Integrating climate change adaptation into development planning

A practice-oriented training based on an OECD Policy Guidance

Handouts

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of BMZ Federal Ministry for Economic Cooperation and Development

The training course and associated materials are based on an OECD Policy Guidance "Integrating Climate Change Adaptation into Development Co-operation", published in May 2009. They were generously funded by the **German Federal Ministry for Economic Cooperation and Development (BMZ) and developed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH** in coordination with OECD and a broad range of reviewers from development agencies, NGOs and research institutions from around the world. The authors gratefully acknowledge the valuable feedback contributed by reviewers and training participants.

Additional modules on understanding climate science, finding climate information, and dealing with uncertainty were developed by the project *Inventory of Methods for Adaptation to Climate Change (IMACC)* funded by the **International Climate Protection Initiative (IKI)** of the **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety**. The review and extension of Module 6 on Monitoring and Evaluation was jointly funded by the BMU and BMZ, and developed by the IMACC project and the Climate Protection Programme for Developing Countries (see next page for project descriptions).

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Registered offices
Bonn and Eschborn, Germany

Friedrich-Ebert-Allee 40
53113 Bonn
Telefon: +49 228 44 60-0
Fax: +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn
Telefon: +49 61 96 79-0
Fax: +49 61 96 79-11 15

Contact

E-Mail: climate@giz.de
Internet: www.giz.de/climate

Responsible
Michael Hoppe, GIZ

Authors
Jennifer Frankel-Reed
Barbara Fröde-Thierfelder
Ilona Porsché
Alfred Eberhardt
Mark Svendsen

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On behalf of
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Contributions by
Lea Herberg
Martin Baumgart
Udo Höggel
Timo Leiter
Julia Olivier
Michael Hoppe
Members of the OECD Task Team on Climate Change and Development Co-operation

Eschborn, Germany

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GIZ's Climate Protection Programme for Developing Countries helps developing countries adapt efficiently and appropriately to changed climatic conditions. Working together with our partners, we identify the options for action with regard to affected people, economic sectors and ecosystems.

The key task of the Climate Protection Programme for Developing Counties is to mainstream climate protection within the various activities of German Development Cooperation. This applies both to reducing greenhouse gas emissions and to measures to adapt to climate change.

These tasks, however, cannot be successfully tackled by climate protection experts alone. The Climate Protection Programme for Developing Countries can therefore only work effectively if it is integrated into the networks of development cooperation and globally organised climate protection, and collaborates with national and international partners.

http://www.giz.de/climate

Inventory of Methods for Adaptation to Climate Change (IMACC) is a global project by GIZ funded by the **International Climate Protection Initiative** of the German **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)**. The project aims at user-driven application and advancement of existing tools and methods for adaptation, developing capacities for adaptation action and supporting South-to-South exchange, particularly among its seven partner countries: Grenada, India, Indonesia, Mexico, Philippines, Tunisia and South Africa.

IMACC is operating the platform AdaptationCommunity.net which provides introduction to key topics, examples of adaptation experiences as well as webinar recordings and an exchange forum. IMACC has also supported the development of additional modules of the training "Integrating Climate Change Adaptation into Development Planning" including the new modules on Monitoring and Evaluation (M&E).

Have you carried out or participated in the training? If yes, we would appreciate hearing from you! Please send your feedback (Who organised the training? Who participated in the training? How did you find it? What worked and what did not?) to climate@giz.de.

Contents

Introduction to the course

Adapting to climate change is a rapidly growing challenge, particularly for developing countries. Even if greenhouse gas emissions are reduced significantly in the coming years, climate change impacts, such as gradual temporal and spatial shifts in resources as well as drought, floods, severe weather events and sea-level rise, are likely to result in food shortages, increases in vector-borne diseases, infrastructure damage and the degradation of natural resources. The poor will be affected disproportionately.

Development choices today influence the adaptive capacity of people and their governments well into the future. We cannot afford to delay adaptation planning and action. However, many development policies, plans and projects currently do not take climate change into account due to a lack of awareness and clarity on how to effectively develop and integrate adaptation options.

Integrating adaptation into development cooperation provides an essential opportunity to make more climate-resilient development investments. OECD's Environment Policy Committee (EPOC) and its Development Assistance Committee (DAC) therefore developed the *Policy Guidance on Integrating Climate Change Adaptation into Development Co-operation*[1] (OECD Guidance) with the aim of promoting understanding and identifying appropriate approaches and practical ways for integrating climate adaptation into development policies and activities at national, sectoral, project and local levels.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, in close coordination with the OECD, developed this training course and associated materials. The documents are based on GIZ's involvement in the OECD Guidance, extensive adaptation activities on the ground in developing countries and the GIZ tools for mainstreaming climate change into development cooperation activities, namely Climate Assessments for GIZ projects, Climate Proofing for Development and Climate Strategy Advice.

Aim

The aim of this course is to enhance capacities among development actors and to support institutions in successfully implementing the Guidance and taking action on climate change adaptation. The teachings of this course provide an introduction to the theory and practical starting points of adaptation to the effects of climate change.

Training participants will learn

- what climate change is and how it is inter-linked with development cooperation,
- where to find relevant climate information and how to use it,
- how to think through systematic steps which aim at defining concrete adaptation options at national, sector, local and project levels,
- how to define necessary institutional capacities to carry out a change process and
- how to plan and support processes of mainstreaming adaptation to climate change in their institution[2]

[1] http://www.oecd.org/document/26/0,3343,en_2649_34361_44096282_1_1_1_1,00.html

[2] In many cases additional support will be needed. For instance, GIZ's Climate Proofing for Development is always facilitated by experienced experts which have followed a special in-depth training.

Audience

Target groups for the course include:

- administration officials and planners in agriculture, water, natural resources, climate change, as well as other relevant sectors, at national, provincial and local levels,
- national and international development cooperation staff (climate experts as well as sector specialists without a climate change background),
- local consultants on adaptation to climate change,
- NGO / civil society representatives.

Course overview

The course is designed for a maximum of 4-5 days. Due to its module structure, it can be 'tailored' for shorter training events. See the supplementary **Cookbook** on AdaptationCommunity.net for a guide on how to arrange the modules to suit your audience's needs.

The training consists of **ten modules**[3] that can be selected according to the training needs of the target audience. Together they offer a comprehensive and practice-oriented overview.

M 1 – Apply a climate lens:
Identify the relevance of climate change to a policy, programme, plan or project.

M 2 – Interpret climate data: [4]
Understand how to interpret and use different standard climate data sources.

- **M 2a – Understanding climate science**
- **M 2b – Finding climate information**
- **M 2c – Managing uncertainty**

M 3 – Assess vulnerability:
Identify factors contributing to vulnerability in a system.

M 4 – Identify adaptation options:
Identify a range of adaptation options to adjust or improve planning and management.

M 5 – Select adaptation measures:
Evaluate and prioritise options using selected criteria.

M 6 – M&E Introduction: [5]
Rationale and concepts for adaptation M&E.

- **M 6a – M&E for adaptation at national / subnational level:**
  Developing a national adaptation M&E system including indicators.
- **M 6b – M&E for adaptation projects and programmes:**
  Strategic result orientation and development of indicators.

[3] The main approaches to integrating adaptation outlined in the OECD Guidance are applying a *climate lens* and *the four-step approach*. The OECD Guidance explores entry points for integrating adaptation into development cooperation at national, sector, local and project level. *Module 2: Interpret climate data* and *Module 7: Build institutional capacity for adaptation* are additional.

[4] Module 2 has been revised and supplemented under the Inventory of Methods for Adaptation to Climate Change (IMACC) project which is implemented by GIZ and the Potsdam Institute for Climate Impact Research (PIK) with the financial support of the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) through their International Climate Protection Initiative (IKI).

[5] Module 6 has been revised and supplemented under the Inventory of Methods for Adaptation to Climate Change (IMACC) project which is implemented by GIZ and the Potsdam Institute for Climate Impact Research (PIK) with the financial support of the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) through their International Climate Protection Initiative (IKI).

M 7 – Develop institutional capacity for adaptation:
Identify institutional capacities needed to deal with adaptation as a continual change process.

M 8 – Local climate stresses, vulnerability, resilience:
Identify local information on climate change vulnerability.

M 9 – Take action at local level and beyond:
Identify action at the local level and how it links to sub-national, national and other actors.

M 10 – Integrate adaptation into the project cycle:
Identify key steps to integrate adaptation according to the various steps of the project cycle.

Supplementary module "Acting as a Multiplier" (see handbook annex)

Supplementary module "Ecosystem-based Adaptation (EbA)"

The ten modules are complemented by **Action Learning Exercises**, e.g. on adaptation terminology and framing adaptation. The modules on M&E and ecosystem-based adaptation can also be conducted as standalone training courses.

Training Methodology

The course is based on the Harvard Case Method,[6] which conveys teaching messages mainly through **interactive practical work by trainees**. The training deals with the fictitious Federal Republic of Zanadu, a situation closely based on real life conditions and challenges.

All modules follow the same sequence, including the following crucial elements:

The **introduction**, given by the trainer, provides the necessary theoretical background and introduces participants to the case work.

The **case work** gives participants the opportunity to work through the different aspects linked to climate change adaptation in a systematic manner. Participants assume the roles of 'case work experts' in charge of the specific module's task.

The 'case work experts' **present their results** to the plenary. This is the opportunity to share experiences and for mutual learning. Trainers offer alternatives and corrections when necessary.

In a final **reflection**, the participants reassume their own real-life position. They reflect on their experiences and link them to their own work in order to make the newly gained knowledge more applicable. Trainers support through guiding questions.

Training Package

- The **Handouts** provide a summary of learning points and references for each module.
- The **Training Manual** gives the storyline for delivering the training. It explains the case work tasks per module and includes all necessary supporting information for completing the exercises.
- The **Trainer's Handbook** consists of two parts. Part I presents basics on participatory training methodology and the Case Method and gives hands-on guidance on developing a good training course agenda. Part II provides necessary information as well as suggestions on running the modules and Action Learning exercises.
- A library of **PowerPoint Slides** with notes supports the input sessions.

For a tailor-made training, print out the selected handouts.

