7 are part of the NRM discourse in GPDP. Similarly, items 8–15 are related to infrastructure that needs to be resilient to address climate stress and disaster. Items 16–29 have strong linkages to the response capacity of the community.

The **key components** of the planning process are given in Figure 23.

Figure 24. Key components of the GPDP planning process



Source: <https://slidetodoc.com/gram-panchayat-development-plan-gpdp-peoples-plan-campaign/>

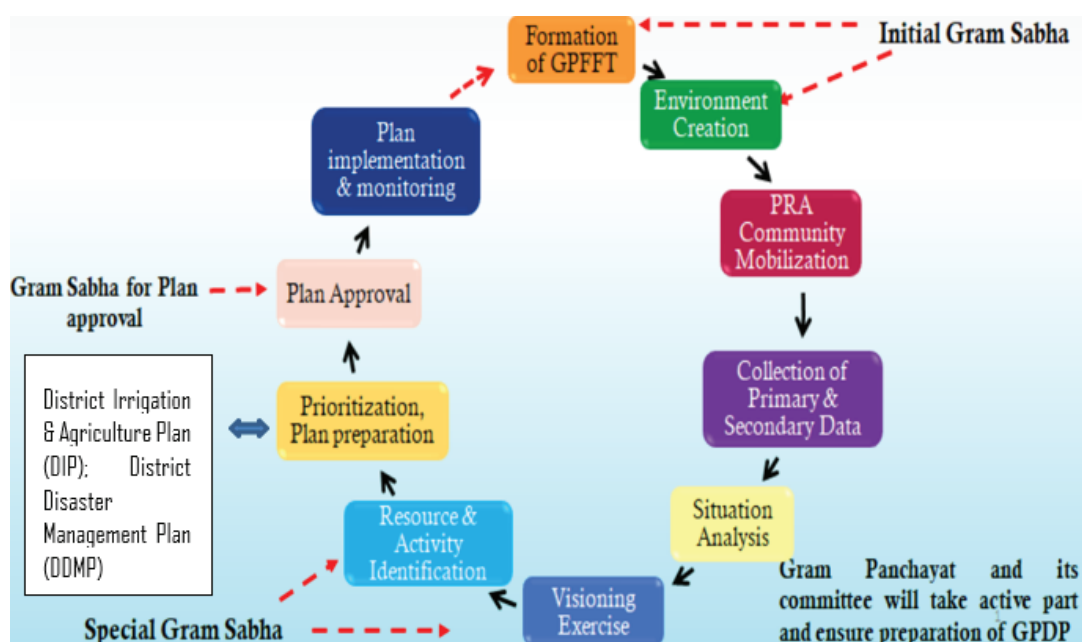
The **key stakeholders** that are involved in the planning process are given in Table 9.

Table 10. Key stakeholders involved in the planning process

Elected representatives	Functionaries (frontline workers of mission mode programmes)	Others
<ul style="list-style-type: none"> Mukhiyas/UP Mukhiyas/ Pradhans Traditional heads of PESA Panchayats Ward members Members of standing committees of Gram Sabhas 	<ul style="list-style-type: none"> Panchayat secretaries Rozgar sewaks of MGNREGA ASHA workers Jal sahiyas Anganwari supervisors Cluster coordinators under SSA Sahiyas/ANMs Cluster coordinators under SBA Charge officers 	<ul style="list-style-type: none"> Women collectives under the NRLM and other programmes NGO partners, if any Members of PPT Community members – members of the Gram Sabha and children/ child representatives Master trainers/resource persons

Plan cycle of the GPDP has been given in Figure 24.

Figure 25. Plan cycle of GPDP



Source: Ministry of Panchayati Raj and Ministry of Rural Development (nd): *People's Plan Campaign for Gram Panchayat Development Plan (GPDP) 2021-22*. Available at: https://gpdp.nic.in/resources/PPC-2020_Booklet.pdf

The opportunity for linking NRM issues in the GPDP serves as an input for the District Irrigation Plan, which aggregates crop-based water demand from GPs to create irrigation infrastructure. The inputs also help in preparing a comprehensive district agriculture plan, village water security plan, etc. Similarly, Section 32 of the Disaster Management Act, 2005, empowers local bodies like Gram Panchayats to articulate the requirements for responding/preparing for disasters, which acts as input to the disaster management plans of districts and states. This has been discussed in the following sections.

- Present slides 6–8 to the participants (presentation 5.1 – GPDP mechanism and integration of NRM) to the participants.

Step 2. Linkages of the GPDP to the CCA-DRR concept

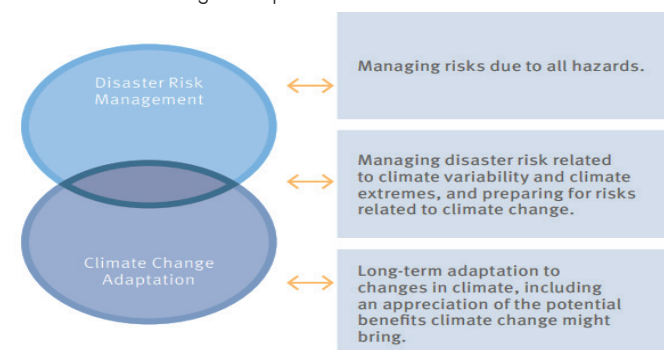
During the preparation of the GPDP, communities should be motivated to make their own short-term and long-term Disaster Management Plans for Disaster Mitigation, for which GPs need to lead from the front in building their capacities. GPs should consider the integration of disaster preparedness plans into the GPDP, particularly in disaster-prone areas. Most districts in UP have integrated Hazard Risk Vulnerability and Capacity Analysis (HRVCA) into their respective disaster management plans. During the visioning exercise and situation analysis while designing the GPDP, efforts should be made to synergize effectively to tap into the traditional wisdom of local communities and complement modern practices in disaster mitigation efforts. A synergic approach involving elected representatives along with civil society initiatives like NGOs and CBOs would provide a broad-based framework for disaster reduction and mitigation. During the data collection process, information and data on disaster preparedness should be collected.

People are aware of the risks posed by disasters and can react appropriately. However, adaptation needs due to climate change are relatively long-term and their planning is relatively difficult because of the associated uncertainty. Risk reduction and climate change adaptation are relatively not new for India – however, the combination or integration of both could be a new approach. Due to the past efforts of the NDMA, NIDM, Ministry of Earth Science and MOEF, knowledge of historical risks and expected future climate impacts are now available for further long-term planning. The GoI has effectively invested in research to identify priority areas and sectors that would be hit the hardest up until the 2050s. Most state governments now have a State Disaster Management Authority, the apex body for DRRM, along with state-level climate action plans. The challenge is coordinating adaptation activities across two different institutions, which sometimes leads to duplication or confusion at the local level.

Integration of NRM issues in the GPDP through the CCA-DRR lens

Mainstreaming disaster management into the development planning process essentially means looking critically at each activity that is being planned, not only from the perspective of reducing the disaster vulnerability of that activity but also from the perspective of minimizing that activity's potential contribution to hazard-specific vulnerability. CCA and DRR are cross-cutting concepts and require multi-sectoral and multi-agency convergence. The expected benefits of mainstreaming climate change adaptation and disaster risk reduction into development activities include avoided policy conflicts; reduced risks and vulnerability; greater efficiency compared to managing CCA and DRR in silos. Both structural and non-structural measures that can help the community better prepare (capacity to respond and post-disaster recovery) should be part of GPDP. They should look into current and future vulnerabilities and find the gap in infrastructure, institutions and skills when suggesting such measures.

Figure 26. Interlinkages between disaster risk management and climate change adaptation



Adapted from Mitchell and van Aalst, 2008

Case study for linking the concerns of CCA & DRR to a plan like the GPDP: Development of the Resilient Village Programme (RVP) in villages of Bihar

A resilient village is envisaged as a dynamic and proactive social unit wherein individuals, households and the community as a whole are capable of assessing natural hazards and climate-change-induced risks and accessing early warnings; addressing climate-change-induced hazards through risk-informed development planning, including preparedness, mitigation, response and recovery in form of building back better; and preserving the ecosystem thorough environmental impact assessments. Based on the concept of the resilient village, the Resilient Village Programme (RVP) has been developed by the Bihar State Disaster Management Authority (BSDMA) in alignment with the DRR roadmap (2015–2030) of Bihar. RVP is backed by the comprehensive structure involved in the development of the Gram Panchayat Development Plan. The field testing of the RVP was done in 10 villages of Bihar, and the programme is yet to be implemented in all the villages of the districts of Bihar based on their risk priority in the 2015–2030 related phase of the DRR roadmap.

The RVP broadly focuses on understanding and assessing the disaster risk at the village level and developing a Gram Panchayat level development plan to integrate the concerns of DRR & CCA, using participatory and scientific risk analysis; planning for risk reduction actions with a focus on vulnerable sections and areas; capacity-building of VDMC and concern villagers on risk analysis, risk-informed planning and risk reduction actions; and target actions for communication for DRR.

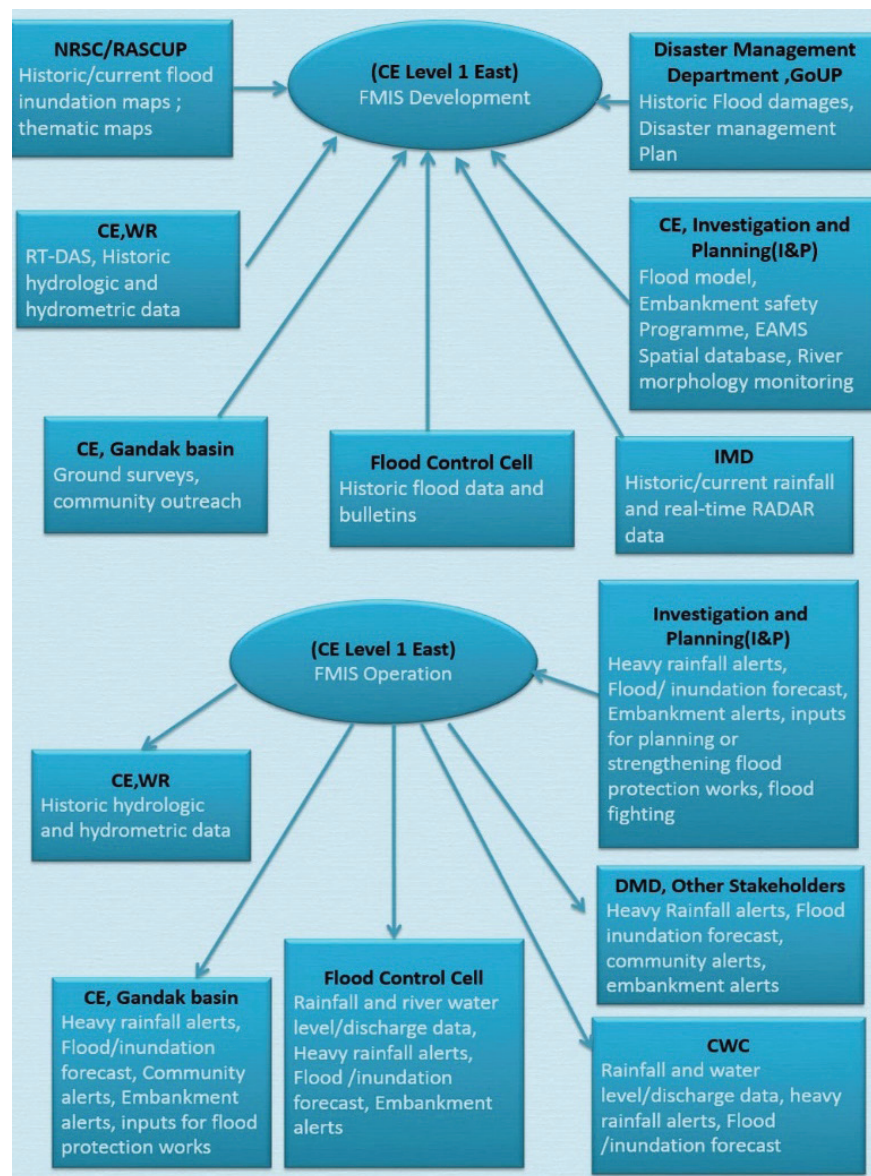
Step 3. Scientific and evidence-based adaptation to flooding in UP by establishing a Flood Management Information System

A Flood Management Information System Centre (FMIS) has been established in the wake of recurring floods in Ganga, Yamuna, Ramganga, Gomti, Sharda, Ghaghara, Rapti and Gandak rivers of Uttar Pradesh, which annually affect about 2.7 million hectares of land and more than 21.1 million people and causes damage of ₹ 430 crore. More than 30% of the total geographical area is flood-prone in 23 districts of Uttar Pradesh.

- Present slides 9–10 to the participants (presentation 5.1 – GPDP mechanism and integration of NRM) to the participants.

FMIS was created in Uttar Pradesh with a government order dated 20 October 2014. FMIS is a system developed to produce operational information products that support the organizations responsible for the construction and maintenance of structural and non-structural interventions for flood mitigation. FMIS also provides flood projection-related information to state disaster management agencies so that they can take needed actions at an appropriate time. FMIS has been implemented on a pilot basis in the Rapti basin extending to Ghaghara and the other flood-prone basins of Uttar Pradesh. The primary focus of FMIS is flood forecasting, river monitoring, community outreach and public dissemination. FMIS supports emergency flood management through in-season river monitoring and real-time inundation mapping. It involves satellite monitoring of river basins in flood seasons with a centralized accessible GIS database and provides technical support to various flood offices of the prone districts by conducting real-time monitoring of hydrological and meteorological data.

Figure 27. Process behind development of FMIS and operation of FMIS in UP



Source: Irrigation & Water Resources Department of UP (nd): Flood Management Information Center. Available at: <https://www.fmiscup.in/>

FMIS supports short-term flood response, long-term flood early warning and flood-management goals. FMIS issues the flood bulletin during the flood season daily for all the rivers by indicating their respective water levels and also gives real-time rainfall statistics. Further, FMIS issues embankment advisories for flood divisions or the drainage divisions of irrigation departments present across the pilot area for projecting the vulnerable area of the respective embankment in case the river breaches the embankment.

Group discussion

Encourage the participants to share their experiences on how they can link this to GPDP.

Guiding questions:

- What actions do you take to prepare for and/or reduce impacts of disasters on your village?
- Will some actions that you took help in the short term (list) and what will help in the long term to reduce the effect?
- Are you aware of the district disaster management plan of your district?
- Did you participate in planning, training? If so, please list the topics.

Useful literature and databases

- Ministry of Panchayati Raj and Ministry of Rural Development (nd): People's Plan Campaign for Gram Panchayat Development Plan (GPDP) 2021-22. Available at: https://gdpd.nic.in/resources/PPC-2020_Booklet.pdf
- Ministry of Panchayati Raj: Guidelines for Preparation of GPDP 2018 (nd). Available at: <https://panchayat.gov.in/en/gdpd-guidelines-by-mopr>
- Ministry of Panchayati Raj Department of Rural Development (nd): Gram Panchayat Development Plan (GPDP); People's Plan Campaign 2nd October 2018 – 31st December 2018. Available at: <https://slidetodoc.com/gram-panchayat-development-plan-gdpd-peoples-plan-campaign/>
- Irrigation and Water Resources Department of UP (nd): Flood Management Information System Centre of Uttar Pradesh. Available at: <http://fmiscup.in>

Key take-aways

- The process described in this module shows how the GPDP planning process can integrate proactive adaptation measures that can address disaster risk for the area.
- There is some degree of overlap between CCA and DRR, which needs to be clearly articulated.
- The tool (in the case study) encourages participants to think through these linkages in the CCA–DRR framework of the country.
- The tool encourages participants to fine-tune action plans by assessing alternatives.
- Focus on addressing how benefits can accrue to the community and individuals both in the short and long run especially during and after disasters.

Debriefing questions

- What are your important take-away messages from this session?
- Do you plan to apply the key concepts provided by this session to your work? How would you do this?

Session 5.2 Designing a project for selected adaptation measures that can be integrated into GPDP planning processes

Learning objective	To design a need-based project at the village level that can be integrated into the GPDP	
Prerequisites/ prior knowledge for successful participation	Climate risks, CCA needs and measures are identified (Module 2, 3 and 4); knowledge of the planning cycle of the GPDP, structural and non-structural measures and climate-resilient works. The participants should familiarize themselves with their sectoral issues (water) and also have a basic understanding of PRA exercises	
Steps (duration)	Step 1. Review and outlook: local adaptation planning cycle	30 min
	Step 2. Developing a basic project design for selected CCA measures (objectives, outcome, output)	60 min
	Step 3. Developing an action plan (tasks, timeline, roles, resources) Developing a generic action plan Specific processes for the development of a village-level action plan (sectoral) that goes into the GPDP	120 min
	Step 4. Database generation for adaptation planning	60 min
Total duration	4 h 30 min	
Methods/ Exercises	Input presentation, reviewing prior key results, determining the results chain, developing an action plan, visioning exercise for a water project and database generation for adaption planning using the example of water budgeting	
Material	PowerPoint presentation 5.2, Handout 5.2, Laptop, LCD projector, flip chart or wall to pin cards on	
Preparation of the material	You may adapt the examples provided that facilitate the exercises in this session to the participants' context.	

Step-by-step approach

After identifying, assessing and prioritizing climate risks, adaptation needs and concrete adaptation measures (Module 4), this module deals with the design of adaptation projects aimed at reducing the identified climate risks.

The project design presented in this session is a four-step process that helps the community create the “backbone” of their adaptation project, beginning with a brief review of previous modules and an outlook on upcoming ones (**Step 1**). In a review exercise, participants will reflect on their collected findings on climate impacts, risks, adaptation needs and selected adaptation measures and adjust them if necessary. The module continues with the development of a basic project design (**Step 2**). Here, an overarching goal or vision of how participants want to see their future in relation to the identified climate risk is identified, and a results chain is created. In **Step 3**, participants develop necessary tasks and their phasing and identify the resources necessary to achieve the defined goals and objectives. Step 3 first addresses the development of a general action plan and then looks at the key processes for developing a village action (VAP) plan for the GPDP.

The concepts used in this session need not be new to participants. Defining goals, developing an action plan and other aspects of project design may have already been learned in other contexts. However, in this session, participants will have the opportunity to clarify concepts, talk with each other purposefully and work through the design process by practically planning an adaptation project for their community. At the end of the session, the participants will move one step closer to preparing a risk-informed village-level action plan that will fit into the GPDP. How the adaptation project could be funded will be looked at in Sessions 5.3 (with a special focus on MGNREGA), 5.4 (further support schemes) and 5.5 (the application procedure).

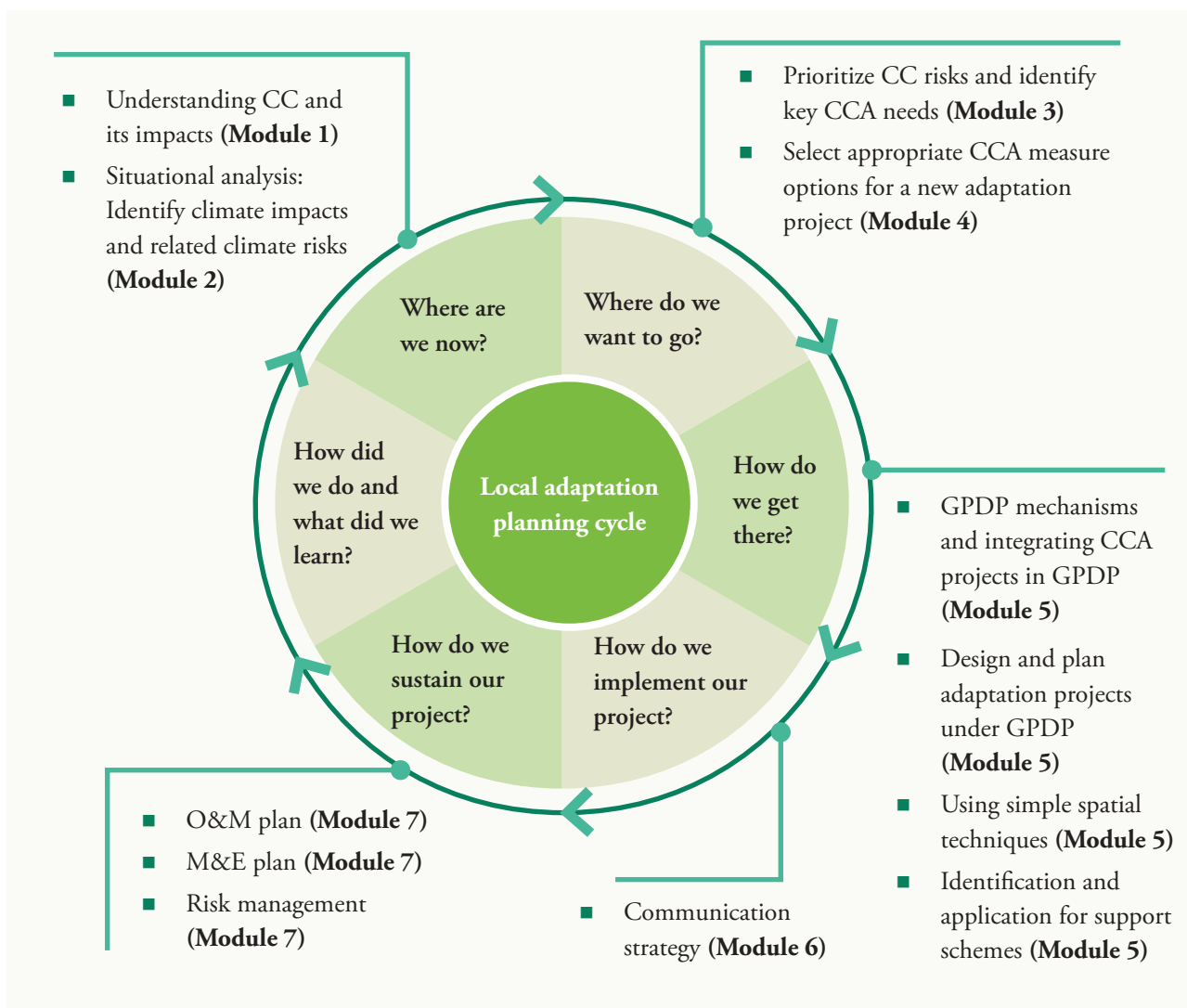


Step 1. Review and outlook: generic local adaptation planning cycle

Input presentation

- Present slides 3–6 (Presentation 5.2 – Designing a project for selected adaptation measures) to the participants.

Figure 28. Arrangement of the CDP's modules along a general local adaptation planning cycle



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The cycle shown in Figure 1 illustrates the relationships between the different steps/phases in project development for climate adaptation, with one step neatly following another. In fact, a project rarely develops in such a pattern – steps can happen simultaneously, and it may be necessary to pause work to reconsider or redo something. The present Capacity-Building Package comprising several modules also follows these logical sequences of project planning.

You can present this overview to the participants to give them an understanding of project development/planning. The circle diagram also gives a good overview of the results achieved in previous modules, where the participants are currently in project development/planning (Module 5), and what they can expect from Module 5 and the following Modules 6 and 7.

Review exercise – Review your climate impact – risks – CCA needs – CCA measures chain identified in prior modules

Time: 30 min

At the beginning of the session, discuss and evaluate with the participants the results gained in the previous modules/sessions. For the exercises in this session to be successful, participants must be aware of the climate risks relevant to them and have concrete ideas for an adaptation project (adaptation needs are identified and measure options are assessed and selected). If participants are undecided about which CCA measure options they want to realize with a CCA project, you may repeat exercises from Modules 2, 3 and 4 with the participants depending on their specific training needs.

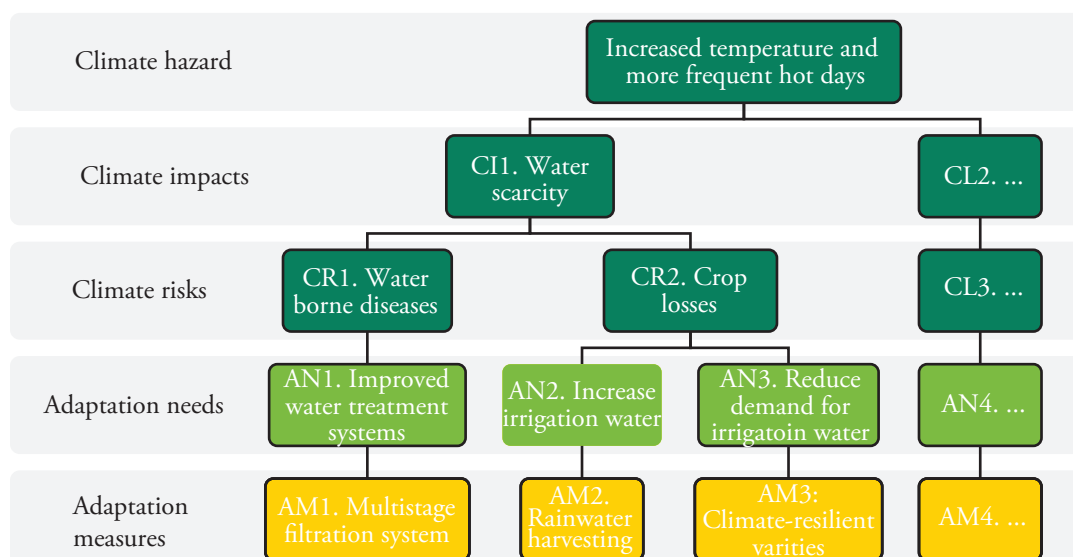
The group exercise below will help the participants remember and structure their results from prior modules.