[6] see http://harvardmag.com/pdf/2003/09-pdfs/0903-56.pdf

All materials can be downloaded free of charge at AdaptationCommunity.net or the OECD website: http://www.oecd.org/dac/environment-development/integratingclimatechangeadaptationintodevelopmentplanningapractice-orientedtrainingbasedontheoecdpolicyguidance.htm

Short animated film on Climate Change Adaptation

GIZ and the Potsdam Institute for Climate Impact Research jointly developed the animated short film

*"**Climate change adaptation: It's time for decisions now!**"* (5:42 minutes).

The film explains climate change and its consequences, introduces adaptation and illustrates adaptation options. It advocates for a participatory approach to adaptation planning and highlights the benefits of timely action rather than delaying decisions. *Climate change adaptation: It's time for decisions now!*

For the training, a viewing is generally recommended in a preparatory session. It does not take up much time and is available in twelve languages. If it is not scheduled during your training course, you can view it at AdaptationCommunity.net under *Knowledge* / 5 minute film about adaptation. It can also be downloaded and different file formats on the website of the Potsdam Institute for Climate Impact Research.

Handouts

All Handouts are numbered separately.

Introduction to climate change adaptation

Main lessons learnt

- **Climate change is a core development issue and presents risks to the achievement of Millennium Development Goals**. The solutions involve development that is both low carbon (renewables, efficiency, and land management for carbon storage) and climate-resilient (adaptation).
- **Adaptation is cross-cutting**. Dealing with climate change requires focused responses in certain key areas (e.g. agriculture, transport), as well as integrated planning (such as land use planning, social policy) and financing over the near and long term for both urgent and strategic investments.
- **Political interest is growing, but scepticism remains and political sensitivity is high**. In some countries, impacts are evident and adaptation is underway. In some countries, there is still a need to clarify that adaptation is a part of good development and to provide evidence of the benefits of anticipatory action. In some countries, climate change and adaptation are highly political issues.
- **Development cooperation plays an essential role**. A significant proportion of technical and financial support is sensitive to climate change impacts or related to positive opportunities. Common development cooperation programmes that relate to adaptation include natural resources, agriculture, public health, disaster management, planning, governance, science, infrastructure and public services, among others.
- **Adaptation is a complementary risk management strategy to mitigation**. As with most risks, there is a need to reduce exposure (i.e. mitigate greenhouse gas emissions in order to 'avoid the unmanageable'), and also insure against potential negative effects (i.e. adaptation activities to 'manage the unavoidable').
- In most cases adaptation efforts reflect activities from the development 'toolbox.' The uniquely 'adaptive' elements of most efforts involve defining problems, selecting strategies, and setting priorities — not in implementing solutions. There are three 'models' of how adaptation and development objectives coincide: (a) activities to achieve development objectives incidentally achieve adaptation objectives; (b) adaptation of development efforts to ensure long-lasting results; (c) discrete adaptation activities (WRI 2007).
- There is **broad international consensus among scientists** about the key dynamics of climate change and many impacts on terrestrial and ocean systems are already evident. Global average temperatures have risen 0.74° C since the early 1900s, with 11 of the last 12 years (to 2006) ranking among the 12 warmest years on record. Sea level rose by 1.8 mm per year over 1961 to 2003, and about 3.1mm per year from 1993 to 2003, and snow cover has declined dramatically. (See IPCC 2007, WRI 2009)
- Both **biophysical and social-economic climate change impacts** should be identified. Biophysical impacts result directly (although not exclusively) from changes in climate, for example, lost crops due to drought, damaged infrastructure due to flooding, etc. Socio-economic impacts are linked to biophysical effects and may include the migration of people from areas at high-risk of floods, loss of income as crops fail, etc.

Example

Consider a coastal fishing village. Hurricanes occur seasonally. Air and sea temperatures, as well as intense rain events are increasing. Certain fish populations have declined in recent years. Most households are involved in fishing and bring their catch to a nearby port for sale without the use of refrigeration. Some households are also involved in small-scale farming. Some homes are constructed further inland while others are built along a small river bank. Some homes are constructed on stilts. Basic wells provide access to groundwater.

Systems of interest: The village could be the system of interest, made up of key assets (boats, homes, wells and port infrastructure and resources (fisheries, groundwater and arable land).

Hazards/Climate signals: Sea level rise, hurricanes, intense rainfall, increasing air and sea temperatures

Potential impacts: Flooding, storm damages to assets, freshwater pollution, decline in fish stocks, saline intrusion into groundwater

Exposure: There is a likelihood that all households are exposed to hurricanes and contamination of groundwater associated with saline contamination of groundwater. Settlements on the shore and at the mouth of the river are particularly exposed to storm surge. Fishing households are exposed to declines in fish stocks associated with changes in ocean conditions as well as to potential impacts on the port. Farming households are exposed to the salinisation or erosion of arable land.

Adaptive capacity / Sensitivity factors: Fishing economies are sensitive to increasing temperatures due to the lack of refrigeration. Households involved in both farming and fishing have a greater adaptive capacity than other households to potential impacts. Houses on stilts are less sensitive to flooding than other households. Households with access to a car or motorcycle have a greater adaptive capacity to evacuate in the case of hurricanes or landslides.

Vulnerability: This village is highly vulnerable to climate change impacts. Households depending on a single source of income, in exposed, non-stilt housing and without access to transportation, are most vulnerable.

Adaptation: Vulnerability could be reduced, for example, by natural or physical infrastructure to protect settlements and arable land from storm surge, evacuation planning or the construction of shelters in the event of hurricanes, improving fish storage, enhanced construction standards and improving freshwater resources, either through treatment or surface water access.

References

OECD Policy Guidance - *Integrating Climate Change Adaptation into Development Cooperation*, Part 1: Understanding the Challenge.

Introduction to climate change adaptation:
http://www.eldis.org/go/topics/resource-guides/climate-change/key-issues

Intergovernmental Panel on Climate Change (IPCC), 2007:
http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html

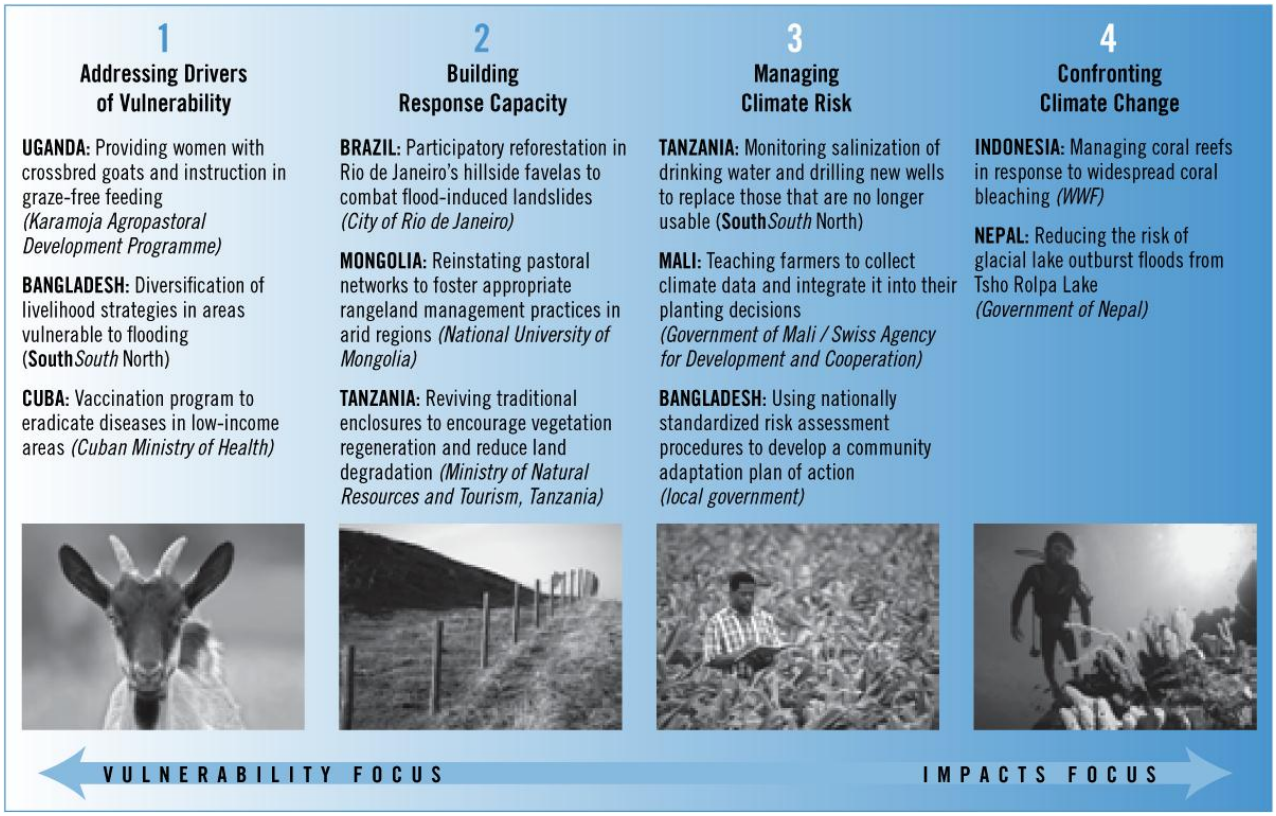
Intergovernmental Panel on Climate Change (IPCC), 2007, Working Group II, Chapter 17: Assessment of adaptation practices, options, constraints and capacity.
http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter17.pdf

World Resources Institute, 2009, *Climate Science: Major New Discoveries*:
http://pdf.wri.org/climate_science_2009-2010.pdf

Action learning: Framing adaptation

Rationale

- The term ‘adaptation’ applies to different categories of activities
  - category 1 activities aim to increase individual and community buffer capacity
  - category 2 activities aim to build robust systems for problem solving
  - category 3 activities aim to increase a system’s resilience by strategically and systematically using climate information
  - category 4 activities respond directly to a CC-related threat
- The **objective** of this step is to understand the different approaches related to ‘adaptation’ and to discuss their respective strength and challenges.
- Desired **outcomes**
  - understand the broad spectrum of options for adaptation measures
  - common understanding of terms



Source: WRI 2007

Main lessons learnt

- In reality, adaptation stands for a **continuum of approaches** and often 'adaptation' activities are linked to more than one category
  - **Category 1**: All development activities should contribute to vulnerability reduction, i.e. adaptation, as described in category 1. Most activities in category 1 are **no-regret adaptation options** that would also foster development if there were no climate change or the projections underpinning the adaptation strategy did not become a reality.
  - **Category 2**: Development activities in critical sectors, such as natural resource management, biodiversity conservation, water, etc. with a focus on enhancing the target groups' explicit adaptive capacity, contribute to category 2.
  - **Category 3**: Measures taken to **'climate proof'** development projects and programmes of all categories, i.e. assess their vulnerability to CC and design respective measures, account for category 3. Systematic assessments also aim to **avoid maladaptation**, overlooking or misjudging climate change impacts and thereby inadvertently increasing exposure and or vulnerability to CC. With the (Environment and) Climate Assessment, GIZ has put forward a tool to crosscheck potential impacts of climate change on their projects and programmes.
  - **Category 4**: Activities in category 4 respond to a **clearly CC-induced threat**. As they often invoke high transaction costs and clearly push a system out of the 'comfort zone', the need for reliable climate information as well as additional funding is especially high.
- **Systematic assessments**, such as advisory services to development institutions in partner countries, e.g. Climate Proofing for Development (CP4Dev) by GIZ, contribute to category 3.
- Especially when it comes to **fundraising for adaptation**, it is important to locate your approach. Most development financing is spent on activities in categories 1 and 2, while specific adaptation financing mainly funds activities in category 4 and some in category 3.