- Ask the participants to reflect on the climate impacts and related risks identified in Module 2. Engage them to recreate their climate impact chain, similar to the one below, by writing down climate impacts (remember, there are direct and indirect impacts) and prioritized risks (most relevant negative effects on the participants) on **red cards**.
- After the participants reflect on their climate impact chains, ask them to write down their key adaptation needs to minimize the identified climate risks on yellow cards and to add them to their climate impact chain. The adaptation needs have to result directly from the risks and describe broad solutions at this point. Help participants think “big picture” to define their needs.
- Finally, ask participants to write down specific adaptation options on green cards. These will also be added to the overall picture as shown in the visualization example below.
- To assess their results, participants can use Worksheet 1 of Handout 5.1.

Hint for the trainer

- The resulting overview is a perfect start for the development of a project design and will be very useful in the next steps.
- If participants get stuck, support them with simple questions.
- An adaptation project can comprise several measures. For simplicity, however, it is advisable to let the participants choose one identified measure for which they will carry out the next steps of this session (in the best case, this measure has scored best in the rough assessment in Session 4.2). Afterwards, the session can be replicated for other measure options. There are measures that complement each other very well and are required by many funding institutions as part of one project, such as grey measures (e.g., managed aquifer recharge system) and soft measures (e.g., capacity building).





Step 2. Developing a basic project design for selected CCA measures (Objectives, Outcome, Output)

This step will guide the participants in defining specific objectives, outcomes and outputs for their selected adaptation measure in Module 4.

Input presentation: Results chain of an adaptation project

- Present slides 8–9 (Presentation 5.2 – Designing a project for selected adaptation measures) to the participants.

A results chain shows the targeted short-, medium- and long-term results of an action in a series of causal statements. As shown in Figure 37, there are four basic components of a results chain:

Activity: How the project through proposed measures intends to achieve its objectives and goals

Examples:

1. *Rainwater harvesting*
2. *Climate-resilient varieties*

Output: The tangible and intangible products that result from project activities are often described as direct results

Examples:

- 1.1. *x m³ of rainwater harvested*
- 1.2. *x ha area additionally irrigated*
- 2.1. *x ha field is planted with climate-resilient plants*

Outcome: The short- and medium-term effects of an intervention's output; the outcome describes the **objectives** (what the project intends to accomplish).

Examples:

- *To increase year-round access to food to 50% of the vulnerable households through climate-resilient cropping practices and water management in three years.*

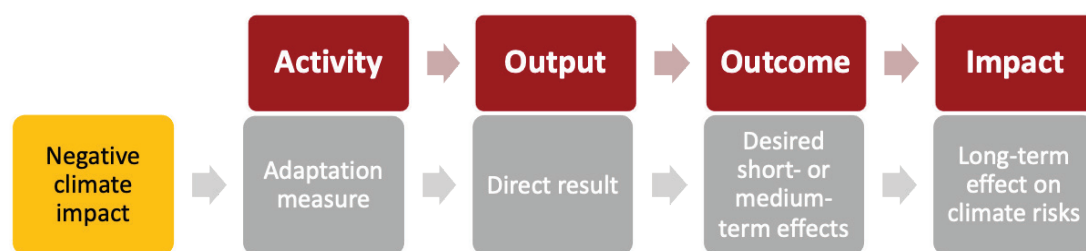
Impacts: Higher level strategic **goals** such as increased access to justice or improvements in public safety. The impact can be achieved only indirectly through the outcomes (objectives) of the project.

Example:

- *Achievement of food security in our villages addressing climate change.*

Results chains help to break down and refine your project idea and assumptions for achieving the objectives and thus form the basis for developing the project action plan (Step 3) and the monitoring and evaluation plan (Session 7.2) that measures the effectiveness of your actions.

Figure 29. Results chain of an adaptation project



The SMART concept for defining project objectives and goals (slide 10)

When defining your results chain, make sure that the outputs, outcomes are SMART:

- **Specific** – an objective should say exactly what will be achieved, with who, how, when and where;
- **Measurable** – so you are able to tell exactly when the objective is achieved;
- **Achievable** – it must be realistic given the prevailing circumstances and challenges that you are facing and resources available to you
- **Relevant** – it must relate to the problem being addressed; and
- **Time-bound** – it must be achieved by a certain date

Group exercise: Developing a basic project design (slide 11)

Time: 30 min

- Facilitate the participants in creating their project design. This will be done by continuing their climate-impact chain (review exercise) with a result chain. The participants may follow the listed steps:
 1. Start with your selected adaptation measure (green cards from review exercise).
 2. Determine the tangible and intangible products/direct results that result from the adaptation measure, which will be the outputs of your project.
 3. Determine the short- and medium-term effects/benefits of an intervention's output, which will be the outcome of your project. Guiding questions: What does the project intend to accomplish in the short/medium term?
 4. Determine the impact of your project/CCA intervention, which will be the goal. Guiding question: If I reduce the climate risks addressed with the selected adaptation measure(s), what are the long-term effects for the village?

In case the participants have problems defining the overall goal of their projects, conduct the following visioning exercise with them:

- Ask participants to sit back in a comfortable position, relax and imagine the following:

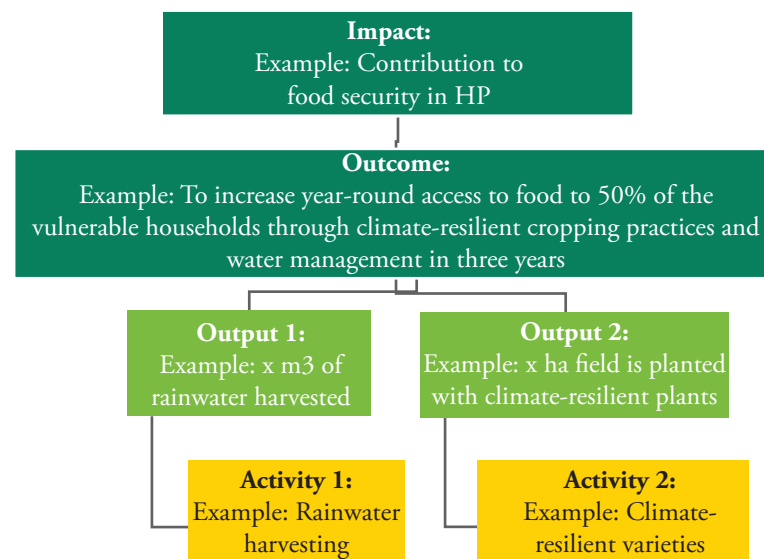


“It is now one or two years into the future. You and your community are having an enormous celebration to commemorate the project you have finished. The community has really moved forward, and you are all beaming with pride about what you have accomplished. You feel excited about some of the obstacles and conflicts you were able to overcome, and you’re all pleasantly surprised to have seen such strong commitment from so many people. You’ve even managed to get good support from outside the community. It’s mid-afternoon and one of the community leaders’ steps to a microphone to recount the major accomplishments and point out the results of your hard work. Listen closely... What do you hear the leader saying? Look around you... What do you see has happened as a result of this project?” (Peace Corps 2003)

- Engage the participants to write a brief statement or draw a picture with key words to represent the vision/goal they had in mind when listening to you. Afterwards, ask them to present in one minute what they have seen.
- To collect their results, participants can use Worksheet 2 of Handout 5.1

Hint for the trainer

- Advise the participants that the impact is generally very broad and that a project can just contribute in a small way.
- One activity can have more than one output.
- To give the participants a better understanding of the exercise, it is advisable to present them with an example. You will find one example below in the visualization example, which may need to be adapted to the situation of the participants.



Step 3a. Developing a generic action plan (tasks, roles, timeline, costs)

- Present slides 13–17 (Presentation 5.2 – Designing a project for selected adaptation measures) to the participants.

Step 3 will focus on the project activities and their planning. Participants learn what an action plan is and its respective components: Tasks, schedule and costs. The learning is then applied to the participants’ project ideas/**own examples**.

Input presentation

Action plan

The action plan (sometimes also called a project plan) is a logical series of tasks/activities to achieve the project objectives. **Guiding questions:** What activities are needed to set up a rainwater harvesting system in my village? (e.g., Are people of my village with required professional skills available? What infrastructure activities are necessary?)

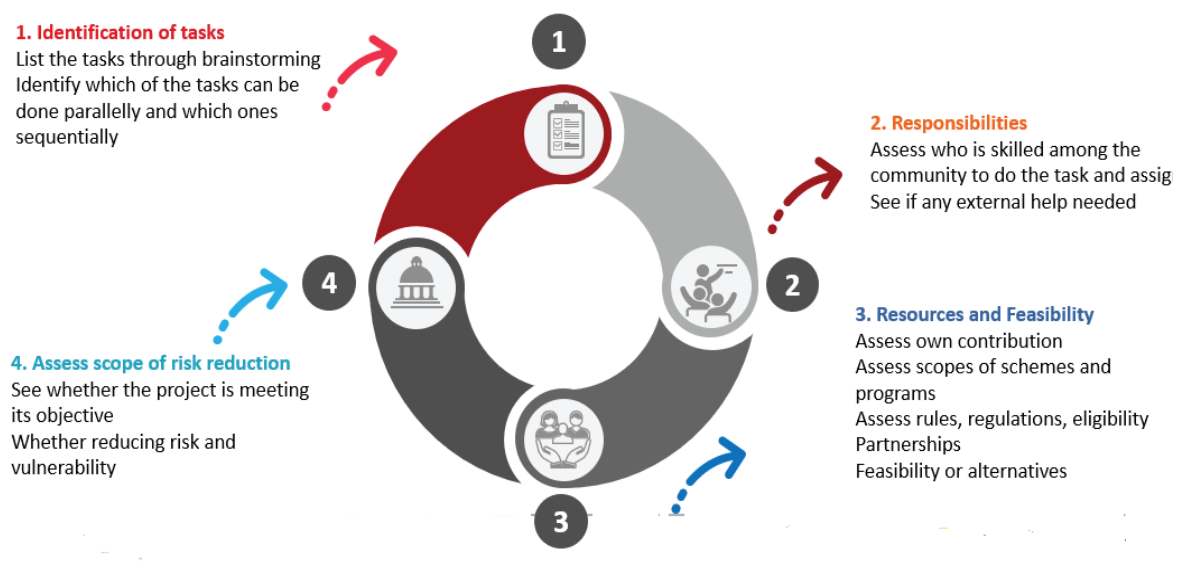
WHAT IS A PROJECT PLAN	WHY WE PLAN	HOW IT HELPS
<ul style="list-style-type: none">• A series of steps arranged in specific sequences (one after another or parallel) to lead to an objective that helps in reducing risk or vulnerability of a community	<ul style="list-style-type: none">• It is based on issues and priorities• It clarifies goals and helps community develop a vision or an outcome• Assess various alternatives and their feasibility• Assign resources• Assess partnership/convergence• Check whether it is reducing risks/vulnerability	<ul style="list-style-type: none">• Eliminates poor planning• Tries to filter out very ambitious projects• Clarifies linkages of activities to address/issues and problems• Optimisation of resources• Better accountability• Leading to risk reduction

Steps in action planning

Figure 30 illustrates the sequence of steps towards the creation of an action plan, which will be carried out in the following exercise.

- The facilitator will explain the different steps of action planning by introducing the planning cycle (Slide 15) to the participants.

Figure 30. Steps in action planning



(Source: CTRAN)

Group exercise

Identification of tasks and their phasing (slide 16)

- After the participants have identified the climate-impact chain and results chain of the envisaged adaptation measure, encourage them to:
 - Brainstorm about various sub-activities that address the prioritized climate risks and help in the achievement of the targeted outcomes.
 - Note them on cue cards and pin them on a timeline, some in sequence and some parallel (above and below the line).
 - Collect the key result on Worksheet 3 of Handout 5.1

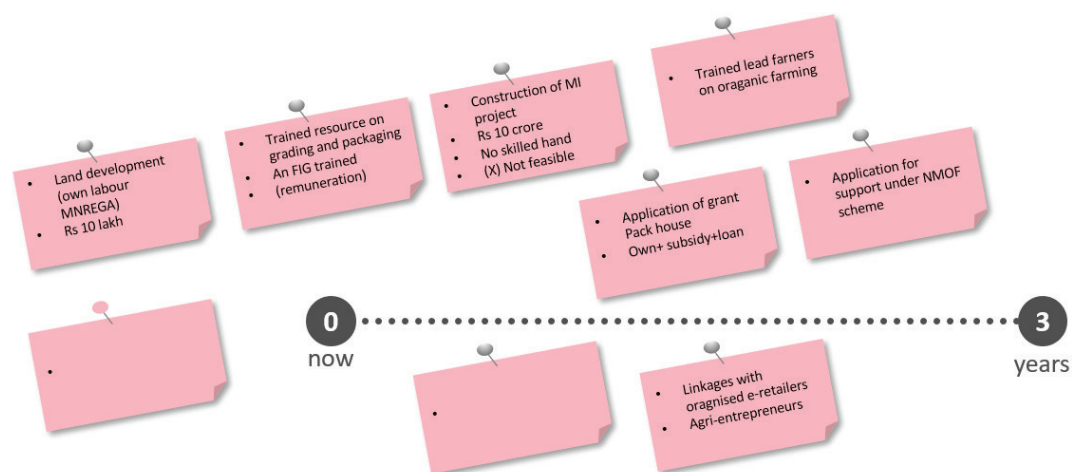
Examples of sub-activities:

- Land development
- Formation of Farmer Interest Groups
- Formation of FPO
- Training on climate-resilient farming practices
- Undertaking a MI project by all villagers
- Training on grading and packaging
- Linkages with organized e-retailers
- Application for packhouse construction
- Training on climate-resilient farming practices



Estimate resources: Human resources and costs (slide 17)

- Engage the participants in estimating the necessary resources for project implementation and operation. **Guiding questions:** Who can lead this activity? Do we have the necessary resources in our community, or do we need to hire or partner (Human Resource)?
- Afterwards, ask the participants for a rough estimate of the cost for each activity. **Guiding questions:** How much of the estimated costs can be contributed by the community? How much budget could be obtained via schemes? What is the gap? What could be borrowed? If the costs are too high, they have to consider alternatives and/or drop the activity unless the objective is at risk.
- To collect their results, participants may use Worksheet 4 of Handout 5.1.



Develop an action plan

The participants may also use the matrix below to collect their results from the Step 3 exercises and to create an action plan (Worksheet 1 of Handout 5.1).

- Note the potential activities which the participants identified and will get them to achieve the defined objectives in the left-hand column of the table below.
- Ask the participants to identify and to note:
 - Who should lead this initiative (can be individual alone, group, institution)
 - When the activity should be done (immediate: within 2–3 months; soon (in a years' time; later (within 1–2 years).
- In the final step, ask the participants to note the estimated resources needed (They may not get to the number at this stage, let the participants only identify the labour, material and indicative cost).
- To collect their results, participants can use Worksheet 5 of Handout 5.1

Activity		Land development	Farm pond	Drip irrigation
Who will do	Individual			x
	Group	x	x	
	Institution	PRRD	PRRD	Horticulture
When	Immediate			
	Soon			
	Later			
Resources	Labour			
	Material			
	Financial			



Step 3b. Specific processes for the development of a village-level action plan (sectoral) that goes into the GPDP

- Present slides 18–22 (Presentation 5.2 – Designing a project for selected adaptation measures) to the participants.

This step will guide PRI-members in developing a village-level action plan under GPDP. To illustrate the theory, a case study example on increasing drinking water availability in your village is given.

The Gram Sabha is the critical institution in the planning process.

- It determines the order of priority of works in the meetings of the Gram Sabha keeping in view the potential of the local area and its needs and local resources (Para 4 (2), Schedule I).
- Monitor the execution of works within the GP.
- It is the primary forum for the conduct of social audits.
- It provides a platform to all residents to seek and obtain all relevant information from all the Implementing Agencies including GP in relation to MGNREGA works implemented in the GP area.

Case study

The FC-XV in its interim report has recommended a sum of ₹ 60,750 crore be allocated to PRIs for the year 2020–21. All the tiers in the Panchayats – village, block and district, including Fifth and Sixth Schedule areas, shall receive the grants. This will enable the pooling of resources across villages and blocks to create durable community assets and improve their functionality. The goal with regard to drinking water is ensuring the long-term sustainability of the water supply system to provide a minimum service level of **55 litres of potable water per person per day**, and PRIs should accord utmost priority to this activity.

Situation analysis on context: Your area (reflect on the map) is under moisture stress and a drinking water crisis. The people of the village struggle to get water. The tap connections go dry, and for 3–4 months every year, there is a crisis of lack of drinking water and water for livestock and crops. The Gram Sabha has debated these aspects. You can submit a new scheme for drinking water for your village or suggest retrofitting to an existing scheme. How can you determine whether you have a functional tap connection or not?

These steps will guide you.

How can you determine whether you have a functional tap connection or not?

	Fully-functional	Partially-functional	Non-functional
Quantity	≥ 55 lpcd	>40 lpcd <55 lpcd	<40 lpcd
Quality	Potable	Potable	Non potable
Regularity*	12 months or daily basis	9-12 months < daily basis	<9 months < daily basis

Activities that need to be planned:

Community-led activities

- Environment creation for a participatory planning/**visioning** exercise (usually starts on 2nd October)
- The NRDWP Department should take the proactive step in contacting **key stakeholders** in the GP, Sarpanch and other functionaries seeking their cooperation and support **to form a VWSC and GPPF Team in order to conduct the GPDP exercise.**
- The NRDWP Department should identify the nodal officers of other schemes (e.g., SBM-G; MGNREGS, WED-PMKSY), requesting their participation and support. These are required for **convergence.**
- **Panchayat resolution** for making it a part of the Jal Jeevan Mission (JJM) in the GP. This may differ for other sectoral action plans.
- Orientation to the VWSC and local members of GPPFT on GPDP and the significance of VAP for enhancing rural water supply, especially in the context of the situation worsening due to climate change.
- **Analysis of the situation analysis report through PRA**, Household Survey and collecting data available with other secondary sources such as the Panchayat Office.
- **Identifying gaps** in service level and infrastructure/facility requirements.
- Preparing a **draft status report (DSR) along with a rough cost estimate (RCE).**

Official facilitation with PRIs

- Presentation of the DSR and RCE in the Panchayat Development Seminar at the GP
- Identifying the Resource Envelop from various schemes (**based on the cost norms**)
- Aligning the VAP with existing schemes (convergence planning)
- Preparing an indicative Perspective Plan and Realistic Operational Plan
- Finalizing the WS-VAP that forms part of the overall GPDP
- Approval of the JJM part of the VAP by the Gram Sabha
- Preparation and finalization of design, estimates and technical approval as per existing departmental procedures
- Determination of community contribution and deposit in the bank account
- Award of work and issue of a contract, as per departmental procedures

Group exercise

Visioning exercise

Participants can build a vision of their village on water-related aspirations so that they develop their adaptation project with a clear objective and timeline (SMART criteria).



Visioning exercise

Participants to focus on their village water supply situation. If a water transect is available, that can be shared. They should focus short-term and long-term measures. First participants to have a timeline (now within years): soon(3-5 years): Later: (>5 and about mid century)

NOW - N (within one year)	SOON - S (within three years)	LATER - L (within five years)
<ul style="list-style-type: none"> 100% FHTCs coverage within one year. The toilets in the primary school and <i>anganwadi</i> be rendered usable with water line facility. Renovate all ponds, and water storage structures in the village. The GP empanels a list of agencies to attend to preventive / breakdown maintenance. All the households pay water tariff as prescribed. IoT-based sensor set up so as to end water wastage/ overflow from OHT/ESR. 	<ul style="list-style-type: none"> Survey and count HH without drinking water tap connection / those with illegal water tap connection and those who use motors for sucking water from pipeline. Regularize unapproved tap connection & remove water taps where pumps are used for sucking water from water distribution lines. Power pump operators are trained in preventive maintenance, and minor break down maintenance. Periodical water quality test in place. 	<ul style="list-style-type: none"> All office / school buildings and premises to have roof-water harvesting structures. Every farm to have a farm pond for water storage. Groundwater recharge pits be made in 20 strategic points in the village. 1000 tree saplings be planted in common & private lands. Ensure all the public institutions have safe water supply facility, and ensure that the wastewater disposal made scientific.

Participants to be encouraged to put out problem cards and solutions under each of the boxes.

Key problem areas (e.g.)

- Acceptance
- Funds
- Skills
- O&M issues



8

- Ask the participants to identify what they want to see immediately and what they want to see in their village after 5 years.
- You can add elements to each of the boxes as per the opinion of the participants.
- You can ask about the various likely problems and classify them under key problem areas.

Solution cards

Participants to focus on possible solutions and can prioritised based on this matrix

	Solution - 1(Renovate just enough to provide additional FHTCs – and the GP will take up O & M)	Solution - 2(Join in a feasible MVS, and provide FHTCs – the GP will do O & M)	Solution - 3(Renovate completely as full-fledged SVS& provide FHTCs – GP will do O & M)	Solution - 4(Renovate completely as full-fledged SVS, contract it out to Private operators for O&M)	Remarks
Criteria -1 (Community Acceptance)	3	2	4	1	
Criteria -2 (Technical easiness to use and operate)	3	3	4	3	
Criteria -3 (Fund support from scheme / HH)	4	3	4	2	
Criteria -4 (Maintenance)	3	3	3	4	
Score	13	11	15	10	
Rank	II	III	I	IV	

Solution cards can be ranked as follows

- ○ ○ ○ Most preferred
 ○ ○ ○ Moderately preferred
 ○ ○ Slightly preferred
 ○ Least preferred



9

Resource convergence

The VAP is a convergent plan, and the resource envelope can be calculated based on the funding mechanisms of different schemes. This has to be worked out to decide which CCA work can be undertaken.

Resource Convergence

Resources must be converged from different schemes* to calculate the total resource envelope to implement this action plan.

Sl.No.	Issues in Question	Ministry / Department concerned		Water Conservation	Department of Rural Devt. (MGNREGS)
1.	Drinking Water Piped water supply for every household Water supply to all the IHHLs Pipe-line extension for covering uncovered households Creation of new Over Head Tank, Pump Room Renovation of water supply infrastructure Drainage systems Water quality surveillance / Testing Labs Addressing water quality problems Rain water harvesting Water for school toilets, water for GP office, water for Health Centre	(Ministry of Jal Sakthi) Department of Drinking Water and Sanitation Jal Jeevan Mission (JIM) Dept Rural Water Supply Water Quality Labs. District / Block Water and Sanitation Mission	3.	Water conservation, water storage structure, watershed, pond renovation, rainwater drainage. PMAY - Housing for all	Department of Rural Development (Block Devt. Office) Ministry of Skill Development & Entrepreneurship (State / District level Skill Development Mission) RUDSETIs
			4.	Skill Training for water supply Maintenance Training of Power Pump Operators Training hand pump mechanics Training in water treatment, purification methods, chlorination	Ministry of Skill Development & Entrepreneurship DDU-GKY
2.	Sanitation Centralised wastewater treatment system Household level wastewater treatment system	Swachh Bharat Mission- (Gramin) District SBM-G office Block SBM-G office	5.	Capacity Building of Panchayats and orientation to Panchayat functionaries Orientation on JIM Orientation on rural water supply management, and VWSC by-law Local governance of water supply (with a special emphasis on financial management) Local governance of water supply (with a special emphasis on O & M).	SIRDS NIRD&PR

* Detailed of the schemes and the application process has been discussed in the next module (5.2)



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Step 4. Database generation for adaptation planning

Input presentation

- Present slides 23–30 (Presentation 5.2 – Designing a project for selected adaptation measures) to the participants.

Both primary and secondary sources are needed for generating databases for planning. While secondary data sets are available from official records, websites and research studies, the primary data is usually generated through survey and PRA techniques.

Primary source	Household Survey PRA (Transect Walk, Social Map, Resource Map, Seasonality Analysis, Problem Analysis)
Secondary source	Panchayat office records, Block Development Office records, Government web portals (e.g. Gram Swaraj, Mission Antyodaya, jalshakti-ddws.gov.in, sbm.gov.in, CGWB, soil health card, water quality data from labs)

The following slides give an overview of the types of data needed for CCA planning in the water, agriculture and DRR sectors, where to find them and how to track them in a planning cycle.

Database generation: for water, agriculture and DRR

The following types of data needs to be generated for climate resilient planning process in water, agriculture and DRR sector

Category	Key data
Demographic	Population (M, F, Child, Old & Infirm), Household type (Poverty, SC-ST, Female headed), Literacy level
Socio-economic profile	Occupation (Cultivator, agri-labour, artisan, etc.), Govt employee, MGNREGA job card holders
Hazard Profile	Type of Hazard, Type of Risk, Vulnerable Groups, Areas, Infrastructures
Land holding and Land use patterns	Small and marginal farmers, large farmers, etc. Area under cultivation, forest, fallow, irrigation, etc.)
Agriculture	Crops (season wise are, production, area under irrigation (season -wise)
Water	Sources of water (canal, springs, ponds) by devices, functionality (drinking water sources, use and level of functionality in different seasons), water quality data
Institutions Detail formats are in handout	Social organisations (SHGs, VWSCs, Coops, FPOs, CBOs, etc), Power supply, Banks & MFIs, Health and education facilities, anganwadi workers, mahila mandals, etc.



The data mentioned above can be obtained from the following sources in the entire project cycle for a drinking water project. Details are in the handout.

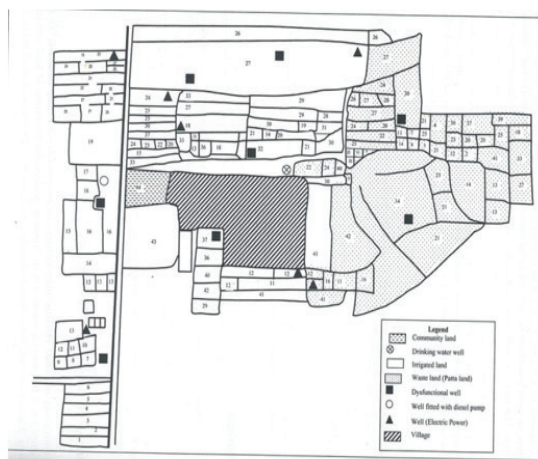
Category of data	Sources where it can be found
Secondary data	Listing of areas for which data are required (depending on the focus areas of the GPDP as identified by the state) – e.g., health, education, drinking water and any specific local issues identified by the Panchayat Committee. District handbook, district census handbook, economic census, district plans, data on water and sanitation, data that are available in the records of GP (make sure that this data are updated); PHC/sub-centre level data; PDS data; data in Anganwadis; data in primary schools; SHG/SHG federation data, FPO and FIG data, etc.; SBM survey data; water quality data from labs.
Primary data	Survey, social and resource map, timeline and seasonality analysis (e.g., water, disease incidence, migration), hazard line analysis, sectoral transect (e.g., water, agriculture, DRR, etc.).
	Measured data if recorded (rain gauge, groundwater, pollution or waste)

Source: WSP

Example: Water budgeting is a critical step for village water security planning

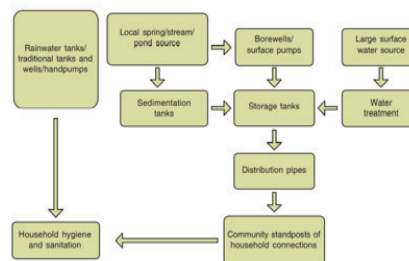
The process of water budgeting that leads to VWSP has been shown in the following slides.

Thematic Maps for resource mapping and water security planning



Thematic resource map, water transect

Facility / Source	Winter			Summer			Monsoon			Autumn	
	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct. Nov.
Type of point Source (Locations)	Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable	
Type of pumping Source (Locations)	Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable			Highly dependable Partially Dependable Undependable	



Seasonality analysis, source sustainability



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Water Budgeting

After gathering information on the sources and water supply infrastructure, the VWSC and the planning team will use the information to prepare their village plan and integration into Gram Panchayat Development Plan.

A **water budget** is prepared by estimating how much water is available from the surface, ground sources and rainwater harvesting and comparing this with how much water the users require. This should be done for summer and winter. Communities should use a combination of rainwater harvesting, groundwater and surface water sources so as to provide the best value for money at different times of the season.

Type of Source	Summer			Winter		
	Water available (supply)	Water used (demand)	Gap	Water available (supply)	Water used (demand)	Gap
Rainwater • Source 1 • Source 2 • ...						
Groundwater • Source 1 • Source 2 • ...						
Surface water • Source 1 • Source 2 • ...						

Based on the gaps between demand and supply, various sources are augmented, role and responsibilities are assigned. Different schemes such as MNREGA, PMKSY, IWMP, etc, are converged. Communities too contribute certain %ages. This plan once approved by gram sabha is termed as **Village Water Security Plan (VWSP)**.



12

Useful literature and databases

Ministry of Panchayati Raj and Ministry of Rural Development (nd): People's Plan Campaign for Gram Panchayat Development Plan (GPDP) 2021-22. Available at: https://gdpd.nic.in/resources/PPC-2020_Booklet.pdf

Ministry of Panchayati Raj (nd): Guidelines for preparation of GPDP 2018. Available at: <https://panchayat.gov.in/en/gdpd-guidelines-by-mopr>

Department of Drinking Water and Sanitation/Ministry of Jal Shakti (nd): Jal Jeevan Mission Presentations. Available at: <https://jalshakti-ddws.gov.in/presentations-water>

Ministry of Rural Development (nd): The Mahatma Gandhi National Rural Employment Guarantee Act 2005. Available at: <https://nrega.nic.in/Netnrega/stHome.aspx> and various circulars

Uttar Pradesh State Disaster Management Authority (UPSDMA; nd): Homepage. Available at: <http://upsdma.up.nic.in/>

Ministry of Drinking Water and Sanitation and Water and Sanitation Programme (2015): Toolkit for the Preparation of a Drinking Water Security Plan. Available at: <https://www.wsp.org/sites/wsp/files/publications/WSP-India-Toolkit-for-Preparation-of-Drinking-Water-Security-Plan.pdf>

Key take-aways

- Generic project planning concepts are an essential step in designing specific sectoral projects.
- When designing a project, the following concepts should be considered: SMART for objective setting, logical frameworks from input to outcome and participatory techniques like visioning, resource transect, problem analysis and solution techniques.

Debriefing questions

- What are your important take-aways/messages from this case study?
- Which part of the exercise do you find most relevant to your work?
- Do you know how to apply the key concepts to your work?
- Did the session help you design and plan your adaptation project?

Session 5.3 Adaptation measures that can be leveraged through GPDP/MGNREGA vis-à-vis schemes and programmes

Learning objective	To match selected adaptation measures with GPDP/MGNREGA vis-à-vis schemes and programmes	
Prerequisites/prior knowledge for successful participation	Prior knowledge of climate risk and vulnerability and PRA exercises	
Step-by-step approach	Step 1. MGNREGA and its climate benefits	15 min
	Step 2. Permissible work under MGNREGA and planning process	15 min
Total duration	30 min	
Methods/Exercises	Input presentation; sharing experiences linked to MGNREGA	
Material	PowerPoint Presentation 5.5, Handout 5.5, Laptop, LCD projector, chart paper, markers, scheme inventory	
Preparation of the material	You may update the provided data and figures on MGNREGA and its climate benefits, should they no longer be up to date (status 2021)	

Step-by-step approach

This session explains in-depth the linkage between CCA measures and GPDP and MGNREGA.

Step 1 gives a general introduction to MGNREGA and its benefits along with the positive impacts on climate and CCA projects, with examples of MGNREGA/NRM interventions. **Step 2** focuses on possible activities/works under MGNREGA, the planning cycle and the key stakeholders in the planning and application process, with practical examples from the region.

Step 1. MGNREGA and its climate benefit

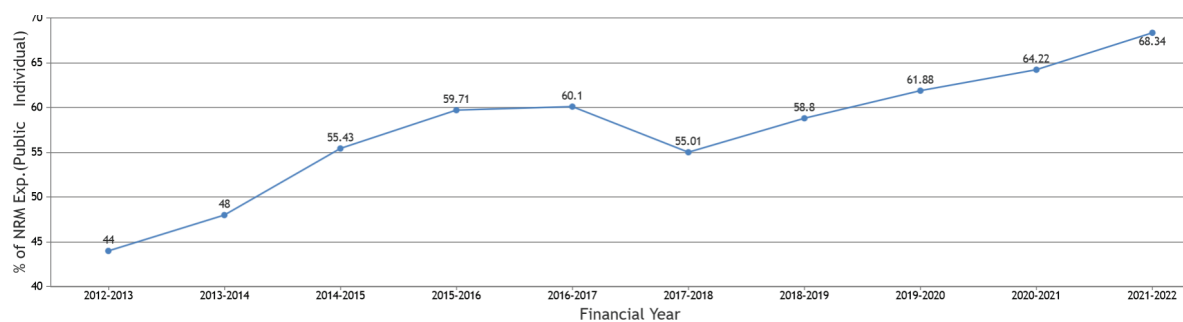
Input presentation

- Present slides 3–7 (Presentation 5.3 – CCA-MGNREGA GPDP) to the participants.

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is the biggest anti-poverty programme in the world with an annual outlay of ₹ 34,000 crore giving work to about 170 crore persons. The main objective of this act is to enhance the livelihood security of people in rural India by guaranteeing 100 days of wage employment in a financial year to a household whose adult members undertake unskilled manual work as per demand. This is the largest workfare programme in the world. The programme invests heavily in NRM. The expenditure on NRM-related works is almost two-thirds of the total allocation.

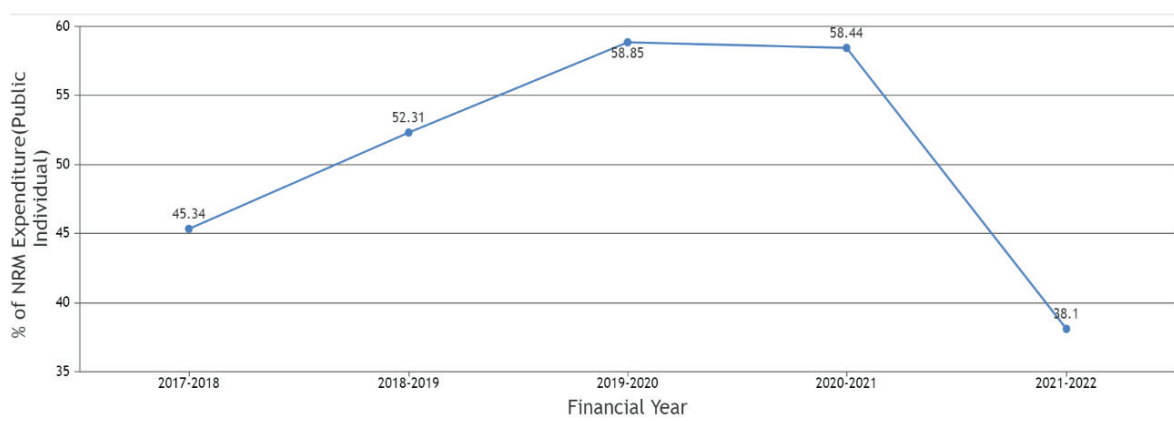
The NRM-related expenditure has been steadily rising since 2017–18 at the all-India level:

Figure 31. Percentage of NRM expenditure as a percentage of total expenditure (public + individual): All-India



(Source: Ministry of Rural Development (nd). Available at: http://mnregaweb4.nic.in/netnrega/all_lvl_details_dashboard_new.aspx)

Figure 32. Percentage Of NRM expenditure as a percentage of total expenditure (public + individual): UP



(Source: Ministry of Rural Development (nd). Available at: http://mnregaweb4.nic.in/netnrega/all_lvl_details_dashboard_new.aspx)

In Uttar Pradesh, the NRM-related expenditure has also gradually increased since 2017–18, but in the year 2020–21, it slightly decreased due to COVID-19 – this trend continues.

Apart from the programme playing a stellar role in providing social protection to the most vulnerable during distress, it has several positive climate benefits such as groundwater recharge, soil protection, water and biodiversity conservation, sustainable food production and mitigation of land degradation. It also builds local resilience to the effects of climate change such as moisture stress, delayed onset of rainfall, droughts and floods.

The following matrix (Sinha *et al.*) shows how it addresses various climate and disaster risks.

Issues Activities	Food security	Water scarcity	Ecological sustainability	Health hazard	Extreme weather events
Well and pond	Increase in total crop area, crop diversity and crop yield	Enhanced provision of water for Irrigation, livestock, domestic purposes, surface water storage and ground water recharge	Efficient water use	Safe water	Drought proofing
Plantation on individual, community and degraded forest land	Edible produce	Ground water recharge, reduced evaporation from soil, surface runoff	Soil and biodiversity conservation, and increase in green cover and carbon sequestration	Improved micro-climate	Drought proofing, flood protection
Watershed management	Enhanced agriculture due to better soil and water management	Better soil moisture regime, surface water storage, Reduced surface runoff	Improving the resilience of ecosystem		Drought proofing, flood protection
Well for potable water		Potable water availability		Sanitation, safe water, prevention of water-borne diseases and contamination.	Drought proofing.
Road construction	Faster supply and distribution of food grains during emergencies			Sanitation, increased facilities in health emergency	Coping for risk and disaster mgt.,

Source: Sinha *et al.* (n.d.): *Adapting to Climate Change: Opportunities under MGNREGA*. Available at: http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/7144/BhaskarSinha_IASC.pdf?sequence=1

Group discussion

After a brief explanation of MGNREGA, encourage the participants to reflect on:

1. What is the climate change related stress they see in their area?
2. What are the NRM works done in their areas?
3. What kind of benefit have they observed?

These can be listed in a flipchart.

Step 2. Permissible work under MGNREGA and planning process

Input presentation

- Present slides 8–13 (Presentation 5.3 – CCA-MGNREGA GPDP) to the participants.

As per Schedule I of MGNREGA, 260 kinds of works/activities have been identified as permissible works, of which 181 kinds of works relate to NRM alone, and out of the 181 NRM works, 84 are water-related. Most of these works help in climate change adaptation

- Soil and Water Conservation Related Works (including non-water-related Works) (32)
- Ground Water Recharge Related Works (7)
- Irrigation Related Works (19)
- Drainage and other Related Works (16)
- Plantation Related Works (17)
- Land Related Works for Livelihood support (9)

Step 2: Permissible works

Sc I Cat A: Public Works (NRM)	Cat B: Individual Assets for Vulnerable Sections
<ul style="list-style-type: none">■ Water conservation and water harvesting structures■ Watershed management works■ Micro and minor irrigation works■ Renovation of traditional water bodies■ Afforestation■ Land development works in common land	<ul style="list-style-type: none">■ Providing infrastructure for irrigation, ie., dug wells, farm ponds and other water harvesting structures■ Improving livelihoods through Horticulture, Plantations■ Fallow / Waste Land Development■ Unskilled wage component in construction of houses■ Promotion of Livestock■ Promotion of Fisheries



6

Step 2: Permissible works

Cat C: Common Infrastructure for SHGs under NRLM	Cat D: Rural Infrastructure
<ul style="list-style-type: none"> Durable infrastructure required for bio-fertilizers and post-harvest facilities including pucca storage facilities for agricultural produce Common work-sheds for livelihood activities of self-help groups 	<ul style="list-style-type: none"> Rural Sanitation All weather road connectivity Disaster preparedness / restoration Buildings for Gram Panchayats, women self-help groups' federations, cyclone shelters, Anganwadi centres, village haats and crematoria at the village or block level. Food Grain Storage structures Maintenance of Rural public assets created under MGNREGS.



7

Key **stakeholders** in the MGNREGA planning process are listed below:

1. Wage seekers (job card holders)
2. Gram Sabha (GS)
3. Three-tier Panchayati Raj Institutions (PRIs), especially the Gram Panchayat (GP)
4. Programme Officer at the Block level
5. District Programme Coordinator (DPC)
6. State government
7. Ministry of Rural Development (MoRD)
8. Civil society
9. Other stakeholders [viz. line departments, convergence departments, self-help groups (SHGs), etc.]

The planning cycle for MNREGA is as follows:

Action to be Taken	Time
Gram Panchayat level planning process by Gram Sabha/Ward Sabha.	2 nd October
Special Gram Sabha for approval of the Gram Panchayat level annual action plan.	3 rd October to 30 th November
Submission of Gram Panchayat Level Plan to the Block Panchayat	5 th December
Approval of Block Level Consolidated Annual Plan by Block Panchayat and submission to District Programme Coordinator /collector	20 th December
Presentation of Block plans by Programme Officer before DPC	19 th January

Action to be Taken	Time
Presentation of District Annual Plan and Labour Budget (LB) to District Panchayat by the DPC/Collector	20 th January
Approval of District Annual Plan by the District Panchayat and submission of the same to State Government	31 st of January
Submission of Labour Budget to the Central Government	15 th February
Meetings of the Empowered Committee (G.o.I.) and finalisation of the LB	20 th February onwards
Communication of the LB to the States by Ministry and further by the states to Districts, Blocks, and Gram Panchayats	31 st March

Group exercise

Time: 15 minutes

- Show the following video on water conservation:
<https://www.youtube.com/watch?v=qM6cYWyaVyA&t=143s>
- Ask participants about their learnings:
 - How many activities have you taken up using MGNREGA in your area?
 - What role did you play in the planning process?
- Participants can use the handout on permissible work and choose a few public and individual works in their village that they can undertake using MGNREGA to address climate change. This should be pasted on the flip chart and discussed.

Useful literature and databases

- Ministry of Panchayati Raj and Ministry of Rural Development (nd): People's Plan Campaign for Gram Panchayat Development Plan (GPDP) 2021-22. Available at: https://gpdp.nic.in/resources/PPC-2020_Booklet.pdf
- Ministry of Rural Development (nd): The Mahatma Gandhi National Rural Employment Guarantee Act 2005. Available at: <https://nrega.nic.in/Netnrega/stHome.aspx> and various circulars
- Sinha et al. (nd): Adapting to climate change: Opportunities under MGNREGA. Available at: http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/7144/BhaskarSinha_IASC.pdf?sequence=1
- Indian Institute of Science, Bangalore, Ministry of Rural Development and GIZ (2013): Environmental Benefits and Vulnerability Reduction through Mahatma Gandhi National Rural Employment Guarantee Scheme. <https://www.giz.de/en/downloads/giz2013-en-environmental-benefits-vulnerability-reduction-india.pdf>
- Mullan et al. (2018): OECD Environment Policy Paper No. 14: Climate-resilient Infrastructure. Available at: <https://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>
- Hare et. Al. (2013): CATALYST, Capacity Development for Hazard Risk Reduction and Adaptation. Available at: https://twas.org/sites/default/files/catalyst_d65_best_practices_policy_notebook.pdf
- Ministry of Rural Development (nd): Technical Manual of MGNREGA. Available at: https://nrega.nic.in/netnrega/Data/Draft_User_Manual_MIS.pdf
- Department of Drinking Water and Sanitation/Ministry Of Jal Shakti (nd): Jal Jeevan Mission Presentations. Available at: <https://jalshakti-ddws.gov.in/presentations-water>
- Ministry of Drinking Water and Sanitation and Water and Sanitation Programme (2015): Toolkit for the Preparation of a Drinking Water Security Plan. Available at: <https://www.wsp.org/sites/wsp/files/publications/WSP-India-Toolkit-for-Preparation-of-Drinking-Water-Security-Plan.pdf>

Key take-aways

- There is some degree of overlap between CCA and DRR, and this needs to be clearly articulated
- The tool (in the case study) encourages participants to think through these linkages in the CCA–DRR framework of the country
- The tool encourages participants to fine-tune action plans by assessing alternatives
- Focus on addressing how the benefits can accrue to the community and individuals both in the short run and long run, especially during and after disasters



Questions for the debriefing phase

- What are your important take-aways/messages from this case study?
- Which part of the exercise do you find most relevant for your work?
- Do you know how to apply the key concepts to your work?
- Did the session help you use the GPDP mechanism to integrate NRM plans to address climate and disaster risk?

Session 5.4 Using simple spatial techniques for NRM planning

Learning objective	To introduce the importance of geospatial techniques in Gram Panchayat planning and hands-on training to use simple geospatial techniques for NRM planning		
Prerequisites/prior knowledge for successful participation	Prior computer skills (handling data/MIS/GIS) are essential		
Step-by-step approach	Step 1. Creation of a digital village boundary map	20 min	
	Step 2. Introducing GPS and its use in generating a spatial and non-spatial database at the village level	10 min	
	Step 3. Generating contours and digital elevation models using Google Earth and GIS software	20 min	
	Step 4. Uploading generated data and creating a thematic database on the Bhuvan web portal	10 min	
Total duration	60 min		
Methods/Exercises	Creating a map with Google Earth Pro for NRM planning at the village level		
Material	PowerPoint Presentation 5.4, Handout 5.4, Laptop, LCD projector, internet connection, Google Earth Pro, Arc GIS installed and registration with Bhuvan portal (this has to be taken up by trained instructors prior to the training session)		

Step-by-step approach

The Uttar Pradesh government, as per the GPDP guidelines 2018 (Chapter 9, e-Panchayat and GPDP), is increasingly using various database generation, analysis, visualization and monitoring geospatial techniques/tools, such as the handheld global positioning system (GPS), satellite images and Geographical Information System for natural resource planning under MNERAGA, Atal Bhu Jal Yojna, Pradhan Mantri Gram Sadak Yojna and Swamitva Yojna at the Gram Panchayat level. In these efforts, most of the assets are being geo-tagged and uploaded to the web GIS portals like BHUVAN (ISRO geoportal), Gram Manchitra (Panchayati Raj Department), etc. These geospatial techniques are providing better scope to assess gaps and enable their monitoring on a real-time basis.

In this session, before beginning the hands-on training on the application part of the geospatial technique, the facilitator should educate and create interest among the participants about the importance and benefits of using these tools and techniques. They should explain how using these modern tools and techniques can enhance transparency and accountability in the governance system in planning, execution and monitoring level at every level.

As per the GPDP Guidelines, 2018, for the preparation of a GIS-based GPDP, the facilitator should focus on conducting the following elementary exercise with the participants to develop the village plan.

Step 1. Creating of a digital village boundary map on the basis of the cadastral maps of the Revenue Department/Survey of India

Step 2. Creating a spatial database of the village with Google Earth

Step 3. Capturing digital elevation model data using the Bhuvan web portal and creating contours with Arc GIS software

Step 4. Uploading the generated data and creating a thematic layer on the Bhuvan web portal

Hint for the trainer:

The trainer can start with this video and explain it with the PPT and worked out lab

Video: <https://www.youtube.com/watch?v=g-jAa4a7tzc>

Step 1. Creating a village boundary map on Google Earth Pro

- Present slides 3–5 (Presentation 5.4 – Geospatial technology for NRM) to the participants.

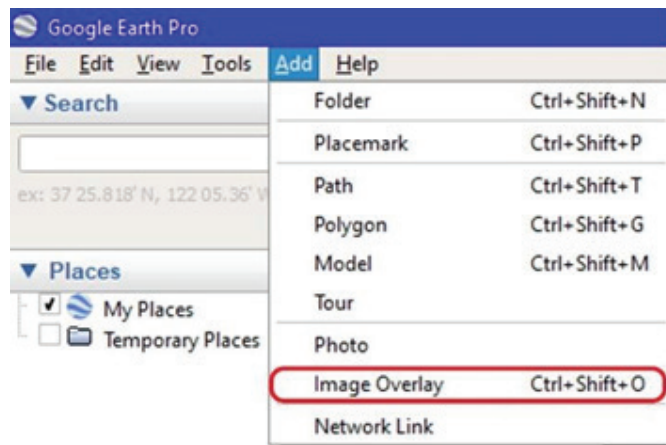
In this step, the facilitator should explain and show the process of creating a digital village base map using simple geospatial tools like Google Earth Pro. The Government of Uttar Pradesh, with the support of the National Information Centre, has uploaded the digital cadastral maps (village-wise) of the Revenue Department. These maps may be accessed in digitized form from the website (www.upbhunaksha.gov.in). Log on to the website and search for the preferred village. The interface window of the website and the resulting village map is shown here. To avail the desired village map, the following steps can be used:

- Open the web browser and log on to www.upbhunaksha.gov.in/bhunaksha/09/index.html
- In the left panel, search the village by going to District>Tehsil>RI>Village
- The village map will be displayed in the main window (on the right side of the search panel).
- Save the map either as .png or .jpeg format



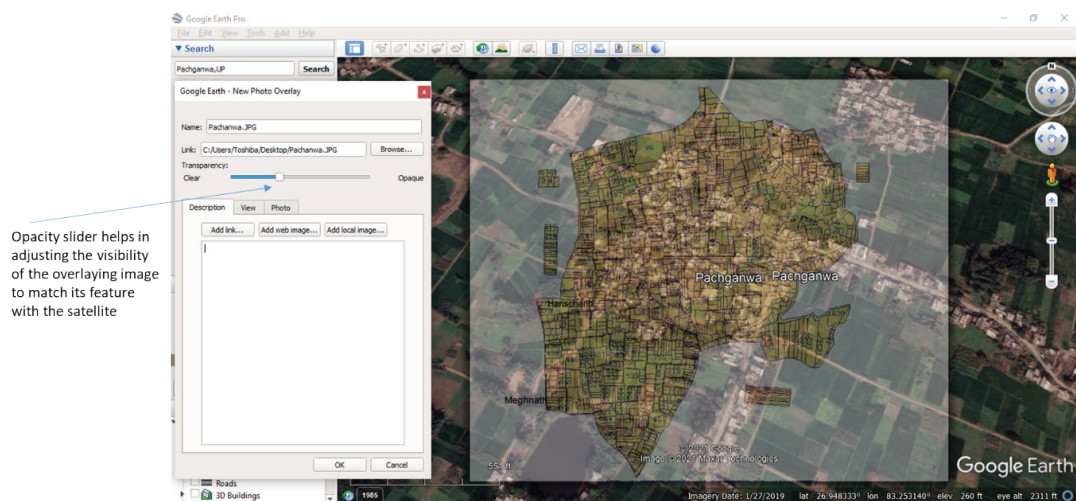
Some information on the cadastral map can be found on the search panel like ownership of land. The blue coloured fields represent government or community land, and the pink colour represents private land within the village boundary. This information can be used for planning on individual or community land.

To draw the boundary of the village, the next step is to overlay the cadastral (revenue) map with Google Earth. This is done by trying to match the features like roads, ponds, water bodies or any other benchmark displayed in the cadastral map and Google Earth imagery. Although this is a time-consuming step, once done, the subsequent steps become much easier.



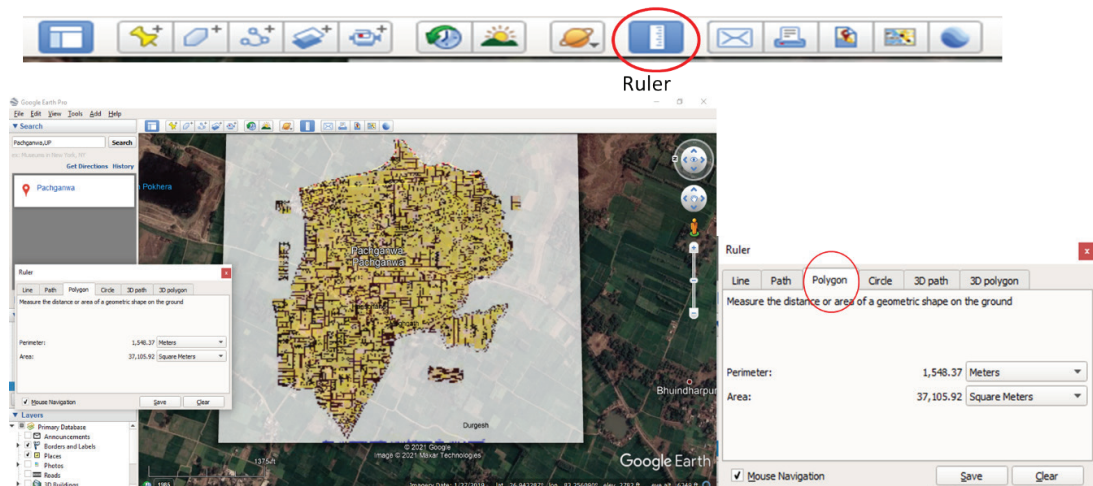
To superimpose the cadastral map on Google Earth Pro imagery, the following steps are to be done.