References

World Resources Institute (2007): Weathering the storm: http://www.wri.org/publication/weathering-the-storm

GTZ (2010): Climate Proofing for Development: Adapting to Climate Change, Reducing Risk; http://www.giz.de/climate.

Horstmann (2008): Framing adaptation to climate change: a challenge for building institutions: http://www.die-gdi.de/CMS-Homepage/openwebcms3.nsf/(ynDK_contentByKey)/ANES-7PSKCQ/$FILE/DP%2023.2008.pdf

UNDP (2010): Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance – A Stocktaking Report: http://www.undp-alm.org/resources/training-tools/screening-tools-guidelines-support-mainstreaming-climate-change-adaptation

Module 1: Apply a climate lens

Rationale

- A climate lens is the first step in identifying how to address climate change risks in relation to an initiative or objective.
- The **objective** of applying a climate lens is to help a policy, programme, plan or project become more resilient to climate change or more supportive of adaptation by understanding the relevant climate change risks and opportunities.
- Desired **outcomes**:
    - A common understanding of the relevance of climate change to development
    - Perception of adaptation as a cross-cutting issue
    - Risks identified can be acted upon at the next stage of programming:
        - Definition of who or what may be vulnerable
        - Definition of who may be responsible for action

Entry points

A climate lens is applied as the first step **in national, sector, local and project policy and programme planning**. 'Applying a climate lens' helps to prioritise vulnerable sectors or adaptation programmes, e.g. in the policy formulation stage or in plan development/revisions. A climate lens can contribute to identifying priority adjustments to ongoing or planned activities. This first analysis may point to the need for further analysis of the nature and scale of risks or response options.

At the national level this step could be useful when discussing:

- National long-term visions
- PRSPs and other short- to medium-term policies (e.g. design standards, land laws, agriculture policy, etc.)
- Multi-year development plans
- Strategic national assessments

Main lessons learnt

A climate lens can generally be applied **using existing information** and in a relatively short amount of time. In some cases, additional information gathering and analysis may be desirable.

Based on existing information, you can **assess**:

1 the extent to which a strategy, policy, plan or programme could be vulnerable to climate change risks, e.g. a hydropower-based energy system is vulnerable when medium-term projections for storm surge are considered,

2 the extent to which climate change risks have been taken into consideration, e.g. historic variability and recent trends of flood damage were used in designing a flood management programme,

3 the extent to which a strategy, policy, plan or programme could increase vulnerability or miss positive opportunities, e.g. dykes may be designed to withstand historic flood levels, but they could end up increasing flood damage if flooding levels increase and overtop them and

4 if being revised, amendments that might be warranted to address climate risks and opportunities, e.g. for a water resources management programme, climate change scenarios may be used to develop contingency plans in the event of severe water shortages.

Example from the module's case work

A Goal	B How could the goal be affected by climate change?	C What region(s) is/ are most at risk?	D What nat actors should contribute to next steps?
Increase and diversify agricultural production and rural incomes.	Ag production and incomes depend on predictable crop yields, which are affected by temp and rainfall patterns	West State (all over) South State (mainly maize-cotton areas)	Ministry of Agriculture at national and State level
Safe drinking water supply and sanitation to be available for 80% of population by 2020.	Surface and groundwater supplies of drinking water are affected by shifts in the timing and quantity of rainfall Sea level rise	West State South State South State Coastal Area (salinisation of coastal aquifers)	Ministry of Water, State Water Authorities, Municipal Water Authorities Respective development programmes NGOs supporting safe drinking water in disadvantaged areas (e.g. water kiosks)

References

OECD Policy Guidance - *Integrating Climate Change Adaptation into Development Cooperation*, Part II: Integrating Climate Change Adaptation at National, Sectoral and Project Levels. See also:

- Box 7.2: Applying a climate lens
- Box 8.1: Applying a climate lens to sectoral policies, plans and programmes through Strategic Environmental Assessment
- Table 12.2: Applying a climate lens to steps in the urban development planning process

OECD DAC SEA and Climate Change Adaptation Advisory Note: http://www.oecd.org/dac/environment-development/42025733.pdf

UKCIP Adaptation Wizard (an online tool that goes through a 5-step process to assess vulnerability to current climate and future climate change, identify options to address key climate risks, and develop an adaptation strategy): http://www.ukcip.org.uk/wizard

Adaptation Learning Mechanism (case studies, publications, country profiles): http://www.adaptationlearning.net

Sector risk assessments in UNFCCC National Communications (under national reports, non Annex I): www.unfccc.int

National Adaptation Programs of Action (NAPAs) for LDCs (under national reports, non Annex I): www.unfccc.int

GEF-funded climate change adaptation project appraisals (search SCCF, LDCF): http://www.gefonline.org/

World Bank climate change data portal: http://sdwebx.worldbank.org/climateportal/index.cfm

Module 2: Interpret climate data

NOTE

Module 2 has been revised and supplemented and thus extended to Modules 2A, B, C under the Inventory of Methods for Adaptation to Climate Change (IMACC) project, implemented by GIZ and the Potsdam Institute for Climate Impact Research (PIK) with the financial support of the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) through their International Climate Protection Initiative (IKI).

The terminology used in these modules relates to ci:grasp, the climate information platform developed by GIZ and PIK, and differs slightly from the (original CCA-Training) Modules 1-10. Should you use the new module 2 in a CCA-training together with other modules, please pay attention to the terminology and give clear guidance on:

- ➔ *The use of consistent language*

New module 2		***Original modules***
stimulus	=	*climate signal;*
direct impact	=	*biophysical impact;*
indirect impact	=	*socio-economic impact.*

- ➔ *The need to replace the terms as appropriate in the ppt.*

In order to make the link from the general introduction to climate change and climate change adaptation (CCA-Training intro ppt) to the more specific section on climate information, you could use the film "We know enough about climate change – it's time for decisions now", also developed by the IMACC-project.

Module 2A "Understanding climate science"

Rationale

Climate change adaptation, i.e. dealing with current and future risks from the changing global climate in development efforts, requires the use of climate information to assess adaptation needs and to prepare decision making for adaptation options. In order to get the adaptation assessment and planning right, the basic facts must be correct. However, for non-scientists, climate science is often something of a mystery.
The **objective** of this module is to create a better understanding of the scientific background. This will help development actors to proactively manage adaptation, despite any remaining uncertainties. *(For issues related to managing uncertainty see handout Module C.)*

Entry points

In the systematic adaptation assessment and planning process, climate information is important when:

- **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 reach development objectives despite climate change?)
- **Designing technical responses**
  (e.g. define storage capacity of a new reservoir/ select irrigation technology)

Main lessons learnt from the module

The climate change we observe is man-made

- There has been a significant, measurable increase of CO_2-concentration in the atmosphere from 280 ppm (in the 1850s, the average concentration in warm periods for the last 700,000 years) to 393 ppm (measured in 01/2012 at the NOAA).
- From paleo-climatology (ice core drills) we know that warm periods in the Earth's history coincide with increased CO_2 -levels in the atmosphere. This can be explained by the Earth's radiation balance (cf. the Stefan-Boltzman law). Global mean temperatures on Earth have increased by 0.8°C since 1900.
- The sources of the increased CO_2-levels (and other GHGs) are man-made: burning of fossil fuels and land-use change (especially deforestation and drying of peat lands).
- The effects of climate change are already visible, e.g. melting polar ice caps, reduced snow cover on Mount Kilimanjaro, the drying of Lake Chad. (Some effects are compounded by other development stressors).

Effects of climate change

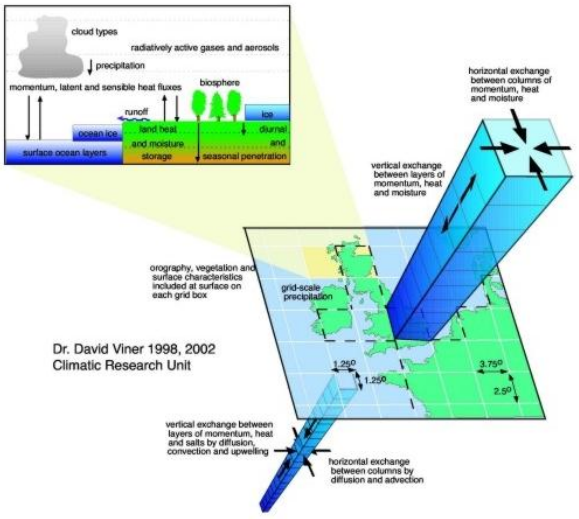
The immediate consequences of atmospheric change, the so -called climate signals or climate stimuli, are: increase in global temperatures, changing precipitation patterns, increasing frequency and magnitude of extreme events, melting of polar ice caps, glaciers and permafrost. These in turn lead to further effects, also called climate impacts. A distinction can be made between biophysical effects (e.g. droughts, floods, infrastructure losses, etc.) and socio-economic effects (loss of livelihoods, income, etc.). For an adaptation assessment they need to be brought into a logical chain in order to inform decision makers on what can be done (adaptation options).
Available climate data and information (historical, projections) inform on the past, present and potential future climate signals and possible biophysical effects (e.g. meteorological droughts). For projections on further effects (aggregated biophysical and socio-economic) additional data (e.g. socio-economic) are required. Climate projections should also be used when selecting adaptation options in order to avoid misinvestments.

Scientific approach

The Scientific analysis of climate change impacts is based on (1) emission scenarios and uses their information in (2) climate models to provide (3) climate scenarios.
(1) Emission Scenarios are plausible representations of the future development of emissions of substances that are potentially radiatively active (e.g. greenhouse gases, aerosols), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships. The scenarios (A1, A2, B1 and B2 families with all in all 40 scenarios) used so far, are described in the IPCC SRES report from 2001. At that time, all

of them were considered equally sound. Over the last few years, scientists have been working on a new generation of scenarios, known as RCPs (Representative Concentration Pathways), which will form the basis of the next IPCC report in 2014. These new scenarios are more elaborate and are not only based on GHG emissions but include other changes in the radiative balance (e.g. land-use change -> change in albedo).

(2) Climate models are numerical representations of the Earth's system. They include fluid-dynamical, chemical, or even biological equations in the atmosphere, oceans, land and cryosphere. Information on those processes is either derived directly from physical laws or constructed by more empirical means. General circulation models depict components of the Earth's climatic system. Atmosphere-ocean coupled general circulation models (AOGCM) with the addition of other components (such as a sea ice model or a land model) are the basis for a full climate model.



Source: http://www.ipcc-data.org/ddc_gcm_guide.html

23 different global climate models were taken into consideration for the last IPCC report in 2007. These vary according to the accentuation of the physical processes represented, and in terms of the grid resolutions. All models have been cross-checked, i.e. projections were made for today based on historical data.

To "run" a model, the planet is divided into a 3-dimensional grid, and then the basic equations are applied to a set of data (e.g. derived from the emission scenarios or historical data). Global climate models provide information on changes in parameters averaged over long periods of time (30 years).

There also exist regional climate models which are elaborated either by downscaling global data or by own modelling efforts. Given the limited data availability, the latter is rather difficult while the former may only provide general averaged information.

Challenges in modelling are: computational constraints, physical processes that occur at smaller scales and cannot be properly modelled but must be parametrisised (e.g. clouds), feedback mechanisms (e.g. clouds and radiation, ocean circulation and ice and snow albedo).

(3) Climate scenarios are the result of the scientific analysis based on emission scenarios and climate models. Such an analysis produces a vast array of information (imagine a set of 4 emission scenario families combined with 23 global climate models!) which now needs to be statistically interpreted in terms of normal distribution, average, extremes etc. This is why they are usually developed in response specific questions for specific regions. (Tools like ci:grasp or the climate wizard can help you grasp the essence of the issue).

Information needs for decision making

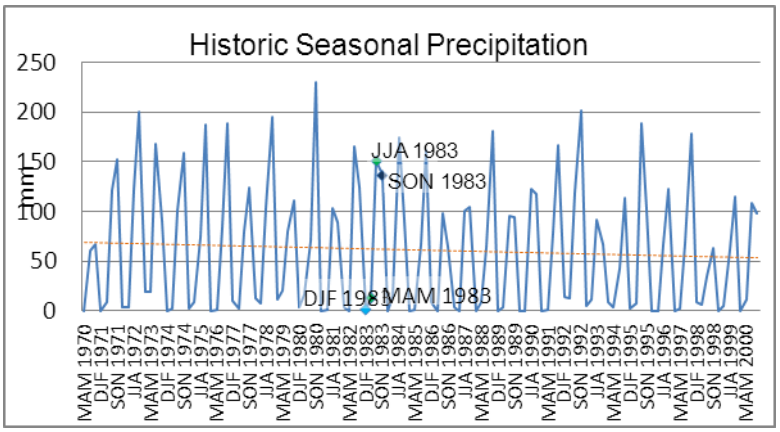
Policy makers want to know…	Information we can provide (within certain limits) …
What will happen?	Trends for specific climate stimuli (-> be careful about details)
Where?	Geographic extent and resolution (-> difficult for smaller scales)
When?	Time frame (-> makes a big difference whether by 2020 or 2100)
How sure?	Confidence level, i.e. validity of data, agreement in analysis, probability of results

Source: GIZ 2011 CCA-Training

Case work: Interpret climate data (Zanadu case)

The case work offers the opportunity to work with different climate information sources and learn about their information potential and limitations.

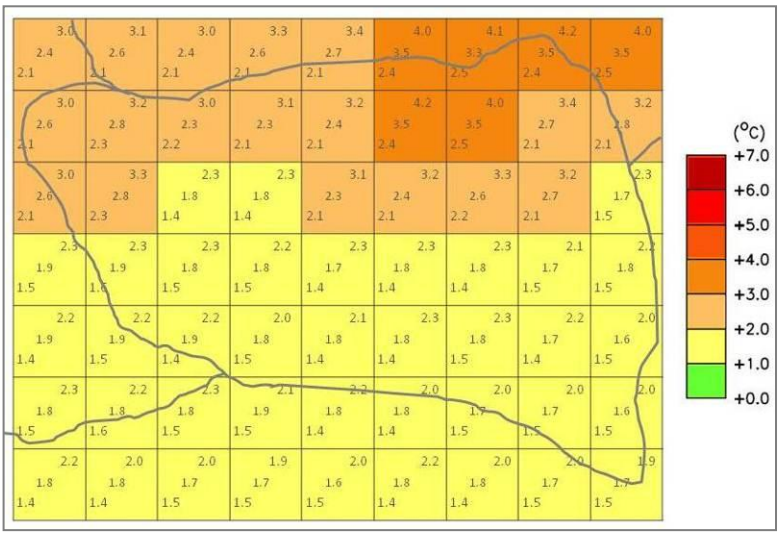
Historic data



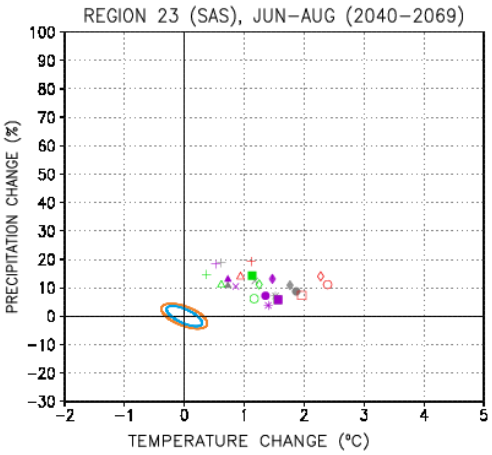
Historical data gives a picture of past climatic variability – the background pattern of climate.
Use: Historical information is used to identify trends (emerging changes in mean conditions), identify thresholds (in combination with other information about impacts), and understand the climatic range with which a system is accustomed to dealing. It can also be used as a reference when selecting the climate models to be used for projections.
Sources: Local people are one source of historic climate information, and nearly every country has a network of weather stations of varying coverage and quality.
Interpretation of the figures*:* The above graph shows historic seasonal precipitation in millimetres for a weather station (Maja) over 30 years, from 1970-2000. Each point on the graph represents a 3-month rainfall total (Dec-Jan-Feb [DJF], Mar-Apr-May [MAM], etc.). The data shows highly seasonal rainfall, with zero, or nearly zero precipitation over the 6 month period from December to May, and rainfall occurring over the 6 months from June to November, totalling 250-350 mm. There is no major change in the seasonal distribution over time at this weather station.
What they do not tell you: The figures give no detailed information about future developments; however, there is a recognisable trendline which might indicate a further decline in annual mean precipitation.
Further questions to explore: Are there seasonal or annual rainfall levels (thresholds) that impact local systems? What happened in 1986-7, 1989-90, and 1993-4, when two

consecutive summer rainfall levels were low? How important is rainfall? What other sources of water are available and how is their availability changing over time, including in the future (e.g. groundwater)?

Projected downscaled data



Projected, downscaled data are used to support adaptation planning on national or sub-national scales. Projections are plausible estimates of future climate conditions based on climate system models and scenarios of future conditions (not predictions!).
Use: Projected data can be used to depict the range of possible climate futures combined with a spatial representation.
Sources: Projected data will deploy one or more emission scenarios based on socio-economic development and resulting greenhouse gas (GHG) emissions (SRES scenarios A1, A2, B1, B2, etc.), and one or more climate models.
Interpretation of the figures: The map above provides downscaled annual average temperature projections for the 2060s over the country of Zanadu (A2 scenario, range of seven models). The range of model outputs (ensemble=7) is indicated in the lower (ensemble minimum) and upper corners (ensemble maximum) of each grid, with the ensemble median in the centre. The median gives information on value (n) which is in the middle of all values. (In contrast, the mean value, also called average, is the sum of the values divided by the number of values (xn/n).) For analysis of the range of change projected, look at the minimum and maximum values, the median will only help you if you do a more detailed statistical analysis.
The map shows an anticipated increase in temperatures between 2.1-4.2°C in the mountain region, 2.1-3.3°C in the arid NW, and 1.4-2.3°C warming in the rest of the country.
What it does not tell you: The map does not tell you about the seasonality of temperature change; it depicts only the annual change.



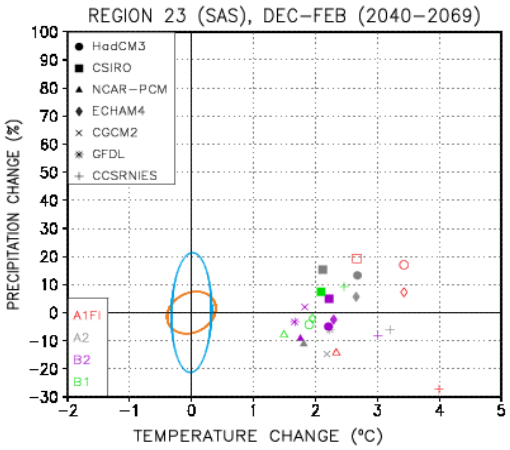
Scatter plots

Scatter plots (left) reflect the range of modelled temperature and precipitation projections at the sub-continental scale.