- Open Google Earth Pro. Ensure that the computer/laptop has an active internet connection.
- Go to “add image overlay”.
- When the dialogue box opens, write the name of the layer (e.g., cadastral map) and then click ‘browse’.
- Browse the location where the cadastral map is saved on the computer/laptop.
- Select the cadastral map and click open.
- Reduce the opacity of the layer by sliding the opacity slider to around 40–50% and try to match the physical features of the map with the Google Earth Pro imagery.



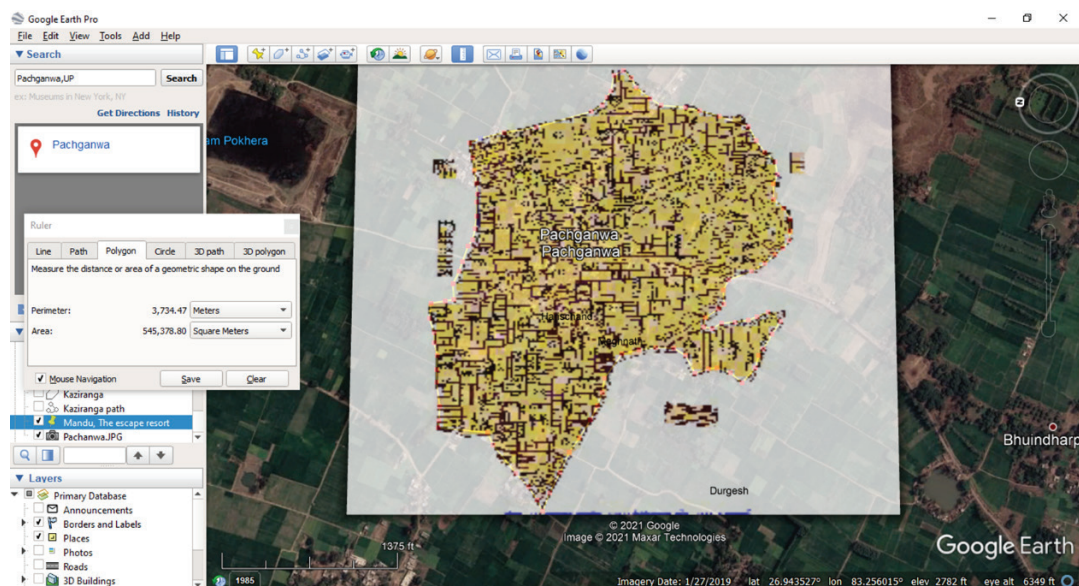
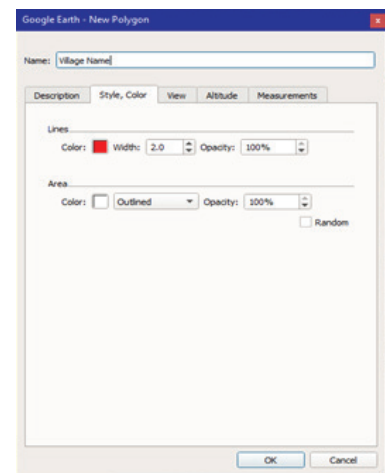
Once the cadastral map is completely overlaid, draw the boundary of the village and save it as a .kml file.

Next the process includes - go to ruler > Polygon> Draw boundary > Save> Right click > Save place as > Select destination > Save the kml file



The accuracy of the boundary can be increased by zooming in the map to the maximum extent visible and then clicking on the boundary outline. After the demarcation of the boundary is done, match the enclosed area of the polygon with the actual area of the village available on the land record website or with the Patwari. The changes in the area enclosed within the polygon can also be done later if it does not match the actual area of the village.

- After drawing the complete boundary of the village, click “Save” on the ruler box.
- A new dialogue box will open and will prompt for the name of the layer. Put the name of the village in the name tab.
- In the style and colour tab, change the colour of the boundary line and its thickness.
- Click “Save”.
- The layer will get saved in the left panel with the name put in the name tab. Right-click on the boundary layer name and select “Save place as”.
- Choose the destination folder, and select the file type as KML.
- Save the boundary in the desired location on the computer/laptop.



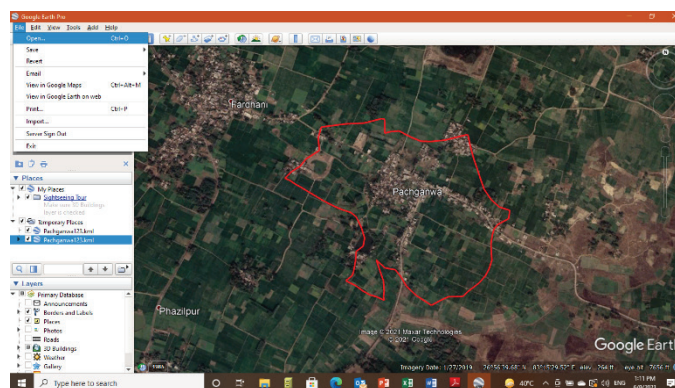
Always use white and visible colour for polygon line which can be visible even in small screen



Step 2. Creating a spatial database of a village with a Google Earth Pro image

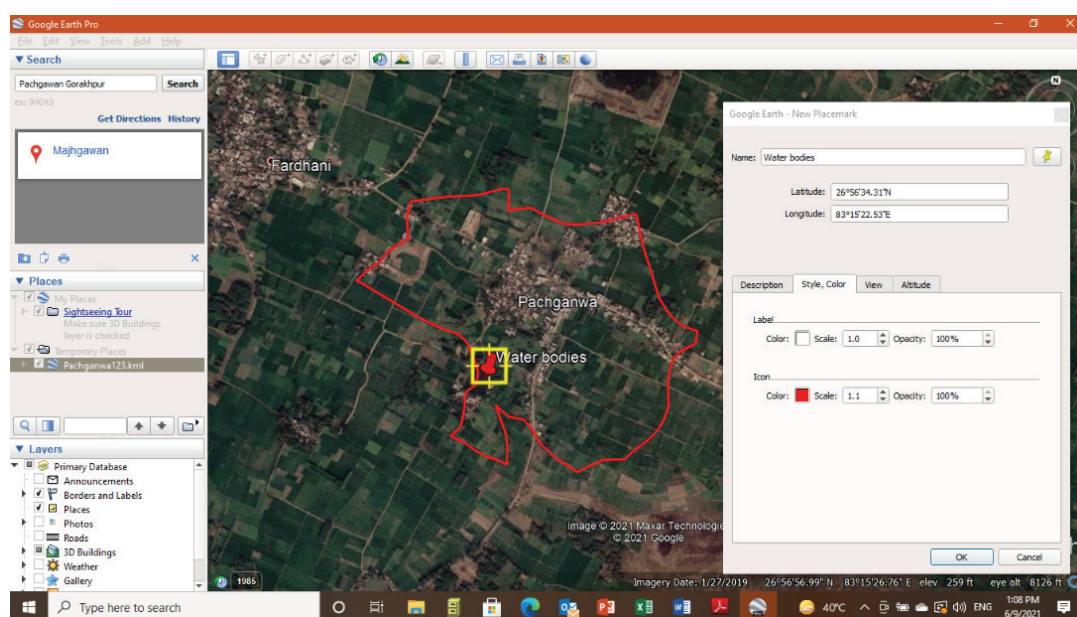
- Present slides 6–8 (Presentation 5.4 – Geospatial technology for NRM) to the participants.

In this step, the facilitator should explain the process of spatial database collection with the help of Google Earth Pro. They should explain how with the help of Google Earth image, the location-specific data like ponds, water bodies, schools, health centres, etc. can be collected without going to the site location. They should explain the following steps to open the saved digitized map and collect spatial data.



- Go to the File tab of Google Earth Pro at the top left and click “Open”.
- Select the saved village KML file and open it. The village map will be displayed.

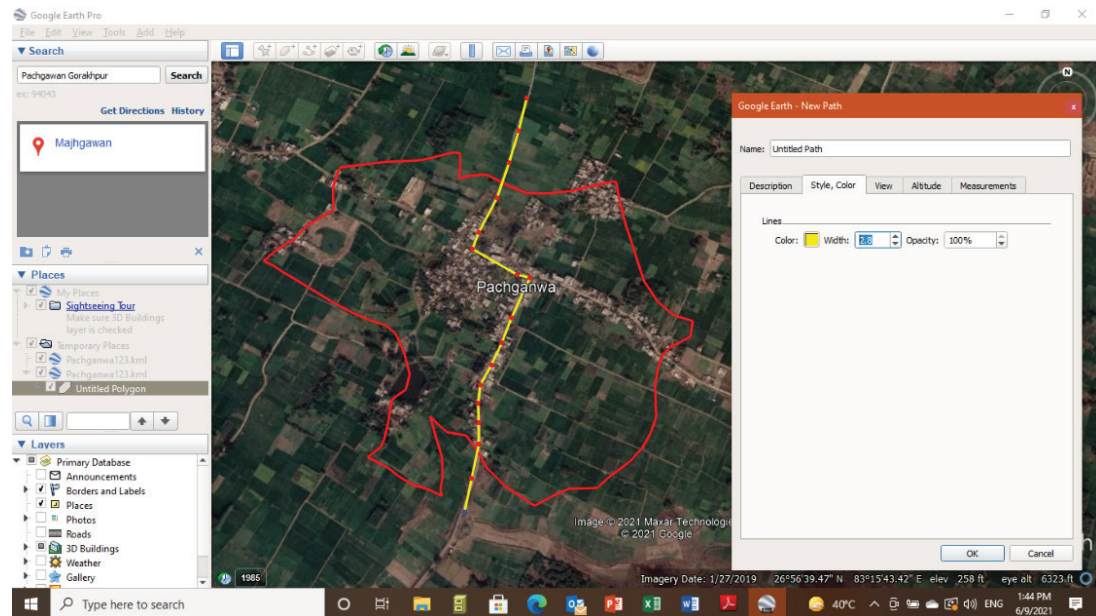
Once the village boundary map is displayed on the Google Earth screen, with the background of the satellite image, the facilitator should attract the attention of participants by zooming into the village map and asking the participant to identify the point data like ponds, rivers, houses, etc. To collect the spatial data (water bodies, road, agriculture land) of the village, do the following steps as an example to collect the data:



- To collect point data (e.g., water body), put the cursor on **add placemark** and click.
- A pin icon will be displayed on the screen. Drag this pin icon to the location of the water body which is visible on the screen and note down the latitude and longitude.
- Enter the name of the water body on the box bar on the top and click “OK”.

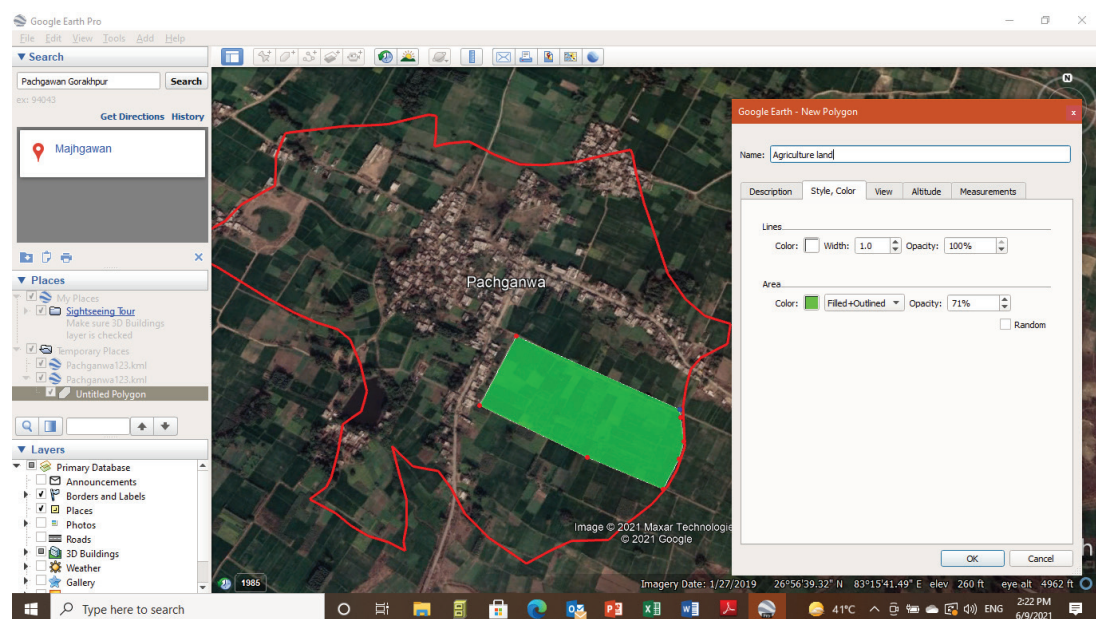
To collect line feature data, like of road, river canal, etc., do the following steps.

- Click on the **add path** icon, and an attribute box will pop up.
- Draw the road appearing in the background image of the Google satellite image.
- Enter the layer name as “village road”.
- In the label, you can change the colour, width and opacity of the road feature.
- Click “OK”.



To collect area feature data, like land use, built-up areas, etc., do the following steps.

- Click on **add polygon** icon, and an attribute box will pop up.
- Draw a polygon over the agriculture areas appearing on the background image of the Google satellite image.
- Enter the layer name as “agriculture land”.
- In the label, you can change the colour, width and opacity of the area features, i.e., represent agriculture with Green colour
- Click “OK”.

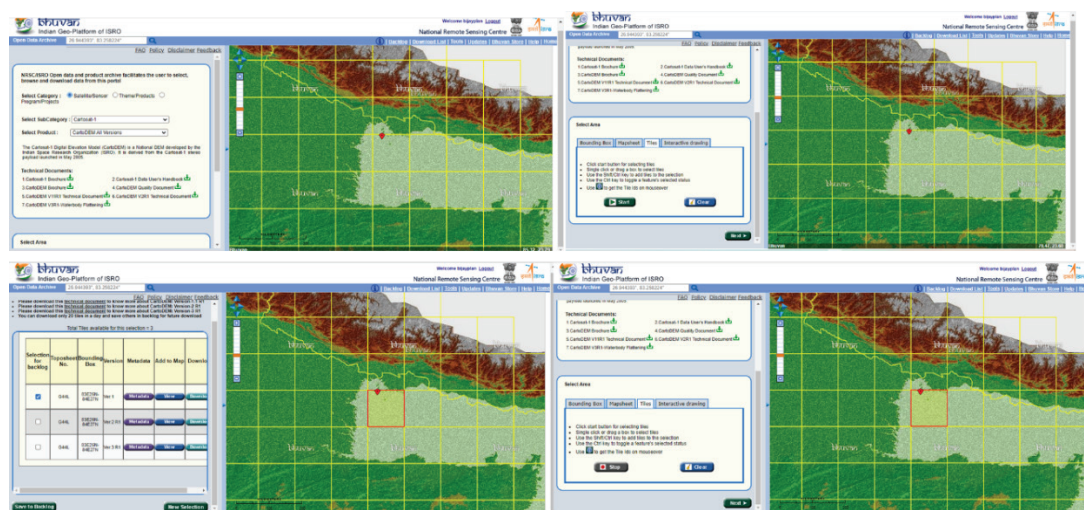


Step 3. Capturing Digital Elevation Model Data Using Bhuvan web portal and creating Contours with Arc GIS software

- Present slides 9–11 (Presentation 5.4 – Geospatial technology for NRM) to the participants.

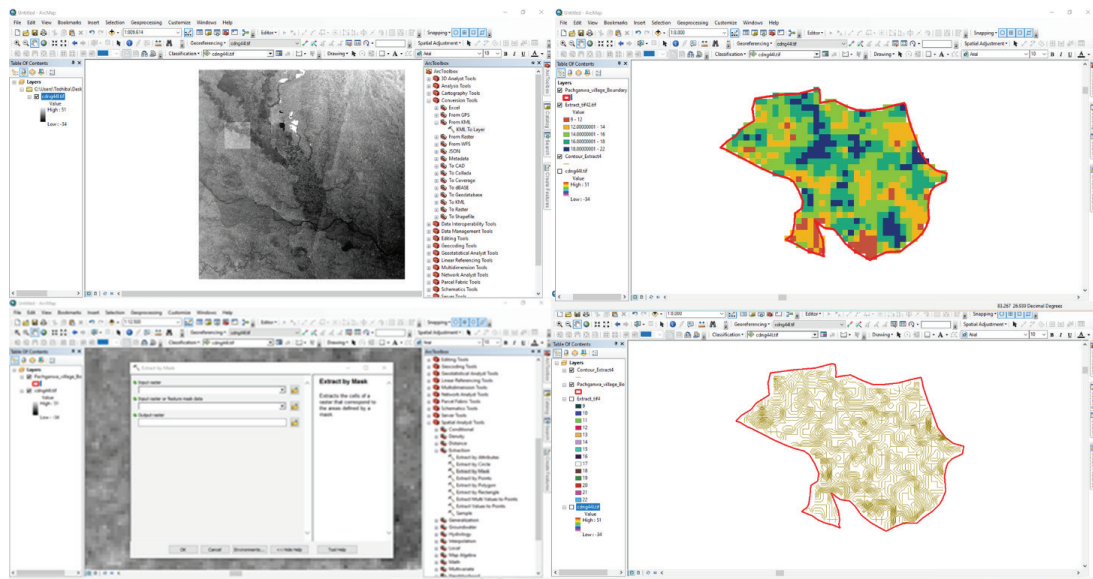
In this step, the facilitator should introduce the term contour, digital elevation model to explain the topography features of the selected village. Contours are the lines that represent the height of the land above mean sea level. This feature is very useful in understanding the topography of the selected area. They can also be used to calculate the storage capacity of any reservoir if a pond is constructed. Using **Bhuvan** and **Arc GIS software**, DEM data and contours of desired intervals can be generated for the selected village. To capture DEM data from the Bhuvan web portal of the selected village, the following steps are to be used:

- Enter the GPS point (latitude and longitude) in the search toolbar to identify the location. Open data achieve and select Carto Sat 1 in the subcategory and carto DEM all versions in the product category.
- Go to select area and click tiles and mark the tiles on the map showing GPS location and finally click on start.
- Click on any DEM files and start downloading.
- Click on stop and save the file in your system.



After capturing the DEM data of the selected village, the facilitator should show the process of generating contours with the interval of the selected village to show the gradient of the village. To generate contours following steps are to be followed.

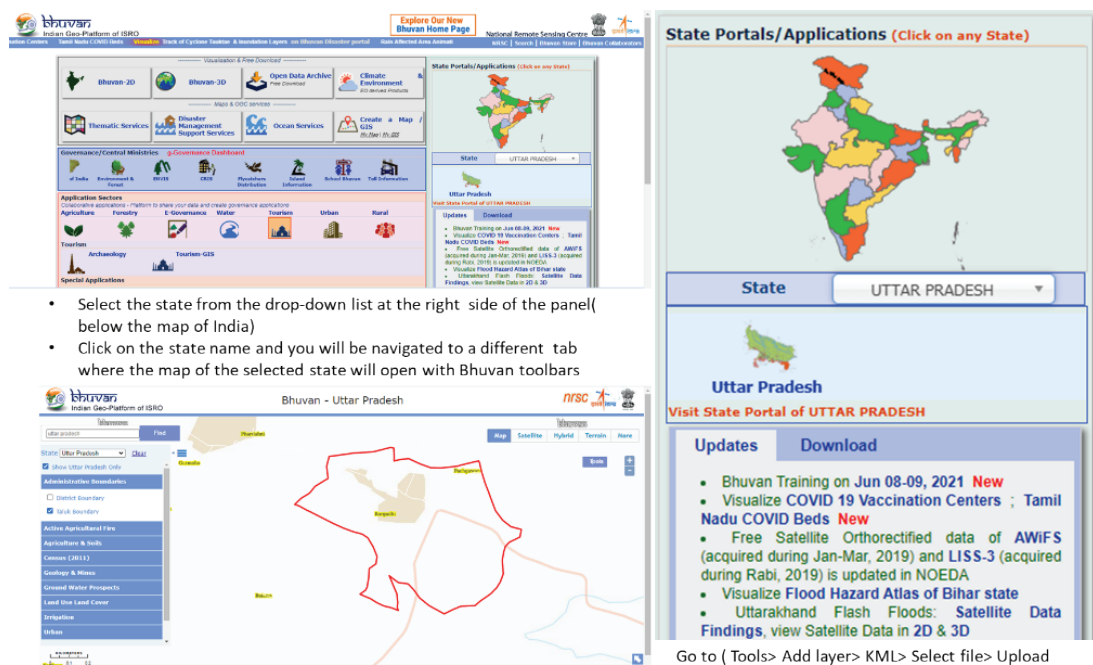
- Open the DEM data in the Arc GIS software.
- Before importing the selected village boundary map into ARC GIS Software, convert the .kml file into a .shp File.
- Extract the DEM data according to the selected village areas.
- Using the 3D analysis tool in the ARC GIS tool box>select raster surface>fill the property of input raster>select contour interval>run the tool.
- The contour map of the village with value will appear.



Step 4. Uploading generated data and creating a thematic layer on the Bhuvan web portal

- Present slides 12–14 (Presentation 5.4 – Geospatial technology for NRM) to the participants.

When the village boundary map and spatial database of the selected village are created and saved in the desired location, they can be uploaded to the Bhuvan portal and different thematic layers can be generated. The process of generating thematic layers is as follows:

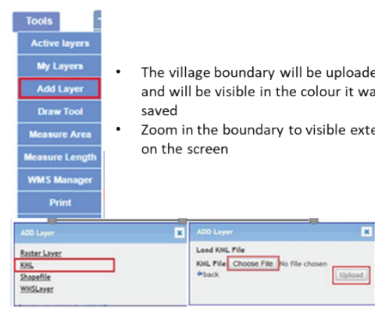


- Select the state from the drop-down list at the right side of the panel (below the map of India)
- Click on the state name and you will be navigated to a different tab where the map of the selected state will open with Bhuvan toolbars

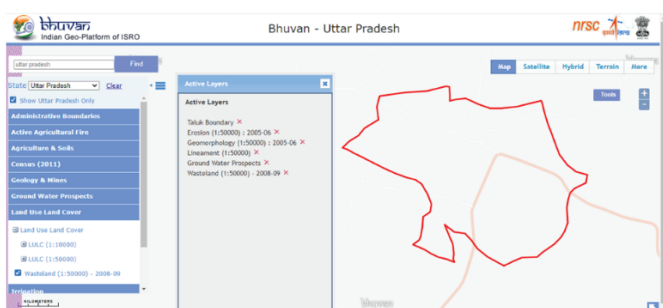
Go to (Tools> Add layer> KML> Select file> Upload

- Open the Bhuvan portal by logging on to www.bhuvan.nrsc.gov.in.
- Now you can upload the boundary of the village (.kml file) to the Bhuvan page.

Shape files(.shp) can also be uploaded on bhuvan portal, but the process is more complicated. Uploading Kml is comparatively easier



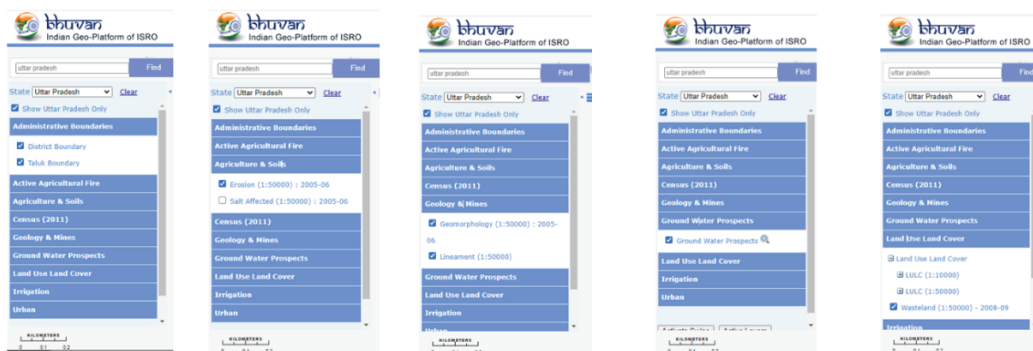
- The village boundary will be uploaded and will be visible in the colour it was saved
- Zoom in the boundary to visible extent on the screen



Now create all thematic layers available at Bhuvan from the left panel of the page. Different

Agriculture & Soils	Soil Erosion
Geology and Mines	Geomorphology
	Lineaments
Ground water Prospects	Ground Water Prospects
Land Use Land Cover	Wasteland
	LULC

These layers are available in WMS format also for use in GIS software like QGIS etc. where detailed analysis can be done.

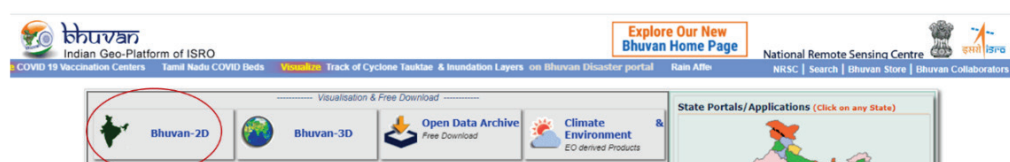


To understand the different colours of the thematic layer, a legend tab is available in the bottom left corner of the page. To display the legend, Click on the tab and a small box will open which contains all definitions of the colours, symbols within the map.

A legend is the detail of different colour codes or symbols used in thematic layers. Correct intervention of the thematic colours/symbols can be done by understanding the legends on any map.

All the thematic layers and their legends can be saved on the computer by taking screenshots using the “Snipping Tool” which is the Windows default app. To open the snipping tool, go to the search tab in the taskbar and search by typing ‘snip’. Since the Snipping Tool is used frequently, it can be pinned to the taskbar and can be used whenever required.