Use: The scatter plots show temperature change (x axis) and precipitation change (y axis), as well as the historic variability of each variable in the ellipses (orange for temperature, blue for precipitation).

Interpretation of the figures:

The data for June-August show that the range of models and scenarios projects an increase in temperature of between 0.4-2.4°C, with precipitation increasing between 4-20%. Both of these projected ranges are beyond the range of historic variability (the precipitation values are beyond the y-axis range of the blue ellipse and the temperature values are beyond the x-axis range of the orange ellipse).



For Dec-Feb, temperatures are projected to increase more between 1.5-4°C, but for precipitation there is no clear trend as the projected change ranges from -30% to +20%. The historic data show that during DJF there was significant variability in precipitation.

In both figures the icons for the different climate models and the colours for the scenarios used give further information. Detailed knowledge on this background data is needed to understand the full message.

If a point falls outside the ellipses, it is different from the historic range of variability. It should be noted that the model outputs above are all statistically significant changes, often due to strong temperature changes that lie well outside the historical range of variability. In contrast, precipitation changes exceed historical variability in fewer cases.

What they do not tell you: Scatter plots do not tell you about the spatial distribution of projected climate changes beyond the sub-continental scale. For precipitation the scatter plot shows relative changes, not absolute numbers.

Keep in mind: It is important to consider absolute values when evaluating relative changes. A 10% reduction in rainfall might for example be more severe if total seasonal rainfall is already low. Likewise, it is important to consider seasonality: changes in wet season rainfall might have more severe impacts than similar changes in the dry season, especially if crop failure, reservoir recharge or flooding are concerns.

Good practices in the use of climate information

- Keep in mind that no data source will ever provide you with an exact picture of the future.
- Use all data and information available, combining information about the past, present and future.
- Use all sources, including weather station observations, first-hand experiences of local people and projections, and use the information to triangulate and/or complement each aspect. Whenever possible work together with climate scientists.
- Build on existing assessments and studies – there is a wealth of existing knowledge for many countries. Gaps may still need to be filled depending on the nature of decisions involved - plans can always be improved with existing climate data and information.

Use historical analogues to interpret the significance of potential future climate change. Historical thresholds (e.g. for drought or flood damage) can give an idea about the severity of future climate conditions without detailed impact modelling.

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Ci:grasp: http://cigrasp.pik-potsdam.de/

Climate Mapper: http://worldwindcentral.com/wiki/Add-on:Climate_Mapper

Climate Wizard: http://www.climatewizard.org (focus USA (small grid) or world with zoom-in option)

IPCC Data portal: http://www.ipcc-data.org/

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Module 2C "Managing uncertainty in decision making"

Rationale

Partner country institutions often feel overwhelmed by the challenge of dealing with climate change: what is going to happen when and where? Consequently, "as long as we don't know exactly what's going to happen we'll stick to business as usual…" is a commonly heard argument. However, this completely ignores the fact that, even if all the necessary information were available, there would still be the need to interpret this information and take decisions. People are perfectly capable of dealing with uncertainties, as examples from the economic sphere show.
The **objective** of this module is to supply participants with (a) a clear understanding of the different aspects of uncertainty and (b) tools to motivate taking action on adaptation in order to support adaptation assessments and planning processes despite uncertainty.

Entry points

This module provides specific information and methods on managing uncertainty which are especially important at all stages when climate information becomes relevant, e.g.

- **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 reach development objectives despite climate change?)
- **Designing technical responses**
  (e.g. define storage capacity of a new reservoir/ select irrigation technology)

Main lessons learnt

What is uncertain or unclear?

<u>The understanding of the Earth's system now and in future</u>

- Limited understanding of the Earth's complex system, which can partly be solved by more research, but as our globe is not a machine inherent uncertainty will remain
- Limited confidence in findings (see graph below on agreement/evidence)

<u>The future development of emissions</u>

- This is a question of political and economic decisions, made today and largely influencing the future

<u>The impacts of climate change</u>

- Likelihood of occurrence (see graph below)
- Climate change is not the only factor influencing development. It is therefore difficult to project impacts, i.e. how climatic changes will unfold on the ground.

Description of probabilities

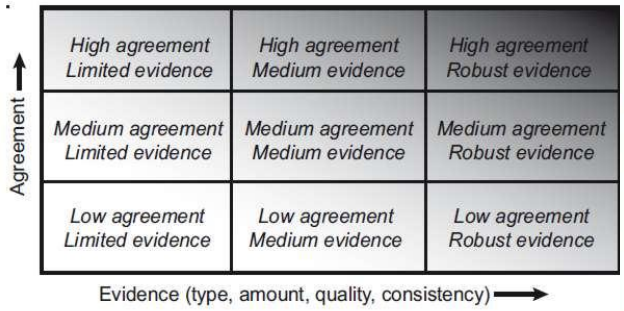


Figure 1: A depiction of evidence and agreement statements and their relat confidence. Confidence increases towards the top-right corner as suggested increasing strength of shading. Generally, evidence is most robust when there consistent independent lines of high-quality evidence.

Table 1. Likelihood Scale

Term*	Likelihood of the Outcome
Virtually certain	99-100% probability
Very likely	90-100% probability
Likely	66-100% probability
About as likely as not	33 to 66% probability
Unlikely	0-33% probability
Very unlikely	0-10% probability
Exceptionally unlikely	0-1% probability

* Additional terms that were used in limited circumstances in the AR4 (*extremely likely* – 95-100% probability, *more likely than not* – >50-100% probability, and *extremely unlikely* – 0-5% probability) may also be used in the AR5 when appropriate.

Phenomenon[a] and direction of trend	Likelihood that trend occurred in late 20th century (typically post 1960)	Likelihood of future trends based on projections for 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	*Very likely*[c]	*Virtually certain*[d]
Warmer and more frequent hot days and nights over most land areas	*Very likely*[e]	*Virtually certain*[d]
Warm spells/heat waves. Frequency increases over most land areas	*Likely*	*Very likely*
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	*Likely*	*Very likely*
Area affected by droughts increases	*Likely* in many regions since 1970s	*Likely*
Intense tropical cyclone activity increases	*Likely* in some regions since 1970	*Likely*
Increased incidence of extreme high sea level (excludes tsunamis)[g]	*Likely*	*Likely*[i]

Sources: IPCC 2010 (left) and IPCC 2007 (right))

Confidence level of projections

What?	HIGHER <---------- CONFIDENCE ----------> LOWER	
Climate signal	Temperature	Precipitation
Change	Trend of change	Magnitude of change
Scope	Average values	Variability Extreme events
Timing	Yearly Long-term	Seasonal Short-term
Scale	Global	Local
Example	***Global annual mean temperature***	***Local precipitation during harvest season in the next 10 years***

(Source: adapted from UKCIP 2003)

Tools to manage uncertainty

First of all, ask yourself at what stage of decision making you are.
(1) Is climate change a problem we should deal with?
(2) What should we do?
(3) How should we do it?
(4) Who? When? Details?

Challenge: everything relates to everything - you feel lost between causes and effects
-> Go step-by-step through the systematic adaptation (needs) assessment (as in the training modules 3-5 and e.g. GIZ climate proofing)

Challenge: the basis for your decision is unclear
-> Analyse your statistics properly, i.e. what is the average likelihood and what are extremes projected for a certain event; compare the uncertainties with a common reference figure (e.g. economic growth rates)
-> Triangulation, i.e. take different perspectives into account (e.g. compare historic climate data and projections, ask local climate experts)
-> Possibility ranges, i.e. look at what the different projections say and whether the difference between high and low outputs really has an influence on your decision now

Challenge: not enough information for long-term decisions on adaptation activities?
-> Work on decisions that you can take now and go step by step, i.e. start with activities that make sense anyway
-> Flexible strategies/corridors, adaptive management, M&E, i.e. regularly review your activities to see if they are leading to the expected goals and refine/change if necessary
(-> In the long run you could also benefit from the installation of observation and monitoring systems)

Challenge: projections show disasters with tremendous effect but rather unlikely occurrence?
->Contingency planning (e.g. an evacuation plan for the case of a tremendous flood)

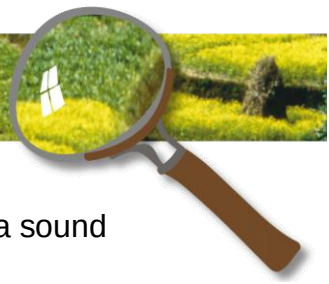
Scenarios – a tool to prepare strategic decisions

Scenarios are storylines that describe different possible future situations. They are composed of different plausible combinations of various relevant factors (e.g. political attitude) with their different values (e.g. reactive-initiative-proactive). They delineate the connection between today's decisions and future development.
The scenario approach helps

- to sensitise decision makers for factors influencing future development
- to anticipate future threats and opportunities for development
- to enhance collective learning and exchange
- to make decisions for activities in due course (limiting threats, securing against negative effects, enhancing opportunities)

Hints for motivating communication on climate change adaptation

1. Be aware of who speaks and who listens
   - What is your mission, mandate, objective? (e.g. are you lobbying for activities OR are you assessing different possibilities OR are you preparing information which is as neutral as possible OR…)
   - Who is your audience? *(e.g. local or national politician, donors…)* What is their knowledge level?



-> If in doubt assume your audience does not know much and provide a sound background – but never underestimate their intelligence!

2. Make your report a trustworthy source of information and an interesting read

2.1. Data/information base

- If you are not a climate scientist, make sure to use validated information or team up with specialists.
- Use your intelligence! Look critically at "expert statements", check several sources (literature, experts).
- Discuss with colleagues, local climate experts, stakeholders, …

2.2. Presentation of findings

- Be precise with facts and figures: which change (e.g. sea-level rise) is projected for which time period (e.g. 50 cm in 2050 compared to 1990) in which area (e.g. all areas <50km from the coast).
- Be clear about how likely that change is (use the calibrated IPCC language).
- Name sources of uncertainty.
  -> Make sure your audience sees clearly the risk (and the associated costs) of doing nothing compared with the risk of doing something
- Be transparent in your methodology, criteria, sources.
- Avoid alarmism: the way in which a statement is framed has an effect on how it is interpreted (e.g. a 10% chance of dying is interpreted more negatively than a 90% chance of surviving).
- Don't forget that climate change may also bring opportunities not only the doomed future. Avoid "climate pornography".
- Show links with ongoing activities (e.g. Review of the National Water Programme) instead of making adaptation a separate/additional issue (Adaptation of the Water Sector).

2.3. Focus

- Carefully select what is important - avoid "death by data"
- Use graphs and tables to present complex information – avoid "analysis paralysis"

3. Lobby adaptation activities

"Changing attitudes towards climate change is not like selling a particular brand of soap – it's like convincing someone to use soap in the first place." (futerra)
"Barriers to community or individual action do not lie primarily in a lack of information or understanding alone, but in social, cultural and institutional factors." (Thompkins&Adger in Jones 2010)

3.1. Define your objective

- What is the message you want to send?

3.2. Communicate according to your audience's mindset

- Know what your audience wants (not what you want them to want), why they are reluctant to act, e.g.
  - *Climate change is not perceived as a problem that requires action now.*
  - *Belief that uncertainty is too great to warrant taking adaptation action now.*
  - *Lack of acceptance of risks associated with adaptation action.*
  - *Cultural norms that discourage change and innovation.*
  - *Lack of experience as traditional ways of reacting are no longer appropriate.*
  - *Lack of institutional flexibility (institutions are the backbones of our social life; they have evolved over time and therefore are strong and inflexible).*
- Use different frames to incite need for action, e.g.
  - *Social progress frame* -> ensure/ enhance quality of life.
  - *Morality/ethical frame* -> global responsibility/polluter pays principle.
  - *Economic development frame* -> business opportunities.
  - *Conflict frame* -> avoid conflicts, destabilization.
- Use audience appropriate language (no jargon, translate or explain technical terms).

3.3. Make your message part of the social change process

- Keep in mind the change formula: motivation to change occurs when dissatisfaction with the current situation is serious enough, people have a clear vision of how they want the future to be ("the cathedral we are building"), and what they can do to get there (first steps). These three factors need to be sufficiently strong to outweigh the costs of change. Give concrete examples in terms that your audience can relate to (in a landlocked country sea-level rise will not cause much interest but changes in precipitation definitely will), use comparisons from the past
- Vision: What should your future look like?
  -> Illustrate: use examples or pictures: refer to where your audience lives, works…
- Choice: The future is not predetermined but a development choice! Plan: what can we do to work towards our vision?
  -> Develop a mid-term plan (<5 years) with feasible results that start showing quickly
- Action: How can individual people contribute?
  -> Define activities for different target groups

3.4. Create momentum

- "I have a dream today…": humans follow the picture they can imagine most vividly (the so called availability heuristic). When you change the way you look at things, the things you look at change.
- Make people join: fun not sacrifice, give trial opportunities, make small steps ("Cross the river in a group and the crocodile won't eat you" saying from Madagascar)

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Module 3: Assessing vulnerability

Rationale

- Assessing vulnerability is **step 1 in the basic adaptation planning process** (4-step approach). The 4-step approach is a systematic and step-by-step process to dealing with all relevant questions and avoids mental blocks due to the over-complex challenge.
- The **objective** is to establish the basis for integrating adaptation into development efforts: The system of interest's vulnerability is analysed and need for action defined.
- Desired **outcomes**:
    - Collection of diverse stakeholders' views
    - Agreed identification of challenges and opportunities
    - Prioritisation of entry points for action
    - Increased awareness of climate change and adaptation among actors

Entry points

Assessing vulnerabilities is a key step towards a clear recognition of climate risks and the need for adaptation within relevant policies and/or projects. This step is especially effective when carried out during policy formulation, strategy development and project identification, appraisal and design.

- At the **national scale**, the results may be needed for cross-sectoral coordination, identified geographic hotspots or priority topics within policies and plans.
- At the **sector scale**, the results may show the potential risks within the sector and recognise the need for coordination beyond the strict boundaries of the sector.
- At the **local level**, the results should integrate needs and views from affected stakeholders.
- At the **project level**, assessing vulnerabilities would, ideally, be carried out during the scoping and design of a project.

Main lessons learnt

<u>Setting the scene</u>

- Defining **systems of interest and development objectives provides the reference** for determining whether and how climate change impacts might be important.
- **Climate is not the only dynamic factor**. Anticipated socio-economic changes should be considered and how they might contribute to development challenges. Especially in resource-based economies, the development of the ecosystem is equally important.
- **Develop a holistic perspective**: In addition to exposure to climate risks, a system's vulnerability and the need for action are also determined by its sensitivity. A system's existing adaptive capacity is a major asset in confronting climate change.
- **Include non-climate factors and existing barriers** to resilience in your problem analysis. Climate risks will compound these.

How to

- Follow the **systematic steps to assess** the following vulnerability functions:
  - characteristics of the system of interest: sensitivity and adaptive capacity
  - relevant climate change signals of concern (i.e. 'exposure')
  - the nature of potential impacts (biophysical as well as socio-economic)

  Combine these factors to identify the system's vulnerability and the need for action.
- Existing **information** from national assessments or programmes is usually available as a starting point. However, information gaps should be identified and specified based on the necessary decisions. Conclusions can be drawn by 'cross-checking' different sources of information and consulting relevant experts to decide whether additional analyses are necessary. Adaptation experts may be needed to contribute to this step.
- **Participation is key**. Transparent processes are required to ensure cooperation and accountability: ask affected stakeholders, especially vulnerable groups, to participate.
- Look for **positive opportunities**, not just risks.
- Do not limit the analysis phase by worrying about how to deal with the challenge; this will be dealt with in the next steps.

Example from the module's case work

Part 1

	A	B	C
System of interest	**Current climate variability**	**Current sensitivity**	**Current adaptive capacity**
Rice/wheat rotation in central plain *(Development objective: to expand production)* Assets • *irrigation technology in place* • *...* Actors • *farmers* • *...*	• *Extended draught period* • *Heavy rainfall in short periods of time* • *Increasing number of hot days per year* • *...*	• *Limited water resources (seasonal precipitation, almost the whole area is already under irrigation)* • *Rice varieties commonly used are sensitive to even small temperature changes* • *Dependency of rural communities on employment in agriculture* • *...*	• *Growing service sector in the State offers other employment opportunities (alternative income)* • *Ability of farmers to access forecasts and adjust cropping calendar accordingly* • *...*

Part 2

	D	E	F	G
System of interest	**Climate change signals of concern the system of interest is exposed to**	**Potential biophysical impacts** (also considering sensitivity [B])	**Potential socio-economic impacts** (also considering sensitivity [B])	**Rate vulnerability and need for action 1-5** (also taking into account adaptive capacity [C])
Rice/wheat rotation in central plain *(Development objective: to expand production)*	• *Seasonal rain pattern becomes erratic* • *Dry spells*	• *Rice sterility with temperature increase*	• *Decreasing rice yields* • *Loss of income* • *Adverse effects on food security*	4: very vulnerable, high damage if less production possible: food security issue and loss of GDP

References

Part 2 of this module is based on some of the methodological features of GIZ's Climate Proofing for Development (CP4Dev). CP4Dev has been developed as a comprehensive tailor-made support package for institutions in developing countries. GIZ support in the context of CP4Dev includes process facilitation for integrating climate change aspects into development planning, participatory development of a methodology and material, extensive capacity building and support for follow-up, learning and quality control of adaptation.

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Module 4: Identify adaptation options

Rationale

- Identifying adaptation options is **step 2 in the basic adaptation planning process** (4-step approach). The 4-step approach is a systematic and step-by-step process to dealing with all relevant questions and avoids mental blocks due to the over-complex challenge.
- The **objective** is to collect a broad range of adaptation options from a variety of perspectives. As climate change adaptation requires thinking 'outside of the box' (which is easier said than done) there is a specific step dedicated to this brainstorming exercise.
- Desired **outcomes**:
    - Broad possible adaptation options
    - First steps towards thinking about implementation by listing actors/stakeholders who could/should contribute to the activities.

Entry points

Identifying adaptation options is a key step in shaping action for climate-resilient development. This step is especially effective when carried out during policy formulation, strategy development and project identification, appraisal and design.

- At the **national, sectoral and local level**, the results will be prioritised according to entry points in identified geographic hotspots or priority topics.
- At the **project level**, identifying adaptation options would, ideally, be carried out during project identification, appraisal and design and shape the intervention logic.

Main lessons learnt

How to

Ensure Participation: Transparent processes are required to ensure cooperation and accountability: ask affected stakeholders, especially vulnerable groups, to participate.

Brainstorm broadly, and don't bother with feasibility. (A strategic selection of priorities will be done in step 3).

Consider the **different characteristics of adaptation options** to produce a broad variety of options for reducing vulnerability:

- Activities at **various time scales** (near future, middle- and long-term).
- Activities within the **various adaptation frames**:
    - Some options will be no-regret, or justified under current or historic climate conditions. These measures often become even more justified under climate change scenarios, especially measures with strong co-benefits for development, *e.g. expanding mangroves to buffer erosion or improving disaster preparedness infrastructure and planning*.
    - Other options will become justified under a certain climate change scenario, *e.g. include long-lived infrastructure (like flood control) or adjusted infrastructure designs, whose costs are only effective if damages are avoided*. These require more certain and precise climate information.

- Activities can follow **various strategies**
  - Avoid or limit the impacts of climate change by reducing exposure or sensitivity of the system.
  - Stabilise or enhance the adaptive capacity of the relevant actors.
- Activities can build on **various tools**:
  - Adjust practices
  - Increase flexibility of the system
  - Develop capacity to improve actions and decisions
  - Change policies, regulations and incentives
  - Invest in infrastructure
- Add to your list through a second round of brainstorming with some **advanced questions**:
  - Which options can address short-term concerns and also support long-term objectives?
  - How can existing adaptive capacities be supported for autonomous adaptation?
- How can barriers to resilience, e.g. availability of information, technical capacity, incentives and awareness, be tackled?