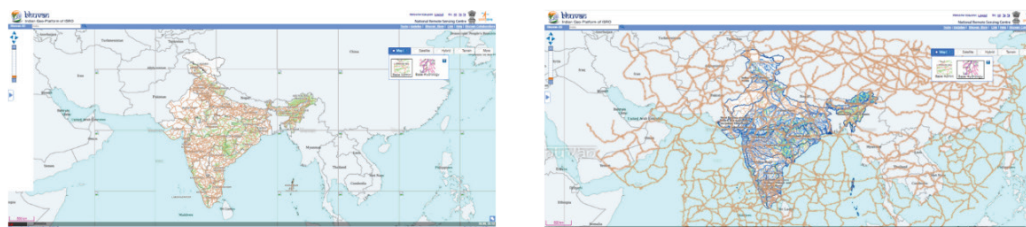
After all the 6 layers are saved, go to Bhuvan main page and select the Bhuvan 2D tab which will be redirected to a new browser tab with Bhuvan 2D page



Repeat the procedure of uploading the kml boundary of the village and zoom in to the full extent of the boundary visibility.

Go to (Tools> Add layer> KML> Select file> Upload

Change the map type from Base Admin to Base hydrology to display all drainage lines mapped in Bhuvan. Take the screenshot of the drainage lines inside the village boundary by using snipping tool and save it to the destination folder.



Now we have 7 thematic layers to be analysed by superimposing them on Google Earth Pro. All these layers can be overlaid on Google Earth Pro and analysed for problem identification like soil erosion problems, wasteland, lineaments, etc. Suitable NRM structures can be proposed on appropriate sites based on these bio-physical characteristics. It is an important decision-making tool that guides us in selecting the right work at the right place and avoiding unnecessary NRM work. Apart from these thematic layers, many other layers are also available in the Bhuvan portal, which can be used as per the requirement of the project.

By going through the above-mentioned procedures, the GIS-based plan for NRM can be made with effective output and outcomes. Appropriate structures can be selected based on the bio-physical analysis, and effective NRM structures can be planned.

Hint for the trainer:

- The trainer can show this video of a case study for exemplifying further the content of this session:
<https://www.youtube.com/watch?v=zsrULVnxSdk>

Useful literature and databases

- Ministry of Panchayati Raj and Ministry of Rural Development (nd): People's Plan Campaign for Gram Panchayat Development Plan (GPDP) 2021-22. Available at: https://gdpd.nic.in/resources/PPC-2020_Booklet.pdf
- Mullan et al. (2018): OECD Environment Policy Paper No. 14: Climate-resilient Infrastructure. Available at: <https://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>
- Stockholm Environment Institute (2010): Linkages between Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). Available at: <https://www.preventionweb.net/publications/view/18241>
- Hare et. Al. (2013): CATALYST, Capacity Development for Hazard Risk Reduction and Adaptation. Available at: https://twas.org/sites/default/files/catalyst_d65_best_practices_policy_notebook.pdf
- Ministry of Rural Development (nd): Technical Manual of MGNREGA. Available at: https://nrega.nic.in/netnrega/Data/Draft_User_Manual_MIS.pdf



- Department of Agriculture and Cooperation (2001): National Disaster Response Plan. Available at: <https://www.nidm.gov.in/PDF/pubs/NDRP.pdf>
- Department of Drinking Water and Sanitation/Ministry of Jal Shakti (nd): Jal Jeevan Mission Presentations. Available at: <https://jalshakti-ddws.gov.in/presentations-water>
- Ministry of Drinking Water and Sanitation and Water and Sanitation Programme (2015): Toolkit for the Preparation of a Drinking Water Security Plan. Available at: <https://www.wsp.org/sites/wsp/files/publications/WSP-India-Toolkit-for-Preparation-of-Drinking-Water-Security-Plan.pdf>

Key take-aways

- There is some degree of overlap between GPDP and CCA-DRR, and this needs to be clearly articulated.
- The tool (in the case study) encourages participants to think through these linkages in the CCA-DRR framework of the country.
- The tool encourages participants to fine-tune action plans by assessing alternatives.
- Participants must focus on addressing how the benefits can accrue to the community and individuals both in the short run and long run especially during and after disasters.

Questions for the debriefing phase

- What are your important take-aways/messages from this case study?
- Which part of the exercise do you find most relevant for your work?
- Do you know how to apply the key concepts to your work?
- Did the session help you to use the GPDP mechanism to integrate NRM plans to address climate and disaster risk?

Session 5.5 Identifying further relevant support schemes for adaptation projects

Learning objective	To identify programmes and schemes being implemented in the villages related to Agri+, Water Resources and DRR and establish needed CC-linkages	
Prerequisites/prior knowledge for successful participation	Understanding climate risks/hazards/disasters and activities to address them	
Steps (duration)	Step 1. Understanding the objectives and components of relevant support schemes	30 min
	Step 2. Matching support schemes with adaptation measures and risks addressed	30 min
Total duration	60 min	
Methods/Exercises	Input presentation, reviewing identified risks and adaptation options, matching support schemes with adaptation options based on scheme inventory	
Material	PowerPoint Presentation 5.5, Handout 5.5, Laptop, LCD projector	
Preparation of the material	You may prepare a list of support schemes relevant to the participants' context.	

Step-by-step approach

This module provides inputs about various schemes to select specific schemes in agriculture, water, eco-systems and livelihoods for the village level plans (GPDP) and leverage MGNREGA and other schemes/programmes to reduce the climate risk.

Step 1 provides participants with an overview of different available support schemes. The participants will learn more about the schemes' objectives and components as well as about relevant

institutions providing the schemes. The step will close with a group discussion on key features of relevant schemes. **Step 2** builds on the new learnings, and adaptation options will be linked to specific support schemes and institutions.

Step 1. Understanding the objectives and components of relevant support schemes

Input presentation

- Present slides 6–13 (Presentation 5.2: Identifying-relevant-support-schemes) to the participants.

Figure 37. Key areas of Interest for stakeholders



(Source: CTRAN)

There are two types of schemes; some are related to specific sectors, and the others are holistic. The development schemes in the villages apart from the sectoral development focus on area development in a convergence mode.

NRM and Livelihood: This has a strong bearing for PRI-members and other sectoral institutions in the villages such as FPOs, SHG groups and the village waters security committees. Key related subjects include the following.

- Agriculture, including agricultural extension
- Land improvement, implementation of land reforms, land consolidation and soil conservation
- Minor irrigation, water management and watershed development
- Animal husbandry (dairy, poultry, goat farming, etc.) and fishery

The Departments of Agriculture and Rural development converge many of these schemes, i.e., RKVY, PMKSY, PMFBY, NFSM, MIDH, NMAET, NLM, eNAM, SHC, etc.

Similarly, the Forest Department with the Union Ministry (MOEFCC) and MoRD covers several **ecosystem development** schemes such as social forestry, farm forestry and development and collection of minor forest produce. The schemes that address these aspects include GIM, MSP for MFP, National AYUSH, Mission, and NMPB. These schemes reduce climate sensitivity and enhance capacity, therefore reducing vulnerability.

Habitat development is the scheme to address the housing needs of the poor. Rural housing and urban shelters are part of specific schemes such as PMAY and are supported by MoRD and Urban Local bodies under the urban development departments of the state.



Basic needs like health and education are addressed by ministries like Jalshakti (Ministry of Drinking Water and Sanitation, Ministry of Health and Family Welfare, School and Mass Education, etc.). They converge several schemes like NRHM/NHM, NRDWP, Mission Indradhanush, ICDS, SBM, PMJDY, PMKKKY, UJALA, NRDWP and NRLM. They cover immunization, institutional delivery, sanitation, Anganwadi systems and pre-schooling activities. The Education Department is responsible for educational activities. Food security is ensured through PDS. Basic-need-focussed schemes reduce climate shocks.

Infrastructure: This includes rural roads, land development, canals, etc. and can also be storage and warehouses, etc. The Irrigation Department, PWD, MoRD and agriculture converge various schemes for these activities. Infrastructures enhance the capacity of the groups to address climate risks better.

- Present the scheme matrix, the objectives and components of different support schemes to the participants (slides 4–27).

Hint for the trainer

- In the scheme matrix, trainers should show the linkages of climate hazard/disasters, the adaptation needs and the linked schemes, selecting one or two examples and asking participants to present one or two examples.

Scheme matrix (slides 5–9)

Hazard/ Risk	Sector	Related Scheme	Adaptation Needs
Drought	Agriculture	Pradhan Mantri Krishi Sinchayee Yojana	<ul style="list-style-type: none"> • Watershed development component • Development of rainfed/degraded land • Programme for reconstruction and preservation of traditional water harvesting structures, construction of canals for transportation of water from surplus to non-surplus areas, establishment of cost-effective drip/sprinkle irrigation practices
		Rashtriya Krishi Vikas Yojna (RKVY)	<ul style="list-style-type: none"> • Preparation of agriculture plans for districts based on agro-climatic conditions • Water governance • Water monitoring and conservation • Developing additional water sources through tube wells, dug wells and farm ponds • Drought-resilient crops and cropping systems • Seed & fodder plan (including alternative varieties, mini kits, etc. keeping in view impending drought)
		National Food Security Mission (NFSM)	<ul style="list-style-type: none"> • Formation of clusters/farmers groups for sprinklers/rain guns in the event of less rainfall/prolonged dry spell or drought conditions during the Kharif or Rabi season • Use of drought-resilient varieties • Assessment plan of food grains under the Public Distribution System (PDS)

Hazard/ Risk	Sector	Related Scheme	Adaptation Needs
Drought	Agriculture	National Horticulture Mission (NHM)	<ul style="list-style-type: none"> • Drought-tolerant perennial fruit crops • Promotion of dry-land horticulture and crops that can withstand drought conditions with a low consumptive use • Introduction/expansion of area under drought-tolerant crops
		Fodder & Feed Development Scheme	<ul style="list-style-type: none"> • Awareness of the feeding requirements of cattle during drought to ensure their health and productivity
		Integrated Watershed Management Programme (IWMP)	<ul style="list-style-type: none"> • Participatory watershed development • Hill slope collection; spring water harvesting
		Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	<ul style="list-style-type: none"> • Water conservation programmes • Watershed development projects • Construction of lined or unlined irrigation channels including field channels under the Command Area Development (CAD) programme • Land levelling and shaping under the CAD programme • Desilting and weeding of canal systems
Drought	Agriculture	Watershed Development Programmes (Drought Prone Area Programme)	<ul style="list-style-type: none"> • Artificial recharging of groundwater, watershed programmes in privately owned small/marginal farms, laying of pipes/channels for exclusive transportation of water to dry areas • Construction of watershed structures at the right place where water recharge can be enhanced/will be used for life-saving irrigation at critical stages of crop growth and during drought situations • Construction of “community ponds” through Panchayati Raj Institutions (PRI) and maintenance by levying user charges
Flood	Agriculture	Flood Risk Mitigation Scheme (FRMS)	<ul style="list-style-type: none"> • Pilot projects for the development of model multi-purpose flood shelters • Development of a river basin-specific flood early warning system • Digital elevation maps for preparation of inundation models for giving early warning to the villagers for evacuation in case of flood
		Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	<ul style="list-style-type: none"> • Spurs and torrent control measures • Strengthening of embankments to prevent river flooding • Restoration of damage due to natural floods (manual works) and the upgradation of works • Development of sites • Plantation along embankments



Hazard/ Risk	Sector	Related Scheme	Adaptation Needs
Flood	Water	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	<ul style="list-style-type: none"> • Construction of rainwater harvesting ponds • Desilting and rejuvenation of old community ponds/ waterbodies • Construction of check dams • Making detention trenches • Water source development and traditional knowledge
Water Scarcity	Drinking Water	National Rural Drinking Water Programme	<ul style="list-style-type: none"> • Permanent drinking water security • Improve water quality by developing the capability of preliminary water testing at the Gram Panchayat level • Adequate water supply received by all households instead of a mere installation of water sources will be considered as a criterion for fully covered habitation • Focus upon economic water security • Conjunctive use of surface and groundwater and focus on rainwater harvesting for recharge • Revival of traditional systems of water conservation • Introduction of catchment protection schemes for surface water
Water Scarcity	Drinking Water	Jal Jeevan Mission	<ul style="list-style-type: none"> • Rural water supply strategy for ensuring potable drinking water security on a long-term basis to every rural household and public institution, viz. GP building, school, Anganwadi centre, health centre, wellness centres, etc. • Creation of water supply infrastructure so that every rural household has a functional household tap connection (FHTC) and water in adequate quantity of prescribed quality is made available on a regular basis • Plan for drinking water security • GPs/rural communities to plan, implement, manage, own, operate and maintain their own in-village water supply systems • Capacity-building of the stakeholders and creating awareness in the community of the significance of water for improvement in the quality of life • Development of in-village piped water supply infrastructure • Technological interventions for removal of contaminants where water quality is an issue • Greywater management
		Saansad Adarsh Gram Yojana	<ul style="list-style-type: none"> • Rainwater harvesting (rooftop) • Watershed management especially renovation and revival of traditional water bodies • Drinking water, preferably treated piped water with household taps

Learning scheme's objective (slides 10–14)

Scheme	Full Name	Objective
NPOF	National Project on Organic Farming	Promotion of organic farming in the country through technical capacity-building of all the stakeholders including human resource development, transfer of technology, promotion and production of quality organic and biological inputs
NHM	National Horticulture Mission	NHM's key objective is to develop horticulture to the maximum potential available in the state and to augment the production of all horticultural products (fruits, vegetables, flowers, cocoa, cashew nut, plantation crops, spices, medicinal aromatic plants) in the state
MIDH	Mission for Integrated Development of Horticulture	<ul style="list-style-type: none"> • Promote holistic growth of horticulture sectors • Encourage aggregation of farmers into farmer groups like FIGs/FPOs • Enhance horticulture production, augment farmers income and strengthen nutritional security • Improve productivity by way of quality germplasm, planting material and water use efficiency through micro-irrigation • Support skill development and create employment generation opportunities for rural youth in horticulture and post-harvest management, especially in the cold chain sector
KCC	Kisan Credit Card	To meet the comprehensive credit requirements of the agriculture sector by giving financial support to farmers
PMBFY	Pradhan Mantri Fasal Bima Yojana	Ensuring the flow of credit to the agriculture sector, which will contribute to food security, crop diversification and enhancing growth and competitiveness of the agriculture sector besides protecting farmers from production risks
MKSP	Mahila Kisan Sashaktikaran Pariyojana	To empower women in agriculture by making systematic investments to enhance their participation and productivity and also create and sustain agriculture-based livelihoods of rural women
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana	<ul style="list-style-type: none"> • To achieve convergence of investments in irrigation at the field level • To enhance the physical access of water on the farm • To expand cultivable area under assured irrigation (har khet ko pani) • To make the best use of water through new technologies and practices • To reduce wastage and increase water availability on-farm • To enhance the adoption of precision-irrigation (More crop per drop) • To enhance aquifers' recharge and to introduce sustainable water conservation practices.



Scheme	Full Name	Objective
KUSUM	Kisan Urja Suraksha evam Utthaan Mahabhiyan	<p>Increase farmers' income, provide a reliable source for irrigation and de-dieselize the farm sector. Under the scheme, farmers, cooperative societies, farmers-cooperative groups and Panchayats can apply to install solar pumps. The total cost incurred in implementing the project is so planned that the farmers' financial burden is negligible. The overall cost is divided into three categories:</p> <ul style="list-style-type: none"> • Government to provide a 60% subsidy directly to farmers • 30% will be provided through soft loans to farmers • 10% actual cost to be incurred by farmers
CADWM	Command Area Development and Water Management	To enhance the utilization of irrigation potential created and improve agricultural productivity and production on a sustainable basis through an integrated and coordinated approach involving a multidisciplinary team
DAY-NRLM	Deendayal Antyodaya Yojana-National Rural Livelihoods Mission	To alleviate rural poverty and create sustainable livelihood opportunities for the rural poor
SAGY	Saansad Adarsh Gram Yojana	<ul style="list-style-type: none"> • To trigger processes that lead to the holistic development of the identified Gram Panchayats • To substantially improve the standard of living and quality of life of all sections of the population
SBM-G	Swachh Bharat Mission-Gramin	<ul style="list-style-type: none"> • Bring about an improvement in the general quality of life in the rural areas by promoting cleanliness, hygiene and eliminating open defecation • Motivate communities and Panchayati Raj Institutions (PRI) to adopt sustainable sanitation practices and facilities through awareness creation and health education
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme	<ul style="list-style-type: none"> • Enhancing livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work • To create durable assets (such as roads, canals, ponds, wells)
WDC	Watershed Development Component of PMKSY	To improve water conservation, irrigation facility, and land use pattern leading to increased agricultural productivity
CAMPA	Compensatory Afforestation Fund Management and Planning Authority	To promote afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses

Scheme	Full Name	Objective
PMKVY	Pradhan Mantri Kaushal Vikas Yojna	<ul style="list-style-type: none"> • Enable and mobilize Indian youth to take up skill training and become employable and earn their livelihood. Increase productivity of the existing workforce and align the training and certification to the needs of the country.
RRR	Repair, Renovation and Restoration of Water Bodies	<ul style="list-style-type: none"> • Comprehensive improvement and restoration of water bodies thereby increasing tank-storage capacity • Ground water recharge • Increased availability of drinking water, improvement in agriculture/ horticulture productivity, improvement of catchment areas of tank commands • Community participation and self-supporting system for sustainable management for each water body • Capacity-building of communities in better water management

Scheme's objective and components (slides 15–16)

Scheme	Objective	Component
National Rural Drinking Water Supply Programme (NRDWP)	The programme seeks to ensure permanent drinking water security in rural India. It also aims to improve water quality by developing the capability of preliminary water testing at the Gram Panchayat level	Provide basic amenities (safe drinking water) to rural India through water quality monitoring and surveillance, communication and capacity development, research and development, programme and project monitoring and evaluation
Flood Protection	Evaluate the risks to existing development in flood hazard areas and identify actions to reduce risks to life and property	Livelihood support through jobs in works related to river management, flood control, anti-erosion, drainage development and flood-proofing works besides flood-prone area development programmes in critical regions. It would also include restoration of damaged flood control/ management work
Hand Pumps Programme	To mitigate the people's misery due to shortages in drinking water in different pockets of drought-prone and acute water scarcity areas	Although hand pumps usually do not provide coverage of a habitation (due to the limitation of rigs operating along road-sides only), they supplement the existing piped water supply and have been installed in drought-prone areas, areas of acute water scarcity and other problematic areas
Command Area Development	The command area development programme (CADP) was initiated under centrally sponsored schemes with the objective of fast utilization of created irrigation potential and optimum agriculture production from irrigable land	To bridge the gap between the potential created and utilized, Command Area Development activities (CAD) are also extended not only to medium schemes but also to minor irrigation schemes



Components convergence (slides 17–19)

Scheme	Central/state government department	Components that can be converged
Swachh Bharat Mission (Gramin) [SBM-G]	Department of Drinking Water and Sanitation, M/o Jal Shakti	Greywater management – soak pits (individual/community), waste stabilization ponds, etc.
MGNREGS	M/o Rural Development	All water conservation activities under the natural resource management (NRM) component
Watershed Development Component (WDC of PMKSY)	D/o Land Resources	Watershed management/RWH/artificial recharge, creation/augmentation of water bodies, etc.
Repair, Renovation and Restoration (RRR) of Water Bodies	D/o Water Resources, River Development & Ganga Rejuvenation	Restoration of large water bodies
Rastriya Krishi Vikas Yojana (RKVY)	M/o Agriculture, Cooperation and Farmers Welfare	Water-related works
Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)		Provision of micro-irrigation for various water-intensive crops to reduce drawing of water from aquifers
Compensatory Afforestation Fund Management and Planning Authority (CAMPA)	M/o Environment, Forests and Climate Change	Afforestation, regeneration of the forest ecosystem, restoration and strengthening of springs, watershed development, etc.
Pradhan Mantri Kaushal Vikas Yojna (PMKVY)	M/o Skill Development	Skill development, training, etc. for human resources required for rural water supply schemes
Samagra Shiksha	M/o Human Resource Development	Provision of drinking water supply in schools
Aspirational District Programmes	NITI Aayog	Water conservation activities financed using the discretionary funds of the district collector
District Mineral Development Fund (DMDF)	State	Water conservation activities on a large scale
MPLAD	Ministry of Statistics and Programme Implementation (MoSPI)	In-village infrastructure
MLALAD	State	In-village infrastructure
Tribal Sub Scheme	Ministry of Tribal Affairs and State	In-village infrastructure
National Rural Livelihoods Mission/ State Rural Livelihood Mission	M/o Rural Development	Developing women entrepreneurs and SHG-led enterprises for water supply services

Step 2. Matching support schemes with adaptation measures and risks addressed

Participatory exercise

- Present slide 21 (Presentation 5.5) to the participants to introduce a case study based on which the next exercise is exemplarily demonstrated.
- You may use the presented case study example to demonstrate how to link activities of adaptation projects to support schemes (slides 18 and 19).
- Provide the participants with scheme cards and the scheme inventory handout.
- All the scheme cards will be shuffled (name generated from the scheme inventory handout) and given to participants.
- They will pin as per their understanding of the schemes.

Further example: Crop-water budgeting and choice of crops to manage moisture stress. They can get individual drip irrigation sets under KUSUM, can have a community storage system for vegetables or fruits under RKVY and can get food assistance under NFSM.

Here, the focus is on rejuvenating a spring, where the labour and material components have been converged with food assistance from various schemes.

Case study: Soil moisture conservation

1. What will change in your village if you undertake this?
Probable answer: It will improve water availability for us and livestock, soil moisture will improve in the long run
2. Who will be involved? (individual or community, which vulnerable groups should get a priority)
Probable answer: Groups rural poor under wage employment
3. Where will the activity take place?
Probable answer: If possible, they should identify a highly vulnerable village on the map (facilitator can use a map or else they can just name a place and the facilitator can ask 'Why this place?')
4. When do you expect the project to be completed?
Probable answer: 1–3 years (the facilitator can get a response to see why there is variation)
5. How will we link available schemes to this project?



6. Where the activity will take place?
Probable answer: If possible, they should identify a village under highly vulnerable map (facilitator can use a map, else they can just name a place and the facilitator can ask, why this place)

Here, the focus is on rejuvenating a spring, where the labour and material components have been converged with food assistance from various schemes.



- Ask the participants to do the same for their adaptation projects. Read out key features of relevant schemes from the scheme inventory and ask participants to pin the schemes and present their learning for their designed adaptation strategy.
- Ask the participants to list suitable schemes for the prioritized adaptation measures on Worksheet 1 of Handout 5.5.

Useful literature and databases

- Ministry of Rural Development (2009): Guidelines for Convergence of NREGS with Programmes of Ministry of Agriculture for enhancing productivity. Available at: https://nrega.nic.in/netnrega/writereaddata/Convergence/circulars/guideline_conver_MOA.pdf
- Ministry of Rural Development (2021): The Mahatma Gandhi National Rural Employment Guarantee Act. Available at: https://nrega.nic.in/netnrega/circular_new.aspx
- RKVY Division, Ministry of Agriculture and Farmers Welfare (nd): Operational Guidelines for Innovation and Agri Entrepreneurship Cell under RKVY-RAFTAAR (2017-18 TO 2019-20). Available at: https://rkvy.nic.in/static/download/pdf/RKVY-RAFTAAR_Ent.pdf
- PMKSY Division, Ministry of agriculture and farmers welfare (2019): Guidelines. Available at: <http://pmksy.gov.in/Guidelines.aspx>
- Please also check the scheme inventory handout with links to further schemes

Key take-aways

- The participants would be able to link various schemes or their components to various climate and disaster risks.
- When choosing the appropriate climate adaptation measure, estimate the budget and see whether any scheme or group of schemes can cover the maximum cost. See whether beneficiaries are willing to contribute.
- Focus on addressing how the benefits can accrue to the community and individuals both in the short run and long run.

Questions for the debriefing phase

- Have you already benefited from a support scheme?
- Do you consider any of the programmes mentioned useful for your adaptation project ideas/problems?
- Have you already discussed your project idea and the possibility of receiving support from support schemes with your community?

Hints for the trainer

- Since Module 5 is heavy on content, the trainer must give examples and make it more interactive. They should project the scheme inventory specific areas during such discussion.

Session 5.6 How to apply for the relevant schemes for CCA-DRR

Learning objective	To apply for the identified programmes/schemes and match them with adaptation needs	
Prerequisites/prior knowledge for successful participation	Understanding of climate risks/hazards/disasters and activities to address them	
Steps (duration)	Step 1. Understanding the application procedure	30 min
	Step 2. Roleplay: apply for a scheme	30 min
Total duration	60 min	
Methods/exercises	Input presentation, role play simulating an application case	
Material	PowerPoint Presentation 5.6, Handout 5.6, laptop, LCD projector	
Preparation of the material	Focus on the application processes of support schemes identified by the participants in Session 5.6 and prepare appropriate materials for them, if needed	

Step-by-step approach

This module provides inputs for familiarizing participants with how to apply for identified schemes to accomplish an adaptation strategy for selected sectors in the village-level planning process.

In **Step 1**, participants will start discussing the identified schemes and zero down on an adaptation strategy based on an already identified climate risk.

In **Step 2**, the participants will put theory into practice and be guided through an application process for support schemes identified in Session 5.5 relevant to their adaptation project.

Step 1. Understanding the application procedure

Input presentation

- Present Slides 3–9 (Presentation 5.6: How to apply for relevant schemes) to the participants.