Example from the module's case work

System of interest	Selected impacts leading to high/medium vulnerability and need for action	Adaptation options	Relevant actors / stakeholders
Rice/wheat rotation in central plain *(Development objective: to expand production)*	• Crop loss due to rice sterility caused by temperature increase • Higher pesticide use and working time due to increased pest and weed incidence • Lower yields due to higher evapo-transpiration, failing to meet crop water requirements • Inadequate water supply following highly seasonal rainfall in summer	• Develop water retention facilities for groundwater recharge (strong rains cater for dry spells) • Establish water pricing system • Inform on water-saving irrigation techniques • Inform on rainwater harvesting, sustainable farming techniques, drought-resistant crops	• Agricultural extension services • SWA (State Water Authority) irrigation dept • Farmers' Association

Note: When defining **adaptation options always refer to your level of intervention**.

- At the local level you may want to invest in cropping techniques.
- At the sectoral level you may consider enhancing the extension service's capacities.
- At the national level you may think of adapting investment programmes to create incentives for adaptation activities.

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Module 5: Select adaptation measures

Rationale

- Selecting adaptation measures is **step 3 in the basic adaptation planning process** (4-step approach). The 4-step approach is a systematic and step-by-step process to dealing with all relevant questions and avoids mental blocks due to the over-complex challenge.
- The **objective** of this step is to arrive at an adaptation strategy. The strategy should be made up of complementary elements and ensure (a) an effective reduction of climate change risks and (b) coherence with the priorities and practical constraints of a given situation.
  At this stage alternative adaptation options are considered*, e.g. protect assets and resources against impacts through the use of natural or infrastructure defences or adjust by changing the location or investing in early warning systems.*
- Desired **outcomes**
  - Agreed set of selection criteria and an agreed process of prioritisation
  - Adaptation options (step 2) are critically assessed
  - List of prioritised and complementary adaptation measures

Entry points

Selecting adaptation measures is a key step in shaping action for climate-resilient development. This step is especially effective when carried out during policy formulation, strategy development and project identification, appraisal and design.

- At the **national, sectoral and local scale**, the results will be prioritised according to entry points in identified geographic hotspots or priority topics.
- At the **project level**, selecting adaptation measures would, ideally, be carried out during project identification, appraisal and design.

Main lessons learnt

<u>Setting the scene</u>

Once it comes to decisions, things may get tough again. This also includes the design of the **decision-making process**, i.e. who should participate?

- Remain realistic; decisions must be taken efficiently, but there will also be substantial uncertainty and the need to cross-check with the hierarchies. Therefore select an **evaluation approach**, *e.g. a facilitated discussion, multi-criteria analysis*, that will suit your purposes and aligns with the standards of development cooperation (*see Paris Declaration*) as well as the partner's procedures.
- The **set of criteria** has far-reaching influences on the outcomes of your adaptation strategy process. Make sure that all relevant actors agree with the criteria. Decide if all criteria are equally weighted.

How to

- **Define criteria** for prioritising measures, e.g.
  - Effectiveness in addressing relevant vulnerability functions
  - Cost of investment and operation; cross-check difference in adaptation costs over time, ask where early action is cheaper, *e.g. long-term infrastructure investments*
  - Feasibility, *e.g. legal, financial, technical, etc.*, and acceptability
  - Strong co-benefits, *e.g. reforestation to avoid landslides, also contributing to carbon sequestration and groundwater recharge,* or low- or no-regret options
  - Alignment with funding requirements
  - Urgency or what happens if no action is taken
  - Windows of opportunity, *e.g. when a plan comes into revision, a certain person in favour of certain ideas is in charge, …*
  - No adverse impacts on environment ('do no harm', biodiversity-friendliness)
- **Evaluate options**
  - This can be done individually, *e.g. voting on prepared sheets and calculation of the median*, or in open discussion. In the end, the vote has to be presented in a transparent manner. All votes should be treated equally
  - Rate all criteria the same way: ++ being positive in terms of implementation (-- would mean high costs with rather unreliable data basis for example). Otherwise you will face difficulties calculating an overall score
  - If too many options have similar evaluations, you might think of weighing the criteria (e.g. criterion 3 'feasibility' x2)
- **Deal with uncertainty** in a strategic manner
  - Recall that uncertainty is no justification for inaction
  - Prioritise measures with sufficiently reliable information
  - Decide on the roots of uncertainty and, if needed, agree on how further analysis, *e.g. cost and feasibility assessments, can be fed in the process without delaying beyond the agree time frame*
  - Choose no- or low-regret options
- **Arrive at a strategic approach** that reflects outcomes of earlier stages, balances stakeholder interests and addresses barriers. Consider alternative adaptation scenarios and their implications; consider complementary actions and substitutes among highly-ranked options.

Example from the module's case work

Adaptation Option	Criterion 1 Effectiveness	Criterion 2 Affordability (Cost)	Criterion 3 Feasibility	Criterion 4 No regrets	Overall assessment
Improve water use efficiency with updated pump and irrigation technology	++	++	++	+++	Recommended
Invest in crop research to develop more drought-tolerant seeds	+	++	++	+	If funding and collaboration are secured
Adjust crop insurance scheme to reduce incentive for growing maize	+++	+	+	++	Conduct further analysis

References

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Module 6: Develop an M&E framework

Rationale

- Developing a Monitoring and Evaluation M&E framework is **step 4 in the basic adaptation planning process** (4-step approach). The 4-step approach is a systematic and step-by-step process to dealing with all relevant questions and avoids mental blocks due to the over-complex challenge.
- M&E aims to enhance effectiveness by relating the adaptation-specific activities to core development goals and accountability. It also aims to foster learning about what activities work.
- This last step concludes the strategic planning process. The **objective** is to link the selected activities to the desired global impact in a results chain.
- Desired **outcomes**
    - Definition of results chain
    - Agreed set of indicators
    - List of possible data sources

Entry points

Developing an M&E framework is the final step in strategic planning for climate-resilient development. This step is especially effective when carried out as part of the strategy development and/or project design. It assists resource allocation and budgeting as well as operational planning. The formulation of indicators is a precondition to enable proper finalisation of the plan.

- At the **national, sectoral and local level**, the result will be an agreed intervention logic (results chain) as part of the plan, linking activities to the desired impact of climate-resilient development.
- In the **project cycle**, M&E activities are ordinarily placed as a final step. However, to provide for adaptive management and results-orientation, the M&E framework needs to be developed together with the project design and M&E should be carried out as an ongoing activity.
- At all **operational levels** information on the target group, timeframe, baseline and target values can be included in the formulation of objectives or further specified in the indicators. The completed plan, including indicators, will now provide a solid basis for management during implementation (and thus for monitoring and evaluation activities).

Main lessons learnt

Given the inherent complexity of adaptation challenges, a structured approach to monitoring and evaluation is of specific importance.

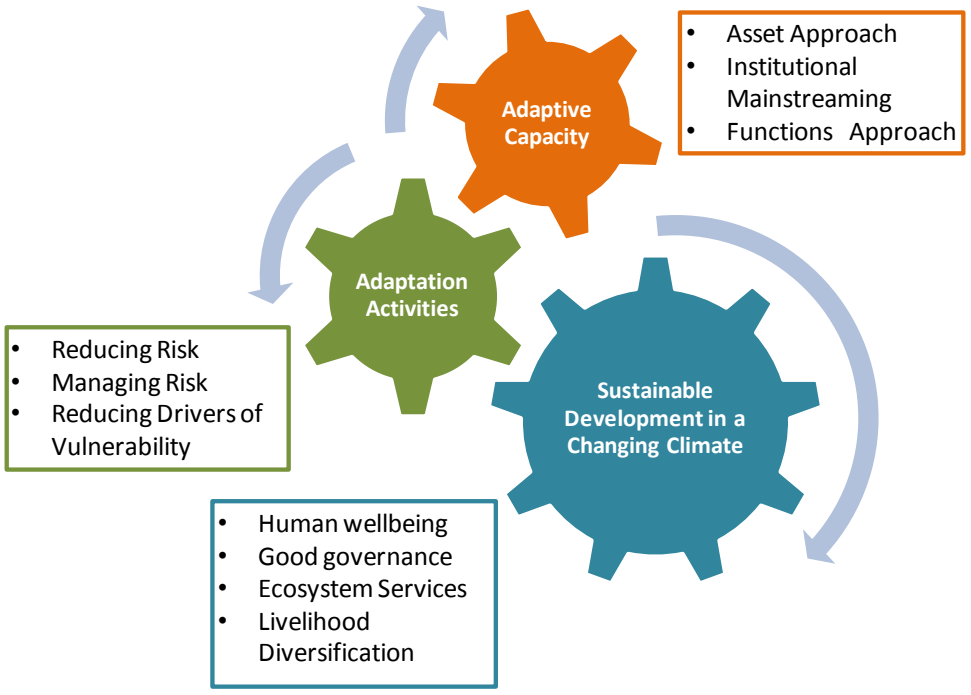
M&E for adaptation can and should fit within ongoing M&E systems. However, standard development and environment indicators need to be complemented by aspects reflecting the adaptation context.

What is being monitored?

M&E asks: 'Are we doing the right things and are we doing things right?'

Concerning M&E for adaptation there are different areas that should be monitored in order to capture adaptation; depending on the intervention, emphasis might be more on one or more of these three aspects:

- You can monitor and evaluate **results and impacts of specific adaptation activities** associated with a project, programme or policy. This requires an analysis of what the key risks and vulnerabilities are and an understanding of how the activities address these. In the short-term, outputs may be the most realistic focus for M&E, rather than changes in outcome- or impact-oriented development indicators. (The case work focuses on this aspect.)
- You can monitor and evaluate how an intervention has contributed to the **development of adaptive capacity** in the stakeholder groups, *e.g. information management capacity, strategic and mainstreaming capacities or technical knowledge on adaptation techniques.*
- You can monitor and evaluate the **overall development success in a changing climate.** The indicators used for monitoring this are often not very different from M&E for regular development interventions (*e.g. securing incomes of target groups in vulnerable regions*).



Reasons for M&E for adaptation

In all interventions, M&E is an opportunity to **strengthen delivery capacity**. The use of clear indicators can help to:

- track the performance of activities and the delivery of results,
- ensure the desired impact,
- enhance accountability,
- increase technical and operational knowledge in new fields of action, thus **enabling learning,** stakeholder engagement and adaptive management**,**
- **develop a unique selling point** for funding, based on provable results.