Table 11. Schemes and their application procedure

Scheme	Application procedure
Rashtriya Krishi Vikas Yojana (RKVY)	<ol style="list-style-type: none"> 1. Contact the District Agriculture Officer/Project Director ATMA. 2. Visit the state's agricultural portal to apply online for a particular scheme. 3. Submit a list of projects proposed to be implemented under the scheme to the Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) after it is approved by the State-level Sanctioning Committee (SLSC).
Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)	<ol style="list-style-type: none"> 1. Contact the District Agriculture Officer/District Soil Conservation Officer/Project Director ATMA/District Horticulture Office. 2. Online: Visit the official website for Pradhan Mantri Krishi Sinchayee Yojana, i.e., http://pmksy.gov.in/.
National Food Security Mission (NFSM)	<ol style="list-style-type: none"> 1. The Gram Panchayat is responsible for the selection of beneficiary farmers. 2. Selection of beneficiaries should involve a "participatory" approach.
Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)	<ol style="list-style-type: none"> 1. A NREGA job card application form may be availed from the local Gram Panchayat, or the application may be made on plain paper. 2. Currently, the MGNREGA job card application process is conducted completely offline primarily because of the low internet penetration in rural India. However, the official NREGA website (www.nrega.nic.in) does give individuals the option to download the NREGA Job Card Application Form for free.
Pradhan Mantri Fasal Bima Yojana (PMBFY)	<ol style="list-style-type: none"> 1. Nearest branches of banks/PACS/cooperative banks/common service centres (CSC)/empanelled general insurance companies notified for the area and District Agriculture Officer/Block Development Officer may be contacted; or visit the web portal www.pmfby.gov.in.
Paramparagat Krishi Vikas Yojana (PKVY)	<ol style="list-style-type: none"> 1. At the district level: Contact District Agricultural Officers for application procedure details. 2. Visit the official portal to apply online for Pradhan Mantri Paramparagat Krishi Vikas Yojana and submit the application form.
Mahila Kisan Sashaktikaran Pariyojana (MKSP)	<ol style="list-style-type: none"> 1. Contact the State Rural Livelihood Mission department. The responsible department will register you for the MKSP scheme. 2. The data entry operator of MKSP will fill your application form on the departmental online portal for MKSP. 3. You must submit all your documents to the SRLM department. 4. After the successful submission of the application, SRLM will forward your application to NRLM.
Mission for Integrated Development of Horticulture (MIDH)	<ol style="list-style-type: none"> 1. Beneficiary can register details online on Hortnet or submit the application to DHO along with the required documents.
National Rural Livelihood Mission (NRLM)	<ol style="list-style-type: none"> 1. District Mission Management Units (DMMU) and Block Mission Management Units (BMMU) have been established to implement the programme. 2. Visit the official website of Deendayal Antyodaya Yojana, i.e., aajeevika.gov.in, to apply online.

Scheme	Application procedure
Integrated Child Development Services (ICDS)	1. Registration at Anganwadi Centres (AWC) through an Anganwadi Worker (AWW) and an Anganwadi Helper (AWH).
National Rural Drinking Water Supply Programme (NRDWP)	1. Apply online by submitting the form on the Ejalshakti website. 2. Contact Jal Shakti Vibhag for the detailed application procedure.
Command Area Development (CAD)	1. Contact Jal Shakti Vibhag for the detailed application procedure. 2. The Ministry of Water Resources coordinates and monitors the implementation of CADWM at the national level; the programme is being implemented through the Command Area Development Authorities (CADAs) at the state level.
Swachh Bharat Mission – Gramin (SBM-G)	1. Contact the concerned officer of SBM-G from the Rural Development Department. 2. Contact Jal Shakti Vibhag for the detailed application procedure.
Watershed Development Component of PMKSY	1. The DRDA/Zilla Parishad selects the villages for the development of watershed projects. 2. The project implementation agency is also selected by the DRDA/Zilla Parishad.
Repair, Renovation and Restoration (RRR) of Water Bodies	1. At the water body level, detailed project reports (DPRs) are prepared and works implemented by the Water Users' Association (WUA)/local Panchayat/a government agency identified by the district-level implementing agency (DLIA). 2. The proposals identified/received by the DLIA are scrutinized/included in the district plan and forwarded to state-level nodal agency.
Sansad Adarsh Gram Yojana (SAGY)	1. The Lok Sabha MP has to choose a Gram Panchayat from within their constituency and the Rajya Sabha MP a Gram Panchayat from the rural area of a district of their choice in the state from which they were elected. nominated MPs may choose a Gram Panchayat from the rural area of any district in the country.
Pradhan Mantri Kaushal Vikas Yojna (PMKVY)	1. The candidate will have to apply online to get the training from the official website of the PMKVY. Here is the direct link to the website: http://pmkvyofficial.org . On the webpage, the applicant will have to enter their basic information. In the next step, the applicant will have to choose the course they want to pursue under PMKVY. The applicant can choose from 40 options like construction, electronics, food and processing, furniture, gems and jewellery, and many others. Now for the last step, the candidate will have to choose the training centre as per its feasibility. Candidates can also visit the training centre to learn more about the course timing and its duration.
Samagra Shiksha (SS)	1. Contact the appointed officer on the Project Approval Board (PAB) under the Department of School Education and Literacy responsible for the implementation of activities under Samagra Shiksha.



Scheme	Application procedure
Member of Parliament Local Area Development Scheme (MPLADS)	<ol style="list-style-type: none"> 1. MPs have a recommendatory role under the scheme. They recommend their choice of works to the concerned district authorities who implement these works by following the established procedures of the concerned state government. 2. The district authority is empowered to examine the eligibility of works, sanction funds, select the implementing agencies, prioritize works, supervise overall execution and monitor the scheme at the ground level. 3. The district authorities get the works executed through line departments, local self governments or other government agencies. In some cases, the district authorities get the works executed by reputed non-government organizations.
Member of Legislative Assembly Local Area Development Scheme (MLALADS)	<ol style="list-style-type: none"> 1. Each MLA may give their choice of works along with the implementing agencies to the concerned Deputy Commissioner at any point of time against the allocated fund for implementation by following the established procedures.
District Mineral Development Fund (DMDF)	<ol style="list-style-type: none"> 1. Contact the Collector of the respective district or Revenue Divisional Commissioner – whoever is the chairperson of the DMDF.
Green India Mission (GIM)	<ol style="list-style-type: none"> 1. Village level: The Gram Sabha and the committees mandated by the Gram Sabha, including revamped JFMCs will plan and implement the Mission's activities at the village level. The revamping of JFMCs includes the setting up of JFMCs by the Gram Sabha following due process, as may be specified in the State Panchayati Raj Act or in the JFM guidelines. The plans will be approved by the respective Gram Sabha. They will have explicit linkages with Panchayat-level planning to ensure maximum convergence. 2. Contact at the district level: District Forest Development Agency.
Compensatory Afforestation Fund Management and Planning Authority (CAMPA)	<ol style="list-style-type: none"> 1. For the benefits and application procedure, please contact your nearest District Forest Officer. 2. Contact officers from the state CAMPA under the Forest and Environment Department.
Aspirational District Programmes (ADP)	<ol style="list-style-type: none"> 1. Contact state-level "Prabhari" Officers and District Collectors responsible for the implementation of activities under ADP.
Tribal Sub Scheme (TSS)	<ol style="list-style-type: none"> 1. Contact the local Tribal Development Department for the detailed application procedure.

Step 2. Role play: apply for a scheme

- Present Slides 10–11 (Presentation 5.6: How to apply for relevant schemes) to the participants.
- Ask the participants to list the priority strategy they want to address, e.g., soil moisture conservation.
- The participants should list individual- and community-level action which the facilitator can write on the flip chart.

Role play (use the role play handout)

- For the role play the participants will be divided into three groups (villagers, officials and GP-level committee).
- There will be one facilitator for each group who will help members identify the procedures and eligibilities from the scheme inventory to apply to specific plans that need to be cleared by the committee and recommended for sanction.
- Encourage participants to use the role play cards from Handout 5.6 and the scheme inventory from Session 5.5.
- The facilitator will explain the process and ask participants in a plenary session about the challenges they currently face and how they can be better prepared in the future.

Process of the role play

- Encourage Group A (villagers) to focus on a specific adaptation measure and to identify climate risks and related schemes. The facilitator can note down the selected schemes and pass them on to the second group (Group B/officials).
- Group B will accordingly seek out the schemes from the scheme inventory and the eligibility norms.
- After filling out the form in the role play handout, Group A will pass on their proposal to Group B for review.
- After group B has reviewed and discussed the proposal, they will make a presentation to group C to make their case.
- Group C will make a recommendation.

Useful literature and databases

- Government of India, Ministry of Rural Development (2009): Guidelines for Convergence of NREGS with Programmes of Ministry of Agriculture for Enhancing Productivity. Available at: https://nrega.nic.in/netnrega/writereaddata/Convergence/circulars/guideline_conver_MOA.pdf
- Government of India, Ministry of Rural Development (2021): The Mahatma Gandhi National Rural Employment Guarantee Act. Available at: https://nrega.nic.in/netnrega/circular_new.aspx
- RKVY Division, Ministry of Agriculture and Farmers Welfare (2020): Operational Guidelines for Innovation and Agri Entrepreneurship Cell under RKVY-RAFTAAR (2017–18 to 2019–20). Available at: https://rkvy.nic.in/static/download/pdf/RKVY-RAFTAAR_Ent.pdf
- PMKSY Division, Ministry of Agriculture and Farmers Welfare (2019): Guidelines. Available at: <http://pmksy.gov.in/Guidelines.aspx>

Key take-aways

- Participants will be familiar with the application procedure for various schemes.
- The tool encourages participants to fine-tune action plans by assessing alternatives.

Debriefing questions

- What are some important take-away messages from this session?
- Which outcomes of the session do you find most relevant to your work?
- How did the session and exercise support you in understanding the application process for relevant support schemes for adaptation projects?



Module 6 Implementing CCA projects

Learning objective	To learn key concepts that facilitate the implementation of adaptation projects in the framework of a GPDP
Duration	Shortest version: 45 min Complete version: 2 h

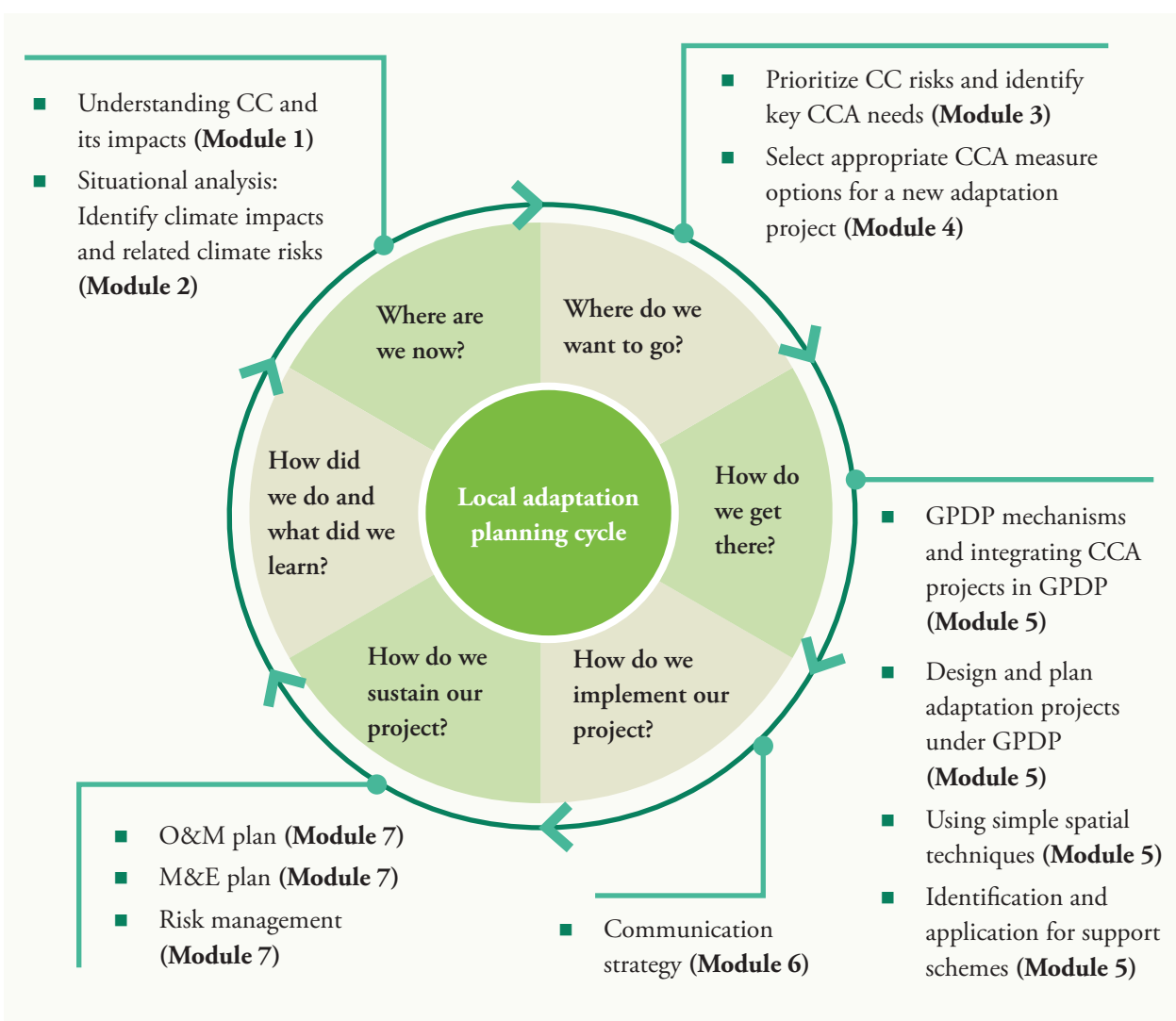
Module planner

Duration	Sessions	Shortest version	Complete version
2 h	Session 6.1 Develop a communication strategy	Step 2 (45 min)	x

Integration of Module 6 along the local adaptation planning cycle

The methodology used by the Capacity-Building Package follows the logical processes of local adaptation planning. The following figure shows the arrangement of the modules of the CDP, their main steps and the methods employed. The colour blue corresponds with Module 6 and Step 6 of the local adaptation planning cycle, which teaches key concepts for developing a communication strategy within the framework of a GPDP. The strategies and concepts developed in this module add value to participants' adaptation projects and should be considered from the start of the project.

In the ExcelTool, you will find tabs in the same colours. Here, you can document the results achieved by your group of participants in Module 6.



Session 6.1 Developing a communication strategy

Learning objective	To improve acceptance and public visibility of adaptation projects by creating and applying an internal and external communication strategy	
Prerequisites/ prior knowledge for successful participation	A rough design of a CCA project should be developed	
Steps (duration)	Step 1. Developing an internal communication strategy	45 min
	Step 2. Developing an external communication strategy	45 min
	Step 3. Using social media	30 min
Total duration	2 h	
Methods/exercises	Input presentation, active listening as the heart of communication, developing an internal and external communication strategy, storytelling, and posting on social media	
Material	Beamer, presentation slides from Session 6.1, Handout 6.1 with worksheets for the participants, moderation material like cards and flipcharts, participants must have internet access	
Preparation of the material	You may adapt the examples provided that facilitate the exercises in this session to the contexts of the participants	

Step-by-step approach

This session provides inspiration and tools for identifying and creating internal and external communication strategies for the local contexts of the participants. Along the way, an understanding of how communication works, what tools exist and how to achieve visibility will be provided.

Step 1 provides participants with general background knowledge on communication concepts and common barriers to effective communication. The participants will learn to adapt the knowledge to their own contexts and create an internal communication strategy. Participants will also be invited to share experiences and difficulties in communication from their contexts.

In **Step 2**, participants will assess the means of external communication and the importance of visibility. They will learn how to realize external communication through a fast writing practice and create an external communication strategy for their own contexts.

Finally, in **Step 3**, the external communication will focus on social media and its importance and challenges in praxis, as part of the external communication strategy.



Step 1. Developing an internal communication strategy

Entry exercise: Active listening as the heart of communication

The session will start with a warm-up exercise that sensitizes participants to communication and its barriers. In this exercise, participants will analyse how differently communicated messages may be received and change when they are passed on.

Time: 15 min

- Ask the participants to form groups of three (Persons A, B and C).
- Engage each group in the following exercise:
 - Person A narrates a story in three minutes.
 - Person B narrates person A's story as accurately as they can, not using more than three minutes.
 - Person C listens actively, and at the end, reflects, together with Persons A and B, on the differences in the same story as told by two people.
- After the exercise, reflect with the group on what happened and the reasons for what happened. To do this, choose three people from different groups who had different roles to recount their experiences.

Input session

- Present Slides 3–5 to the participants to provide them with some general background on communication and common barriers to effective communication.

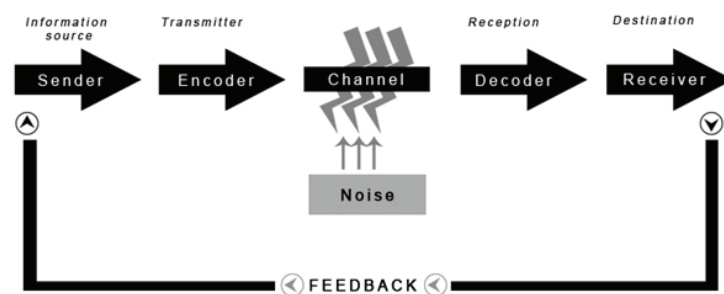
Hint for the trainer

- Use examples of the group exercise to explain the models and different aspects. Try to show why it was difficult for Person B to narrate the exact story.

When implementing a project or realizing activities in your community, proper communication is crucial. To improve the quality of internal communication, we need to understand how communication works and its barriers. This is aided by two commonly used models of communication, which are briefly presented as follows.

The sender–message–channel–receiver (SMCR) model of communication

Figure 33. The sender–message–channel–receiver (SMCR) model of communication



SHANNON-WEAVER'S MODEL OF COMMUNICATION

(Source: *Communication Theory* (nd): Shannon and Weaver Model of Communication. Available at: <https://www.communicationtheory.org/shannon-and-weaver-model-of-communication/>)

The **sender–message–channel–receiver (SMCR) model of communication** provides an overview of the various components in the communication process and how they are interlinked with each other. By understanding the dependence of the different components, the participants will appreciate how communication works and what might disrupt the communication process. The model, including the general components, can be applied to different fields of communication (starting from the left):

- **Sender:** The originator of a message (example: woman farmer A).
- **Encoder:** The transmitter that converts the message into signals, for example, sound waves (example: the voice of a woman).
- **Channel:** The signal carrier or medium (example: voice carried through air).
- **Decoder:** The reception place of the signal which converts signals into a message. Decoding is done by the receiver when they get the message (example: a message gets through to a second woman who listens to it).
- **Receiver:** The recipient of the message from the sender (example: a second woman), who usually gives feedback to the sender to confirm that the message was properly received.
- **Noise:** This affects the communication going through the channel and makes the message more difficult for the receiver to understand (example: thunder or crowd noise).
- **Feedback:** The receiver can get an inaccurate message. This is why feedback from the receiver is important in case the message is not properly received. Noise can also affect the decoding of the message by the receiver (example: a smile from the second woman to the first woman or any verbal replication).

Four-sides communication model (Schulz von Thun) (Slide 5)

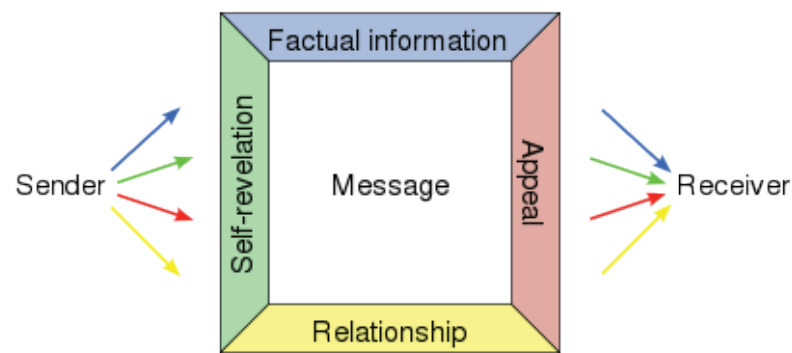
A second important model of communication that helps participants to create a functioning communication strategy is the four-sides model of communication designed by the German Friedemann Schulz von Thun. It shows how the analysis of a message from a sender by a receiver (see preceding model) is influenced by different aspects, which can quickly lead to misunderstandings.

The model says that every message has four facets, though the same emphasis might not be placed on each: the factual, self-revealing, relationship and appeal facets. A message (communication) can therefore be sent as well as received as one of the four sides of information. Therefore, it is important while dealing with internal communication to consider this part of communication which could also be culturally influenced.

- The **factual** level contains statements that are a matter of fact like data, which are part of the news.
- With the **self-revealing** or self-disclosure, the speaker – consciously or unconsciously – reveals something about themselves, their motives, values, emotions, etc.
- The **relationship** layer includes how the sender gets along with the receiver and what they think of them.
- The **appeal** contains the desire, advice, instructions and effects that the speaker is seeking.



Figure 34. Four-sides communication model (Schulz von Thun)



(Source: Schulz von Thun Institut (nd): Angebote. Available at: <https://www.schulz-von-thun.de/>)

Hint for the trainer

To better understand the model, present examples to the participants. Use the following video on the IEC strategy used in the MGNREGA programme.

<https://www.youtube.com/channel/UCIicGPL5rTD23FvCDFOhrOA>

The best-known example which Schulz von Thun gave is the car situation. The front-seat passenger tells the driver: “Hey, the traffic light is green”. The driver receives the message, and, depending on which “ear” they hear it with, will react differently.

- On the factual level, they will understand the **fact** that the traffic light is green.
- On the level of **self-revelation**, they may hear “I am in a hurry” – the passenger reveals a part of themselves.
- On the **relationship** level, they might hear an offer of help: “I want to help you”.
- On the **appeal** level, they could also interpret it as “Come on, drive!” – a command.

The emphasis on the four facets of communication can be meant and understood differently. For example, the sender might intend to emphasize the attractiveness of the statement and the receiver might primarily receive the relationship part.

Examples of barriers to effective communication (Slide 6)

The four-sides model describes the main reasons for misunderstandings. There are many other reasons why interpersonal communications may fail. In some cases, such as that described in the example for the four-sides model, the message may not be received exactly the way the sender intended. It is, therefore, recommended that the sender actively listens, reflects on and checks whether the message has been understood and is aware of common reasons for misleading communication.

Common barriers to effective communication (Drexel University 2018):

- **Dissatisfaction with or disinterest in one’s job** – Dissatisfaction is a big barrier to clear communication and can create conflict.
- **Inability to listen to others** – For fluent communication, it is important to know not only how to communicate but also how to listen.
- **Lack of transparency and trust** – Without trust or transparency, internal communication is very difficult.
- **Communication styles (when they differ)** – Everyone has their own communication style. Some people are very direct while others prefer a more indirect approach.

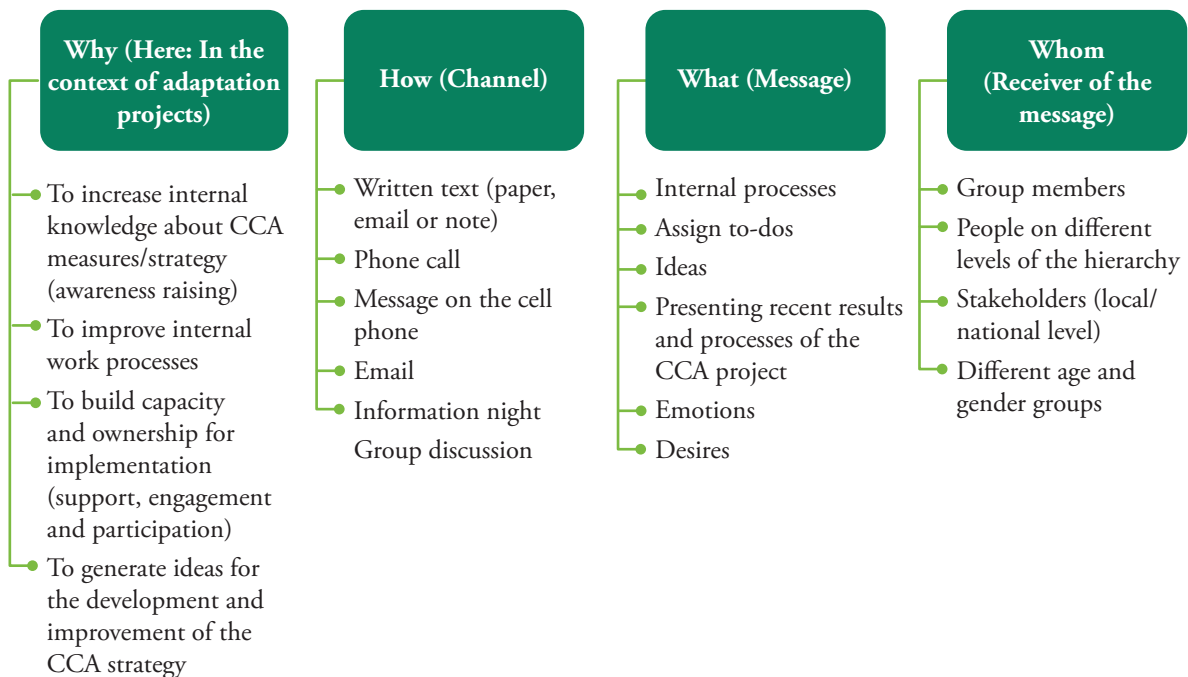
- **Conflicts in the workplace** – When there is a conflict, communication becomes difficult or impossible because it is influenced by a negative feeling.
- **Cultural differences and language** – Communication depends on one's culture and language. A German person greets others by shaking hands and saying "Hi". An Indian person would close their hands in front of their chest and bow, saying "Namaste".

Group exercise: Develop your internal communication strategy (Slides 7–9)

Time: 15 min

After understanding how communication works and what barriers can be encountered, in this exercise, participants will create an internal communication strategy. They will analyse what, how, why and with whom to communicate internally and discuss how to prevent possible risks. When communicating internally, they have to consider that communication is a very complex process and keep the different facets of and barriers to communication in mind.

Examples:



- Ask the participants to form groups and reflect on the communication that is happening within their organizations, groups or in daily life. In doing so they should analyse the different levels of communication including social, technical and content aspects by using Worksheet 1 in Handout 6.1 (you will find an example in the following table).
- Guiding questions:
 - What do you communicate about?
 - Who is involved and in what kind of communication?
 - How do you communicate and how you wish for that communication to work?
 - Who is responsible?
- In the second step, engage the participants in analysing whether and what problems or difficulties they have experienced in this communication and in offering suggestions to improve it. To help participants brainstorm, remind them of the four-sides model presented earlier and examples of barriers to communication.

Hints for the trainer

- This exercise will build the basis for the next group assignment on creating an internal communication strategy.

INTERNAL COMMUNICATION STRATEGY						
Why do we communicate?	What do we communicate about? (Message)	Who is communicating (Sender of the message/ responsible person)	How do we communicate? (Channels)	To whom do we communicate? (Receiver of the message)	Difficulties experienced in communication	Suggestions for improving communication
Example: Work among farmers must be coordinated.	Example: Defining daily routine.	Example:	Example:	Example:	Example:	Example: Define fixed times for internal meetings, when everyone is able to be in one place with reception and a charged phone.
		One farmer woman	Phone call	Close colleague	At certain times there is no signal and people's phones are dead.	

Step 2. Developing an external communication strategy

In this step, the participants will learn how external communication works, what to consider and how they can develop their own strategy for their groups and working teams.

Input presentation

External communication involves communicating your project activities to the public and stakeholders that are not part of your organization/team, such as the community, investors, political authorities and non-governmental organizations. Other people from the region could, for instance, be interested in replicating successfully implemented CCA measures, as they could face the same climate risks. In order to successfully communicate with external stakeholders, it is important to design stakeholder-specific communication since different stakeholders have different levels of knowledge, expectations and interests.

External communication aims at

- promoting the success of implementation efforts and acquiring a pioneer status.
- increasing a project's visibility.
- increasing a project's impact.
- improving external reputation among diverse external stakeholders.
- triggering collaboration in adaptation efforts, e.g., on a cluster level, in cooperation with communities, by supporting programmes by governments, etc.

Input: Storytelling – How to perform external communication (Slides 10–12)

What: Storytelling is the recitation of an event or a series of events that can be either true or fictitious. Storytelling creates a vivid message that the reader/listener can relate to, get involved with and feel empathy towards. It is a good tool for external communication. This tool can be especially effective in cultures that have a rich oral tradition.

Examples: The story of

- a woman whose life changes through the use of rainwater harvesting.
- a little girl and how her daily life was changed by a CCA measure.
- a women's self-help group that changed their way of agriculture, incorporating it into a CC-adapted agroforest system.

Group exercise (optional, if time allows)

- If you have time, you can choose one of the forms for telling stories presented as follows, and practise storytelling with the group.

Forms of storytelling:

- **Sharing stories:** Ask participants to reflect upon a specific topic, and share stories about that topic from their own personal experience. This may contribute to participants' motivation to deeply engage with a particular topic, as it will be grounded in their own experiences and memories.
- **Critical incidents:** Tell or read a story to the group, and then lead a discussion about the issues raised in the story. You might use an existing parable or local story, or create a story to illustrate a topic you want to address.
- **Finish the story:** Begin a story and ask participants to add a line or two each. This works best in smaller groups, and can even be used as a quick and fun warm-up.



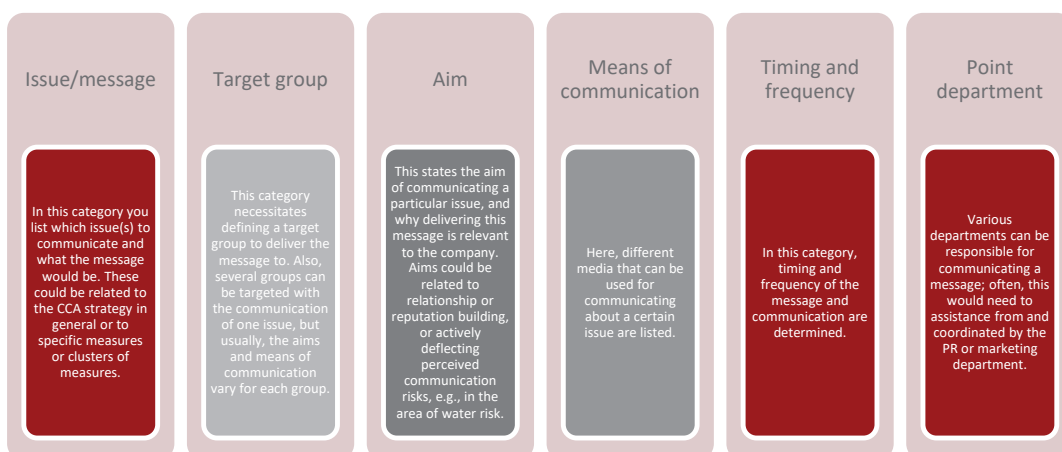
Group exercise: Channels used for external communication (Slide 13)

Time: 15 min

- For this exercise you can use a flip chart to collect and present the results to the group or participants can work on the provided Worksheet 2 in Handout 6.1
- Ask the participants to think about strengths and limitations of each item quoted in the following table.
- Encourage them to talk about their experiences with different communication channels and to present and discuss their own experiences.

Communication channels	Strengths	Limitations
Videos	Example: A video shows a situation or project with images and voice, so it transmits very well what you want to show/communicate, with no literacy necessary.	Example: There is usually more work required for realization (including technical equipment); it also requires a medium for transmission (television, internet, computer, telephone etc.)
Flyers	Examples from participants...	
Painted pictures (walls)		
Audio or music		
Manuals		
Articles in the local newspaper		
Webpages		
Newsletters		
Let participants add further channels they know and which are relevant to their daily lives and working contexts...		

Input: Channels used for external communication (Slide 14)



Group work: Create your external communication strategy (Slide 15)

Time: 30 min

External communication					
Issue/message	Target group	Aim	Means of communication	Timing/frequency	Point department
Example:					
Rainwater harvesting can be a good method for every woman farmer in the village.	Women farmers in the village.	Make the CCA measure more widespread to improve farming conditions in the village.	Create a little audio clip and broadcast it to the village radio.	Once a day for two weeks.	Department responsible for communication and technical needs.
Ideas from participants...					

Step 3. Using social media

In this step, the participants will reflect on the use of social media for external communication and practise with a simple example.

Input presentation

- Present Slides 16–18 (Presentation 6.1: Develop a communication strategy) to the participants.

Social media is the fastest and newest way to communicate what you do. It is used a lot in private communication, but organizations, politicians and companies also use it. Social media is widespread and people like to use it, mainly because it is easily accessible. But remember, not everyone has access to a mobile phone or a computer and the internet. Therefore, access is sometimes limited. A good analysis should be conducted to consider the way social media is used in each context.

Social media is easy to use. It transmits information quickly, is cheap and has a great impact.

Benefit: The benefit of social media is that you can use a lot of pictures and little text and therefore also reach people who have low literacy. You don't need to be a good writer.

Limitation: Internet access is necessary, little information can be transmitted, and it needs continuous updates to not lose the interest of followers.

Examples of social media (Slide 17)

These are the most common social media platforms used around the world:

- Facebook
- YouTube
- WhatsApp
- Instagram

Task for discussion and exchange: ask what social media the participants use and why. Ask them to recount their experience. The trainer also should offer some examples.



Final exercise: Post on social media about our session today (Slide 18)

- Ask each participant to create a post for a social media platform of their choice about what they learned today or about a great experience from the workshop.
- If there are people without cell phones, they should join others.
- If possible, everybody should publish a post and, if they wish, get connected with the other participants.

Hints

- The participants should think about whom they want to communicate with.
- Explain why they should use the medium you decided on.

Hint for the trainer

- This task provides insights into what the participants learned during the session.

Useful literature and databases

- GIZ (nd): Toolkit to Develop Climate Adaptation Strategies for Small and Medium-sized Enterprises (SMEs): Climate Expert. Available at: <https://www.climate-expert.org/en/home/>
- Schulz von Thun Institut für Kommunikation (nd). Communication Models. Available at: <https://www.schulz-von-thun.de/die-modelle>

Key take-aways

- Understand the importance and the difficulties of communication.
- Know what internal and external communication entail.
- Have the knowledge to create an internal and external communication strategy.
- Be aware of the possibilities of social media in the context of CCA.

Questions for the debriefing phase

- What are the important take-away messages from this session?
- Which outcomes of the session do you find most relevant to your work?
- Do you know how you plan to apply the key concepts from this session to your work?
- How did the tool support you in improving the acceptance and public visibility of your project activities?

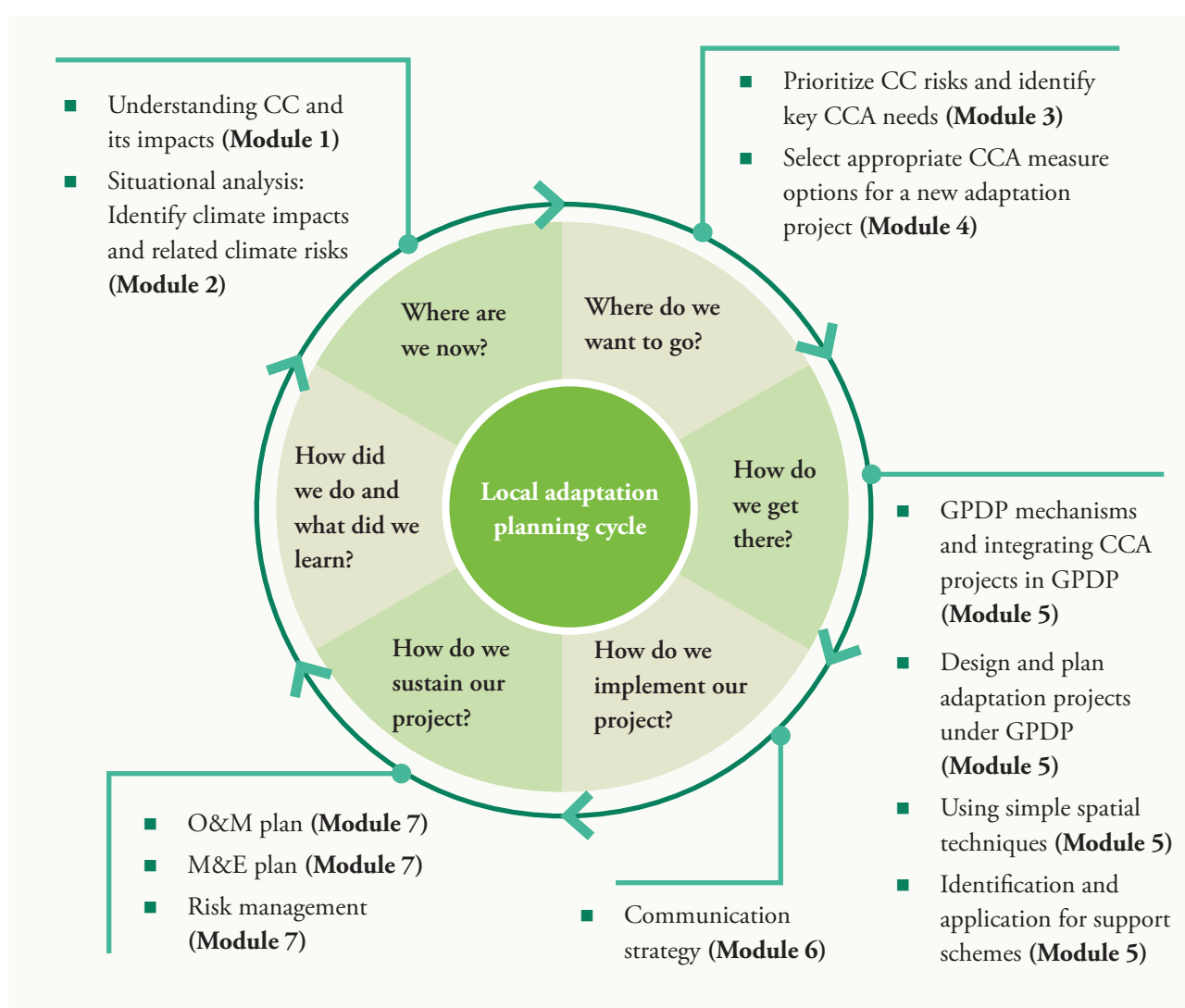


Module 7. Operation and maintenance (O&M) and sustainability measures

Learning objective	To learn key concepts that help sustain adaptation projects.
Duration	Shortest version: 1 h 30 min Complete version: 4 h 30 min

Module planner

Duration	Sessions in the module	Shortest version	Complete version
1 h 30 min	Session 7.1 Operation and maintenance (O&M) plan for environmental infrastructure measures	Step 1 (30 min)	x
1 h 30 min	Session 7.2 Monitoring and evaluation plan	Step 1 (30 min)	x
1 h 30 min	Session 7.3 Risk management	Step 1 (30 min)	x



Integration of Module 7 into the local adaptation planning cycle

The methodology used in the Capacity-Building Package follows the logical processes of local adaptation planning. The following figure shows the arrangement of the modules of the CDP, and the main steps and methods employed. The purple colour indicates that you are in Module 7 and Step 7 of the local adaptation planning cycle, which introduces key concepts to PRI-members to increase the sustainability of the project.

In the ExcelTool you will find tabs in the same colours. Here you can document the results achieved by your group of participants in Module 7.

Session 7.1 O&M plan for environmental infrastructure measures

Learning objective	Developing a long-term O&M strategy to ensure that the implemented adaptation measure is sustainable and remains effective.	
Prerequisites/ prior knowledge for successful participation	CCA projects are designed and ready to be implemented Note: This session is only applicable to environmental infrastructure measures for climate adaptation, including grey and green adaptation measures.	
Steps (duration)	Step 1. Understanding the concept of O&M	30 min
	Step 2. Developing an O&M plan	60 min
Total duration	1 h 30 min (optional: only Step 1 can be completed in 30 min)	
Methods/exercises	Mind map of benefits and risks, developing an O&M plan including a finance plan based on guiding questions and revising your budget plan	
Material	PowerPoint Presentation 7.1, Handout 7.1, laptop, LCD projector, cards and ability to pin the cards on a wall	
Preparation of the material	You may adapt the case study provided that facilitate the exercises in this session to the contexts of the participants.	

Step-by-step approach

The session will provide important steps in developing an O&M plan for environmental infrastructure measures for climate adaptation.

Step 1 gives a general understanding of O&M including basic concepts of sustainability and its advantages. In **Step 2**, the participants will put theory into practice and are guided to develop O&M plans for their adaptation projects. Guiding questions and an illustrative example will provide support. The O&M plan will consider various aspects – the definition of activities, persons responsible and the necessary budget for O&M implementation, which should be considered in the project's budget plan from the very beginning.

Entry exercise (Slide 4, 10 min)

- Ask participants to note down O&M activities they know from their daily work on cards (they can also collect their results for later usage on Worksheet 1).
- Collect the cards and pin them on a wall.
- Ask each participant to present and briefly explain one activity they noted.

This entry exercise will serve as an energizer. Furthermore, the activities collected will give you insight in the existing knowledge of the participants on O&M.

Step 1. Understanding the concept of O&M

Input presentation

- Present Slides 5–7 (Presentation 7.1: Operation and maintenance [O&M] plan) to the participants.

What is O&M?

“... both a technical activity and a service provision aimed at keeping resource infrastructure at a desired performance capacity or to restoring it to a particular capacity.

It is a service supplied to the providers of the infrastructure and/or to those who deliver certain goods by means of this infrastructure.”

(MAINTAIN Programme of GTZ)

Operation refers to the activities that keep a system running smoothly in order to generate certain outcomes.

Maintenance refers to the activities required to sustain the adaptation measure in a proper working condition. This not only includes high system reliability and extended equipment life, but also various non-technical factors, such as the involvement of stakeholders in the maintenance process, management of the financial resources required for the improvement efforts, etc.

Maintenance approaches:

- **Preventive maintenance** (ideal scenario) – Work that is planned and carried out regularly to maintain and keep the system in good condition.
- **Corrective maintenance** – Replacing or repairing something that was done incorrectly or that needs to be changed as it can be foreseen that without correction the system will not work efficiently or may even stop working; an example is the exchange of a leaking pipe or replacement of a wrongly dimensioned pump.
- **Reactive maintenance** – Emergency responses to unplanned breakdowns.

O&M plans are primarily developed for and especially relevant to grey adaptation measures (technologies).

Why is O&M important for your project?

Developing an O&M plan is one pillar that ensures the sustainability and long-term effectiveness of your adaptation project and its objectives. Even the best and most suitable technology can only work if it is properly operated and maintained according to specifications. Many projects have nice ideas, good investments and a successful first implementation phase, but then fail after the financier and the implementing company leave. A common reason for this is a lack of O&M for the implemented measure.

A system is said to have achieved sustainability when

- it is functioning and being used.
- it is able to deliver an appropriate level of benefits (related to quality, quantity, comfort, continuity and affordability).
- it continues over a prolonged period of time (beyond the life cycle of the equipment).
- it is institutionally managed.
- the O&M costs are reliably covered (e.g. through user fees).
- it is mainly operated and maintained at a local level.
- it has no negative effect on the environment.



Advantages

- O&M activities ensure that the project is sustainable in the long term.
- O&M allow for the correct provision of services and benefit of end-users.
- O&M prevent the systems from collapsing and creating environmental and health hazards.
- O&M, which involve small costs, prevent high costs for bigger repairs or replacements.
- The community can be involved in O&M.

Group task: Mind map of benefits and risks (Slide 8)

Time: 10 min

- Divide the participants into two groups.
- Ask the first group to brainstorm about the benefits of an O&M plan.
- Ask the second group to brainstorm about possible risks of a project without an O&M plan for their adaptation projects.
- Realize a mind map of the two aspects and analyse the results with the participants. You will observe that some risks of the project can be benefits of the O&M plan.
- To collect their results, participants may use Worksheet 2 in Handout 7.1.

Step 2. Developing an O&M plan

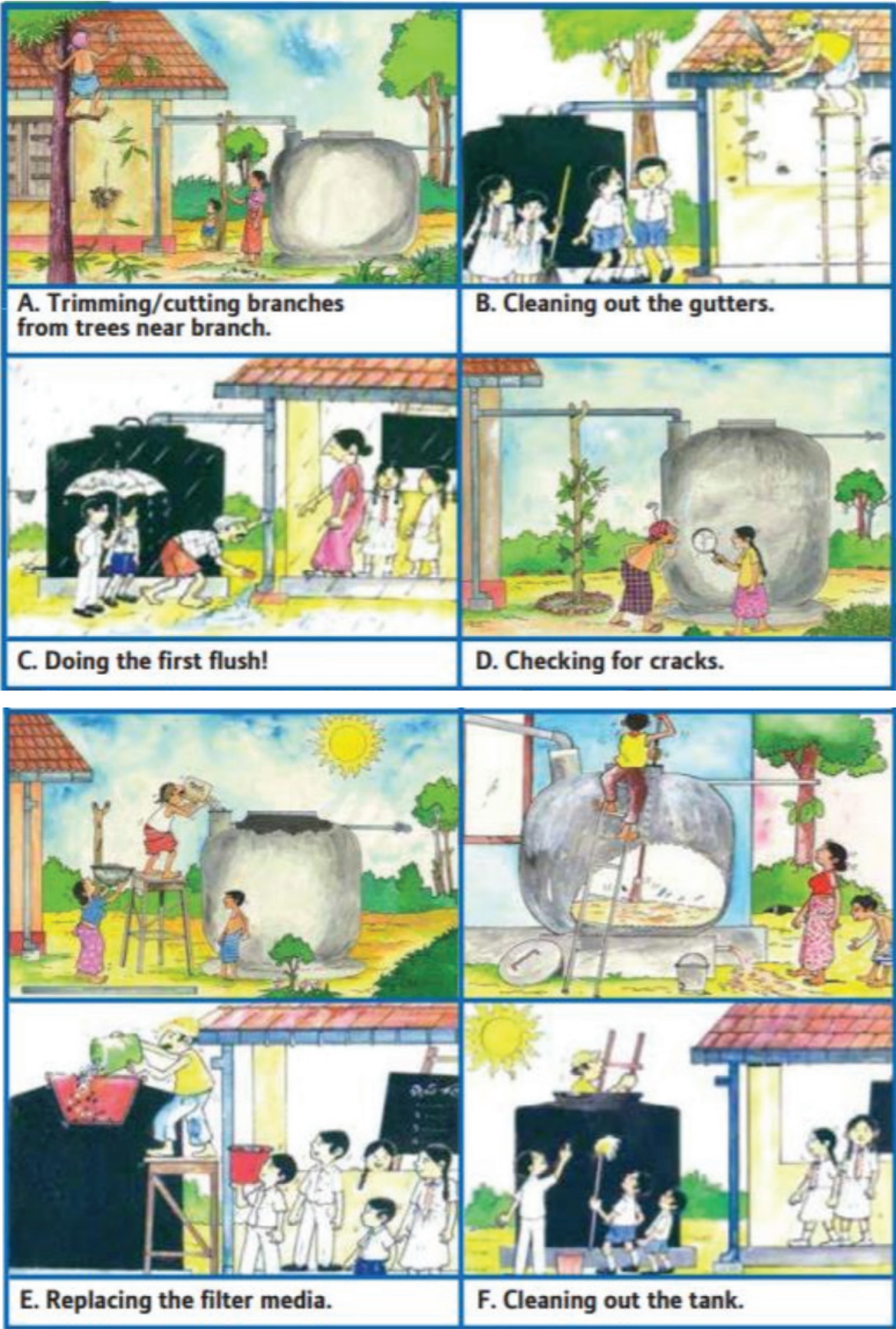
Case study: Examples of O&M plans (Slides 10–11)

Roof rainwater harvesting has high potential in areas that receive high rainfall and have a long rainy season as well as dry periods which need to be overcome with the collected water. Rooftop rainwater harvesting is the simplest, least expensive and most obvious choice for collecting water where there are several and large roof structures. Rainwater harvesting is useful for many purposes, e.g., in areas where clean water resources are scarce, groundwater is either difficult to extract or has become unusable due to poor quality, there are salinity problems or only contaminated surface water is available. In order to operate rooftop rainwater harvesting sustainably and efficiently, O&M activities are crucial. These include, for example, regular inspection and cleaning of catchment, gutters, filters and tanks in order to reduce the likelihood of water contamination. Furthermore, water from other sources should not be mixed with that in the tank.

Hint for the trainer

- The following illustrations may help participants understand important O&M activities for rooftop rainwater harvesting systems.

Figure 35. Exemplary O&M measures for a rainwater harvesting system



(Source: Pacific Community (2020): Operation and Maintenance of Rainwater Harvesting Systems. Available at: <http://ccprojects.gsd.spc.int/wp-content/uploads/2020/09/OPERATION-AND-MAINTENANCE-OF-RAINWATER-HARVESTING-SYSTEMS.pdf>)



The following table shows an exemplary O&M plan for rainwater harvesting including important O&M activities for different infrastructure components, as well as information on how often and by whom these activities are carried out.

Hint for the trainer

- Use this exemplary O&M plan to prepare the participants for the next exercise, in which they will develop an O&M plan for their adaptation projects.

Exemplary operation and maintenance plan for rainwater harvesting systems			
Component	O&M activities	Frequency	Person responsible
Roof	Remove all overhanging branches above the catchment surface when required. Replace catchments (roofing iron) when holes and rust are visible on them. Clean the catchments (roofing iron) of leaves, moss, bird debris, bird droppings or abandoned nests. If using water, divert the run-off by opening the first flush device.	When required, or at least three times a year, prior to every wet season	Caretaker
Gutters/leaf-eaters	Clean the gutters and leaf-eaters of the debris carried by the water from the rooftop (catchment), like leaves and other material possibly clogging the gutters. If using water, divert the run-off by opening the first flush device.	At least three times a year, prior to every wet season	Caretaker
First flush device	Remove plug manually to drain first flush water and replace it securely.	After each rain event	Caretaker
Flap valve	Make sure the mozzie stoppa flap valve (overflow outlet) is closed properly to prevent insects from entering the storage tank.	After each rain event	Caretaker
Storage tank	The tank access hole must be covered properly and all light excluded to prevent the growth of algae and other organisms in the tank. Clean the tank by going inside it and removing any silt/sediment.	After each rain event and strong wind, prior to every wet season; at least two to three times a year; repair leaks at elbows/joints when required	Caretaker

Participatory exercise: Develop an O&M plan for your adaptation project (Slide 12)

Time: 40 min

- Ask the participants to analyse their adaptation measure using Worksheet 3 in Handout 7.1 (see also the following table) and to design an O&M plan by using a four-step approach:
- **First step:** Define the components – what components is your measure composed of?
- **Second step:** Analyse and define what O&M activities are necessary to operate and maintain the infrastructure measure.
- **Third step:** Define the timetable – when is the action to be realized? Will it be a recurring activity? With what frequency must it be implemented?
- **Fourth step:** Who is responsible for each identified O&M activity? Should there perhaps be a person employed just for that task?

The next exercise will look at the costs of the defined O&M activities.

Hints for the trainer

- Advise the group to be very specific in their answers and to use the guiding questions given.

Operation and maintenance plan for _____			
Component	O&M activities	Timetable/ frequency	Person responsible

Guiding questions for identifying components and O&M activities

- What environmental infrastructural facilities are provided?
- What is the basic operation mechanism?
- What are the “do’s and don’ts” for the successful operation of the facility?
- What risks do you see in its operation and how can they be prevented?
- What is the maintenance regime to be followed?
- What material/financial means and technical expertise are necessary for O&M activities?

Guiding questions for identifying persons responsible for O&M activities

- Who owns the infrastructure?
- Who knows best how the infrastructure works?
- Who is going to monitor the functioning of the pilot?
- Who will/can carry out which task/activity?
- When, how and by whom should a relevant person/agency be approached for O&M?
- What difficulties might arise from hiring a particular person or agency?
- What kind of decision-making bodies should be involved in this process to avoid the misappropriation of resources?
- What roles should be assigned for monitoring construction, record maintenance, user charges, bookkeeping, punishments, regular cleaning and maintenance?



Exercise: Determine how the defined O&M activities can be financed – revise your budget plan!
(Slide 13)

Time: 15 min

Projects often fail to operate sustainably because the financing of O&M activities was not considered in the budget planning. With the aim of preventing this mistake, this exercise asks participants to identify any additional O&M costs that may arise and to include these in their budget plan.

- Ask the participants to identify any additional O&M costs that may arise (e.g., how much energy is necessary (costs)? Is there an additional salary? Do you need additional material for O&M? Do you need additional installations? (You will find more guiding questions as follows, which the participants should answer.)
- The participants can use Worksheet 4 in Handout 7.1 to collect their results.
- Ask the participants to go back to the budget plan of their adaptation projects and to include the identified additional costs.

Guiding questions for O&M financing

- Should new bodies be established in addition to the Panchayats, SHGs and VDCs?
- Should there be non-beneficiaries in this committee to restrain the behaviour of the beneficiaries?
- Are there government schemes providing funds for O&M? Can you decide on user fees for financing O&M? Is the community willing to pay the amount allocated?
- What aspects of the O&M process has costs, and how often do these costs occur?

Useful literature

- Central Public Health & Environment Engineering Organisation (2005): Manual on Operation and Maintenance of Water Supply System. Available at: <http://cpheeo.gov.in/cms/manual-on-operation--and-maintenance-of-water-supply-system-2005.php>
- Central Public Health & Environment Engineering Organisation (2019): Manual on Storm Water Drainage Systems. Available at: <http://cpheeo.gov.in/cms/manual-on-storm-water-drainage-systems---2019.php>
- Ministry of Urban Development, Water Supply and Drainage (2015): Manual for Operation and Maintenance of Rainwater Harvesting System in Schools in Sri Lanka. Available at: http://nwsdbrws.org/downloads/RWS_in_Schools_Eng.pdf

Key take-aways

- Preventive maintenance is better than responsive maintenance.
- Have staff who know how to operate and maintain the infrastructure.
- Agree to and document clear responsibilities for O&M.
- Raise awareness and train your staff on potential O&M problems and solutions.
- Integrate the local population benefiting from or affected by your measures through all project phases and give them certain responsibilities to increase ownership.
- Develop your O&M plan before the project starts.
- Update your O&M plan continuously and adapt to changing external conditions (e.g., climate change).
- Budget time and money for conducting O&M activities when planning your project.

Questions for the debriefing phase

- What are the important take-away messages from this session?
- Which outcomes from the session do you find most relevant to your work?
- Do you know how to apply the key concepts to your work?

Session 7.2 Monitoring and evaluation plan

Learning objective	To understand and develop a monitoring and evaluation (M&E) plan for the climate change adaptation projects of women farmers. The plan will help to verify whether objectives are being achieved and support early adjustments in the implementation whenever necessary.	
Prerequisites/prior knowledge for successful participation	A first design for the adaptation project should have been created (Module 5).	
Steps (duration)	Step 1. Understanding the concept of monitoring and evaluation	30 min
	Step 2. Defining the results chain and indicators	30 min
	Step 3. Defining means of verification	30 min
Total duration	1 h 30 min (optional: only Step 1 can be completed in 30 min)	
Methods/exercises	Input presentation, determine prior knowledge of the group, puzzle the results chain, define monitoring indicators and means of verification	
Material	PowerPoint Presentation 7.2, Handout 7.2, laptop, LCD projector, moderation cards and wall to pin cards	
Preparation of the material	You may adapt the examples provided that facilitate the exercises in this session to the contexts of the participants.	

Step-by-step approach

This module guides women farmers step-by-step through the preparation of a monitoring and evaluation (M&E) plan. After learning about the general concept of M&E in **Step 1**, participants will be guided in defining monitoring indicators (**Step 2**) and means of verification (**Step 3**) for their own adaptation projects, to put theory into practice. In each step, a fictional case study will illustrate the concepts.

Step 1. Understanding the concept of monitoring and evaluation

Entry exercise: Determine the knowledge level of the participants

[Image to explain the task]

Monitoring

Evaluation



Input presentation

- Present Slides 3–4 (Presentation 7.2: Monitoring and evaluation) to the participants.

Monitoring and evaluation in the project cycle: M&E are part of the cycle of your project. The preceding graphic shows this cycle and where each process is performed. You will design your project and implement it. During implementation you may realize the monitoring in the middle, and, at the end of the project, the evaluation can take place, using the monitoring as support. Based on the results of the evaluation, you can adapt your project.

Monitoring: Analysing if you are on the right path with your activities is a continuous process. Monitoring needs to be performed constantly (for example, in monthly or quarterly sessions); orientation may be necessary to change or adapt actions or activities towards achieving the desired output, outcome and impact. For projects in climate change adaptation, you can monitor how and if exposing elements to climate change helps to better adapt to the changes and risks.

“Monitoring is the systematic and continuous collection of information that enables stakeholders to check whether an intervention is on track or achieving set objectives.” (GIZ 2015: 8)

Evaluation: It is performed at a defined moment and involves analysing the state of the whole project and its impact at a given time (in the middle or at the end of the project).

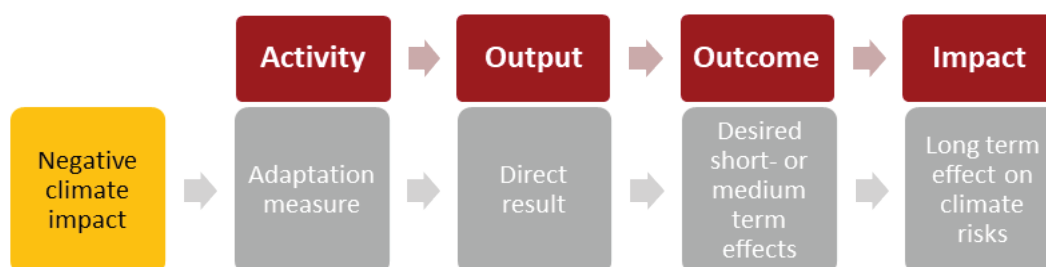
“Evaluation is a systematic assessment of the worth or utility of an intervention at a specific point in time, for example, whether a policy has been effective in achieving set objectives.” (GIZ 2015: 8)

Step 2. Defining the results chain and indicators

Note: Parts of this step have already been done in Session 5.1. If the participants have already defined the results chain for their adaptation projects, they can proceed directly to defining the indicators.

Input presentation: Results chain

- Present Slides 5–6 (Presentation 7.2: Monitoring and evaluation) to the participants.



The results chain of a project consists of the following steps:

Activity: How the project through proposed measures intends to achieve the different results.

Output: What the activities aim to achieve; it is also called the direct result.

Outcome: The effect of an intervention's output and what the project intends to accomplish. In the logic of the results chain, the outcome is the actual goal of a project

Impact: The long-term effects produced by the intervention of CCA, or what the outcome aims for; you cannot directly influence the impact.

Energizer: Puzzle the results chain (Slide 6)

Time: 10 min

An active exercise will help participants to better understand and memorize the results chain of a project.

- Divide the participants into groups of three.
- Write out the results chain and descriptions on eight cards as presented in Slide 5 (activity, output, outcome, impact, adaptation measure, direct result, desired short-or medium-term effects and long-term effects) and hand them over to the participants (hidden).
- The trainer should explain that each group has to form the results chain in the right way, according to the aspect and its explanation; the objective is to be fastest.
- Following a signal, all the groups start and the first group that finishes should yell and present their result by sticking it to the wall.

Case study (Slide 7)

Climate change–related impacts on agricultural production and food security

CONTEXT	OBJECTIVE	MEASURES
<ul style="list-style-type: none">• An increase of extreme rainfall events, interspersed with periods of drought, is causing erosion of arable soil and frequent flooding events. The temperature increase also impacts agricultural productivity. Food insecurity and poverty are linked to production patterns, income, disaster exposure, education and other conditions. Water availability is negatively associated with poverty.	<ul style="list-style-type: none">• The proposed measure targets rain-dependent farming families. The objective of the project is to secure community livelihoods and food security against climate-change-induced rainfall variability.	<ul style="list-style-type: none">• Develop household food security, build resilient livelihoods and institutional capacity in local and regional service delivery to reduce risks through climate change. E.g.:<ul style="list-style-type: none">• Rainwater harvesting system• Capacity building through training• Locally adapted agroforestry systems

Present a local case study to help participants put the theory presented into practice. This case study will be used to illustrate the next steps. You can use the suggested example or choose one that better suits the actual group of participants.



Group exercise: Define your results chain (Slide 8) (15 min)

- Present the results chain of the case study to the participants to support their understanding of the exercise.
- Now ask the participants to define the results chain of their adaptation projects using Worksheet 2 in Handout 7.2 and to discuss their results in small groups.
- Facilitate the group discussions and help with formulating the output, outcome and impact of the adaptation projects if needed.

Input presentation: SMART indicators (Slide 9)

Indicators are used in your project concept and results chain to perform the monitoring process and help you understand if you achieved the intended output and outcome and, therefore, the impact of your project. To formulate the indicators, you need to take into consideration that they have to present your result in a way that you can measure it. To facilitate the formulation of the indicators, we present the concept of **SMART indicators**.

Specific: A *specific* indicator will be narrowly defined and will describe exactly what needs to be measured.

Measurable: A *measurable* indicator is one that can be aligned with a specific numeric or ranked value to show improvement over time; the value is generally given as a countable number or percentage.

Achievable: Defining your indicators using milestones that are realistically *achievable* is important. It also ensures during the conceptualization phases that the project exists within the realm of what is actually achievable.

Reasonable: Ensuring indicators are *reasonable* allows for the consideration of the context in which the project is operating.

Timebound: Finally, *timebound* is the indicator that includes a date by which you expect to see the change, thus giving substance and life to the project as a whole.

Examples for adaptation indicators

Table 12: Example outcome indicators for EbA interventions

Six dimensions of human well-being	Example outcome indicators for EbA interventions
Assets	Damage to infrastructure during extreme weather events including the <ul style="list-style-type: none">• percentage of hospitals or schools damaged• percentage of houses damaged• percentage of roads damaged• percentage of protected areas damaged• percentage of ports damaged• percentage of agricultural land damaged• value of the disruption of ecosystem services

Six dimensions of human well-being	Example outcome indicators for EbA interventions
Livelihoods	<p>Income or value of production per household from livelihood activities under changing climate conditions or during extreme events, including from</p> <ul style="list-style-type: none"> sustainable crop and/or livestock production. sustainable freshwater fisheries and livestock. tourism/ecotourism.
Food security	<ul style="list-style-type: none"> Percentage of people undernourished due to changing climate conditions or during extreme events. Prevalence of moderate or severe food insecurity in the populations, based on the Food Insecurity Experience Scale.
Safety and security	<ul style="list-style-type: none"> Percentage of the population with access to reliable, safely managed and affordable drinking water under changing climate conditions or during extreme events. Percentage of deaths in various demographic groups after extreme events in the affected area.
Health	<ul style="list-style-type: none"> Disability-adjusted life years from waterborne diseases after flooding events. Deaths in various demographic groups from waterborne diseases.
Culture	<ul style="list-style-type: none"> Value of damage to cultural sites and recreation areas under changing climate conditions or during extreme events.

(Source: Conservation International (2017): Submission to SBSTA1 from Conservation International regarding Indicators of Adaptation and Resilience. Available at: https://unfccc.int/files/parties_observers/submissions_from_observers/application/pdf/911.pdf)

Group exercise: Define the monitoring indicators for your adaptation project (Slide 10)

Time: 20 min

- Divide the participants into the same groups as before.
- Advise them to use the same adaptation project as before and continue working with the corresponding results chain.
- Use Worksheet 3 in Handout 7.2 and try to find one indicator for at least one output and outcome of your project, by applying the SMART framework.

	Outcome 1	Indicator
Case study	The quality of the soil moisture and agriculture in the community garden improved, offering more food stability in the village.	The village can harvest on a weekly basis x kg of food from the community field, which contributes 20% to the alimentation of the village.
	Output 1	Indicator
Case study	Daily irrigation of the community field is guaranteed.	With the x litres of rainwater collected on the school rooftop by the end of each week, the village can irrigate the whole community field on a daily basis for one week, so the plants grow according to their schedule.



Step 3. Defining the means of verification and assessing risk and assumptions

Input presentation: Means of verification (Slide 11)

The means of verification are documents with the data necessary for evaluating the project.

List of exemplary means of verification (not exhaustive):

- Project evaluations – semi-annual and annual reports, midterm and terminal (external) evaluation.
- Context section of current sectoral, regional and/or national plans and strategies.
- Monitoring programmes, GIS data and aerial photos.
- Interviews with relevant officials.
- Information from experts and/or the public.
- Photographs of discussions and interventions.
- Surveys.
- Harvesting lists.
- Field monitoring reports.
- Meeting minutes.

Group work: Define the means of verification for your adaptation project (Slide 12)

Time: 20 min

- Divide the participants into the same groups as before.
- Advise them to use the same example as before and continue working with the corresponding results chain.
- Participants may use Worksheet 2 in Handout 7.2 to try to find a means of verification for each indicator of each output and outcome.

	Outcome 1	Indicator	Means of verification
Case study	The quality of the soil moisture and agriculture in the community garden improved, offering more food stability in the village.	The village can harvest x kg of food weekly on a community field, which contributes 20% to the alimentation of the village.	<ul style="list-style-type: none">• Field monitoring reports• Project evaluations• Harvesting lists
	Output 1	Indicator	Means of verification
Case study	Daily irrigation of the community field is guaranteed.	With the x litres of rainwater collected on the school rooftop by the end of each week, the village can irrigate the whole community field daily for one week, so the plants grow according to their schedule.	<ul style="list-style-type: none">• Harvesting lists• Field monitoring reports• Photographs• Surveys

Benefits of M&E

- Guarantee that you realize the project in the way you intended and planned it.
- Avoid forgetting any necessary step.
- Be able to give feedback to the donor.
- Stay on track with your project.
- Have proof that you achieved the intended impacts.
- Guarantee sustainability.

Feedback round: What did the participants learn?

- Ask the participants to go back to the initial wall of understanding of M&E and look at what they wrote on the cards.
- If they see that their understanding has changed, they should take their card and write their new understanding on the back.
- The debriefing questions at the end of this session will help you guide the feedback round.

Useful literature

- GIZ (2015): Developing National Adaptation Monitoring and EVALUATION SYSTEMS: A GUIDEBOOK. Available at: https://www.adaptationcommunity.net/?wpfb_dl=268
- Organisation for Economic Co-operation and Development (OECD) / Development Assistance Committee (DAC) (2002): Glossary of Key Terms in Evaluation and Results Based Management. Available at: <https://www.oecd.org/dac/evaluation/2754804.pdf>
- UNESCO (nd): Sustainable Development. Available at: <https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd>
- Conservation International (2017): Submission to SBSTA1 from Conservation International regarding Indicators of Adaptation and Resilience. Available at: https://unfccc.int/files/parties_observers/submissions_from_observers/application/pdf/911.pdf
- Resin (nd). Supporting Decision-making for Resilient Cities. Monitoring and Evaluation. Available at: <http://wiki.resin.itti.com.pl/article/frequently-encountered-challenges/monitoring-and-evaluation/>

Key take-aways

- M&E frameworks serve to assess projects and keep track of progress made in dealing with climate change.
- Based on the results chain, the tool applies a tabular format to illustrate the logic of the ensuing indicators and the means of verification for the project or programme assessment.
- The tool is a first step in formulating indicators and the means of verification to examine and follow the development of a project.
- The session should give the participants a basis from which to work with M&E in daily project contexts of CCA.

Debriefing questions

- What are some important take-away messages from this tool?
- Which outcomes of the tool do you find most relevant to your work?
- Do you know how to apply the key concepts to your work?
- Did the session help you to write and apply your project better?
- How did the tool support you in establishing an M&E framework?
- Would you be motivated to use M&E in your daily life to improve the quality of your work?



Session 7.3 Risk management

Learning objective	To identify, prioritize and minimize the likelihood of negative events for your adaptation project	
Prerequisites/prior knowledge for successful participation	A first design for the adaptation project should have been created (Module 5)	
Steps/duration	Step 1. Risk identification	30 min
	Step 2. Risk evaluation	30 min
	Step 3. Risk management	30 min
Total duration	1 h 30 min (optional: only Step 1 can be completed in 30 min)	
Methods/exercises	Input presentation, brainstorming of potential risks associated with adaptation projects, risk evaluation matrix and creating a risk management plan	
Material	PowerPoint Presentation 7.3, Handout 7.3, laptop, LCD projector	
Preparation of the material	You may adapt the examples provided that facilitate the exercises in this session to the contexts of the participants	

Step-by-step approach

When realizing a project, even if you planned it carefully, there is always the possibility that unexpected problems will occur. This session will cover risk management. Risk management is a very important aspect of project planning and realization, as it is a continuous process of identifying, analysing, prioritizing and mitigating risks that threaten a project's likelihood of success in terms of, for example, costs, schedule, quality, safety and technical performance. A well thought out plan for managing risks is often one prerequisite for applying for support programmes.

In **Step 1** of this session, the participants will be guided through identifying potential risks facing their adaptation projects.

Step 2 focuses on assessing the risks using forms of prioritization.

Step 3 gives a basis for how to mitigate risks and provides guidance on developing risk mitigation strategies.

Step 1. Risk identification

In this step the focus will be on identifying the risk that can endanger the right implementation of a project. The risks therefore will be divided into the categories of internal and external risk (this is one possible method of exploring potential risks). In this way, there can be a distinction between external risks that stem from the outside and internal risks. External risks do not directly depend on your project but can influence it and its performance. These risks are negative events in the larger environment of your project. Internal risks can include delays in organizational processes, project implementation and production; external risks can lead to security issues, increases in costs, changes in public preferences and demand, and blocks in supply chains.

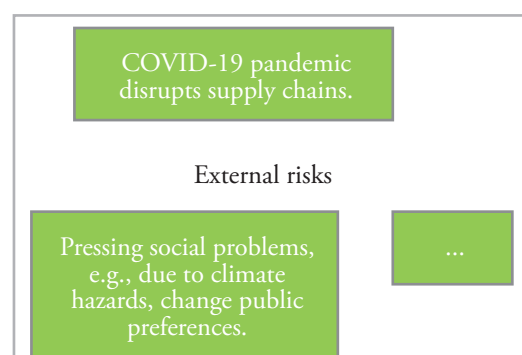
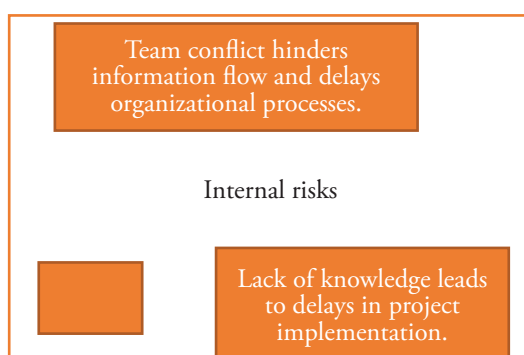
Divided into the internal and external categories, these are possible risks:

Internal risks	External risks
<ul style="list-style-type: none"> • Team (e.g., conflict within the team or lack of trained staff) • Technical (this includes risks based on requirements, the technology being used, and its performance and quality) • Management (this includes any risks associated with planning, scheduling, estimating or communication) • Organizational (this includes any project dependencies, logistics, resources or budget issues) • Knowledge (e.g., lack of knowledge) • Financial (e.g., corruption or inability to cover expenditures) • Operational (e.g., equipment failure) 	<ul style="list-style-type: none"> • Political (e.g., change of government or political unrest) • Economic (e.g., economic crises or inflation) • Social (e.g., pressing social problems or changes in public preferences) • Technological (e.g., energy breakdown) • Legal (e.g., changes in legal frameworks or exposure to litigation) • Environmental (e.g., flooding that blocks transportation) • Financial (e.g., changes in exchange rates)

Group exercise

Time: 10 min

- Ask the participants to brainstorm potential risks that negatively affect the outcomes and outputs of their projects by using the given categories. All ideas for things that can go wrong are welcome at this stage.
- Ask the participants to write their risks on a card and to pin it on the wall you prepared (see the following visualization example).
- Ask the participants to present their cards by describing the risks and possible consequences associated with their adaptation projects.
- Participants may use Worksheet 1 in Handout 7.3 to collect their results.
The risks are assessed and prioritized in Step 2.
Hint for the trainer
- If participants have difficulty identifying potential risks, they can note down five of the most important processes/activities in their project and think of potential risks associated with them.



Step 2. Risk evaluation

In the second step of this session, after having identified potential risks, the participants will learn how to evaluate risks. Risk evaluation involves developing an understanding of which potential risks have the greatest possibility of occurring and can have the greatest negative impact on the project.

As not all risks are equal, there has to be some differentiation in how they are treated in the prevention and management phases. Some risk events are more likely to happen than others, and may have a higher negative impact on the project. Therefore, project teams should first focus on the risks which are more likely to happen and more severe.

Group exercise

Time: 20 min

- Ask the participants to go through the list of identified risks and to prioritize them against their likelihood of occurring and the magnitude of the negative impact on the projects by using the following matrix (Worksheet 2 in Handout 7.3).
- Ask the participants to assign priority levels between 1 and 5 to the risks as shown in the following matrix.

Hints

- Define criteria to determine high-impact risks to help focus on a few critical risks that require mitigation (e.g., a risk that increases the project costs by 10% of the initial project budget is considered a high risk).

Guiding questions

- Is the risk likely to happen?
- Did that kind of risk already happen, and is it likely to repeat?
- Has that risk never occurred before?
- Could that risk negatively affect your project?
- What would be the impact of that risk on your project?

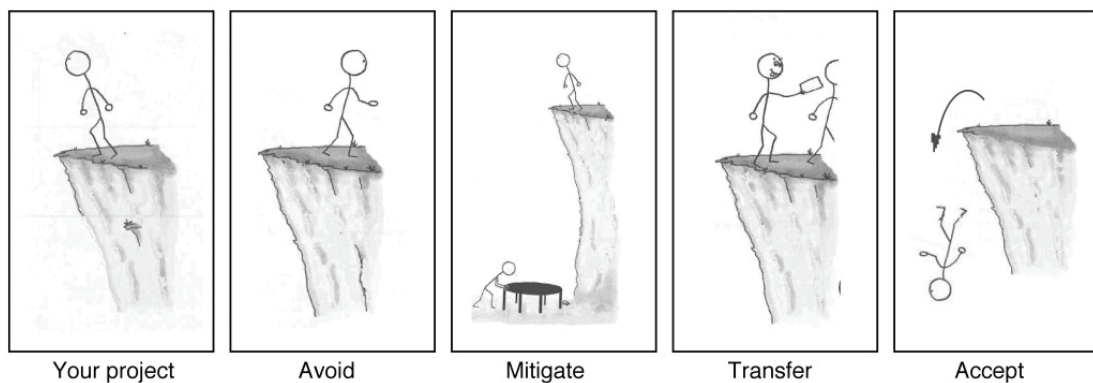


Step 3. Risk management

In this step, participants will design strategies or put measures in place to deal with what they identified as the most critical risks in Step 2 (very likely and high negative effect expected).

There are different ways to manage risk, also depending on what stage of the process the risk management is integrated. Among the most common approaches that can be applied and considered in the project planning phase is mitigation. When you do not use the anticipated approaches for risk management there are still the approaches for immediate risk management, such as avoiding, transferring or accepting the risk.

- **Avoid:** Change your plan to bypass the issue, for example, by removing the cause of the threat altogether.
 - **Mitigate:** Taking preventative action to reduce the probability of risk occurrence or impact on the project – design the project’s activities so that it is prepared to handle risks.
 - **Transfer:** Outsource the risk (or a portion of it) to a different team or agency. Think of this as a typical “insurance” policy.
 - **Accept:** Assume the chance of a negative impact or add to the budget the cost of dealing with it.
- **Preparation:** If you accept the possible consequences of a risk, you should know what to do if it actually occurs. In this case, developing a **contingency plan** is recommended. In such a situation you will be confronted with this question: “What do we do now?”



Source: BCcampus Open Publishing (n.d.): Risk Management Planning. Available at: <https://opentextbc.ca/projectmanagement/chapter/chapter-16-risk-management-planning-project-management/>

Group exercise: Manage the risks (Slide 10)

Time: 20 min

	Risks	Consequences	Likelihood	Negative impact	Priority (1–5)	Risk management measure
Example 1	External risk: Change of government.	Example: The government stops financing your project.	Unlikely	High	3	Accept: Follow political developments.
Example 2	Internal risk: Conflict in the team.	Workflow stops because internal communication is interrupted.	Very likely	Medium	4	Prevention: Schedule regular team meetings with feedback rounds.
Your project



Useful literature

- BCcampus Open Publishing (nd): Risk Management Planning. Available at: <https://opentextbc.ca/projectmanagement/chapter/chapter-16-risk-management-planning-project-management/>

Key take-aways

- Risks can damage a project when you do not consider that there are indeed potential risks.
- Risk management is an important tool in project design, planning and implementation.
- Risks can stem both from internal and external influences; make sure that participants consider both dimensions and are informed that each dimension requires different mitigation strategies.
- Risks vary in severity depending on their level of impact and the likelihood of occurrence. Make sure that participants focus on key risks with high impacts and high likelihood to establish effective mitigation measures; for low impact and low likelihood risks, it can be enough to simply monitor them.

Debriefing questions

- What are the important take-away messages from this session?
- Which outcomes of the session do you find most relevant to your work?
- How did the session support your understanding of risks related to your project and in developing strategies to mitigate these risks?