Difficulties in results-based M&E for adaptation

- The complexity of the adaptation topic increases the well-known difficulty of **attributing certain activities to certain impacts** (attribution gap). This is further complicated as
  - climate change is only one stressor among many on sustainable development,
  - adaptation is a long-term issue with effects that may only be visible after decades and may extend over periods longer than those associated with project lifetimes.
- To qualify for additional funding, there might be a need to **distinguish 'adaptation measures' from 'business as usual'**. This is, per se, hardly possible as best adaptation is integrated in ongoing activities (projects, plans, policies), making it more difficult to track the 'adaptation difference'.
- The **comparison between 'no adaptation' and 'adaptation' scenarios** is difficult as the climate 'baseline' is moving (even without climate change climate conditions are constantly changing), meaning that it is not sufficient to simply compare losses or damages before and after adaptation interventions.

Possible solutions to dealing with difficulties in results-based M&E for adaptation

Combine different assessment methods:

- Other areas dealing with complexity suggest that a combination of **quantitative and qualitative** indicators be used alongside stakeholder perceptions and stories. **Stories** can present changes that support the desired outcome as well as community practices that support adaptation to climate change.
- M&E for adaptation should include a bottom-up perspective. The **combination of scientific data analysis, community level observation and third-party verification** has proven particularly effective.

Complement established M&E techniques:

- Established monitoring techniques can be used for many aspects of M&E for adaptation. However, **additional evaluation loops** should be built-in to make sure that activities that are relevant to making the 'adaptation difference' are assessed.
- As M&E for adaptation is about learning and improving management, it is important that **local experts** are able to monitor the ongoing processes and that results are also available to practitioners, communities and policy-makers.

Define appropriate indicators:

The indicator used to evaluate an effect is not in itself a measurement or evidence of that effect. The indicator only provides information about changes, which may either result from the intervention (effect with direct attribution) or from other causes.

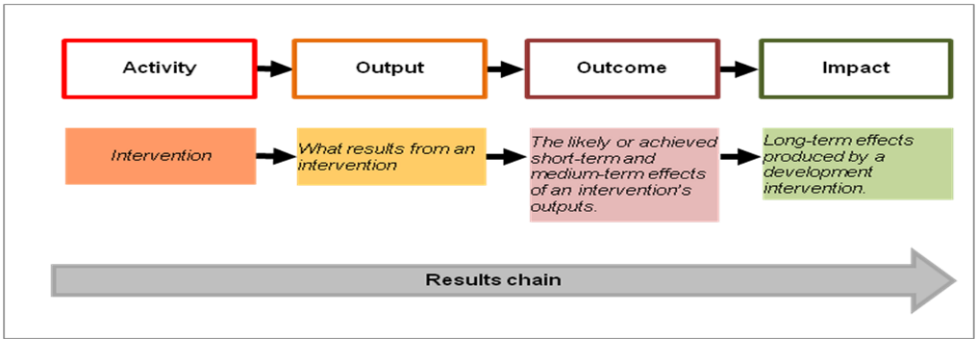
A **good indicator** should therefore:

- **mirror** relevant aspects of the desired result (the set of indicators should cover the different aspects: socio-economic, environmental, governance),
- **indicate** if the intended result has been achieved and/or if activities are on track,
- **provide** information on quality, quantity, time and regional extent of the intended change.

You may also need to review the **geographical scales** (national, regional, community, etc.) of observation. As climate change does not stop at administrative borders, using an ecosystem or risk-relevant area (*e.g. flood plain, coastal strip, etc.*) for observation might provide better results.

Describe a results chain:

- The results chain links the specific activities with the overall desired impact of the intervention (see graph below) and thus establishes the basis for managing results.
- Managing for development results means that success is not only measured in terms of completed activities, but in terms of the resulting changes that can be causally or plausibly attributed to development activities. (For more on results-based monitoring see GTZ 2008).
- When setting up your intervention logic look at factors and impacts that are relevant to risks, vulnerability and resilience.



Use milestones or markers of progress:

- Monitoring interventions designed to deliver long-term benefits should set milestones or use markers of progress that ensure that the intervention is 'on track'.
- Milestones depict a certain **progress in a given time**. Markers of progress should be closely related to sensitivity factors that drive vulnerability or adaptive capacity factors which, in turn, enable the target system to respond to change.

Use M&E for knowledge management and to adapt management from lessons learnt:

- M&E as a knowledge management tool can **increase delivery capacity**:
  - It provides feedback on recent performances.
  - It increases technical and operational knowledge in this new field of work. In adaptation, the management approach should be adaptive, i.e. adjusting plans and activities in reaction to new information (*e.g. new findings on impacts, successful approaches implemented elsewhere, etc*.).

Example from the module's case work

A Adaptation measures selected components of the proposed strategy	**B How does the measure link to the overall aim of SWA's strategy?**	**C Possible indicators**	**D Sources of data, means and schedule for collection**
Train water managers on storage practices, maintenance of transmission system, irrigation practices and contingency planning	***B1 Output***: • *Qualified water management staff*	***C1 Output:*** • *50% of water managers trained in up-to-date water mgmt techniques within the next 2 years* • *…*	• *SWA internal M&E* • *...*
	B2 Outcome: • *SWA's Water Management operational*	***C2 Outcome:*** • *SWA water management unit fulfils annual plan* • *…*	

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Module 7:
Develop institutional capacity for adaptation

Rationale

- Adaptation is about **taking systematic and strategic action**. This requires skilled and experienced experts and appropriate institutional structures and processes.
- The **objective** of this step is to develop a comprehensive strategic approach to develop capacities needed for action on adaptation.
- Desired **outcomes**:
  - Definition of key functions for adaptation and respective management products
  - First steps towards the establishment of an adaptive management approach

Entry points

- At **all operational levels**: For adaptation to climate change, there is normally a need for capacity building in relevant state and non-state institutions, at the organisational and individual levels.
- **Donors**: Capacity development is one of the foremost tasks of technical development cooperation.

Main lessons learnt

- 'Adaptation to CC' requires new or adapted **information, interpretation and decision-making skills**.
- 'Adaptation to CC' is a change process that requires **management structures and processes**, i.e. institutional capacity**.**

<u>Perspectives on developing adaptive capacity</u>

- **Capacity building for adaptation** needs to take into account:
  - **individual** management and leadership as well as technical and soft skills
    -> how: human resource development, strengthen leaders at community level, etc.
  - **organisational** structural and procedural capacities for steering, learning, etc.
    -> how: change management processes
  - **networks**, i.e. co-operative systems to benefit from comparative advantages and economies of scale
    -> how: network management
  - **policies** to ensure values, *e.g. participation of affected communities*
    -> how: policy advice
- **Coordination** is critical for effective adaptation.
  Only national-level authorities (e.g. the office of the President or Prime Minister) have the authority to facilitate such coordination.
  - cross-sectoral coordination, *e.g. existing platforms and coordination mechanisms for disaster risk reduction could offer a starting point; change in water supply and demand will involve ministries such as Water Resources, Agriculture; etc.*
  - vertical cooperation, *e.g. between water sector institutions at national, state and local levels; participatory planning processes; etc.*

Analysing adaptive capacity

- For taking stock of existing resources that help in adapting you may want to use **asset-based** 'adaptive capacity' frameworks (e.g. ACCRA, IUCN, UKCIP).
    - from a **livelihoods perspective** you could look into the five capitals: *human, social, natural, physical, financial*,
    - **attributes of organisational adaptive capacity** are: access to resources, leadership, learning, working with others, access to information, awareness, communication, change agents, motivation, management processes, M&E (see UKCIP).
- Another perspective is **functions-based**. The National Adaptive Capacity Framework (WRI), for example, asks "what can I do that helps me adapt?"
  It is centred around five key institutional functions:
    - **Assessment**: Adaptation requires new information on climate change, its impacts, as well as successful management interventions, *e.g. climate data by region, vulnerability assessments, climate change impact assessments, evaluation of adaptation practices.*
    - **Planning**: Adaptation requires strategic and systematic processes in order to define the right priorities. This demands that you look into various time horizons, geographical inter-linkages, specific vulnerabilities, etc. *e.g. addressing the projected distribution of climate change impacts and different levels of vulnerability across society*.
    - **Coordination**: Adaptation is not a one-man show. Coordination aims to join forces, avoid duplication or gaps and create economies of scale in response to climate change challenges, *e.g. horizontal coordination between the Ministries of Water and Agriculture, vertical coordination between National and State level, policy dialogues including civil society representatives*.
    - **Information management**: Adaptation requires adequate information management. Most institutions have management structures, processes and tools to build on; develop these rather than inventing a new system. This is especially important as change often produces resistance, mistrust, etc. if not carefully introduced.
    - **Implementation**: Adaptation also means implementing measures which reduce climate risks, *e.g. water retention structures, contingency planning*.

Adaptive management

Adaptation is an emerging topic for many organisations and a complex new task for policy makers and managers. There is thus little by way of experience and information to guide action on climate impacts beyond common phenomena.

The adaptive management approach is used to **deal with uncertainties** and **improve performance**. This requires the following **steps**: systematically monitoring and evaluating results → adjusting actions on the basis of what has been learned, *e.g. observing fish stocks and catches reveals the threat of overfishing; in order to provide for sustainable harvests fishing quotas are established.*

Reactive adaptive management is well-known ('learning by doing'), but still not always used, *e.g. if a solution does not bring the expected results, you try something else.* **Proactive adaptive management**, i.e. actively seeking improvements, places high expectations on the management as it requires openness in communication, the ability to 'think outside of the box', the opportunity to review activities, learn from errors and explore other options. This is often difficult to establish in rigidly hierarchical systems.

Example from the module's case work

A State water programme functions/ capacities	B Existing products for water management	C Which short-/ medium-term activities are needed to integrate adaptation in SWA's work?	D What capacity development activities are needed to implement the new activities?	E Which long-term activities could improve water mgmt under CC?
Assessment Adaptation concerns: emerging climate risks, adaptation options	State water resources inventory Projected water demand and supply scenarios	• *CC scenarios* • *CC impact assessments, identification of hotspots* • *Identification of adaptation options* • *Adaptation cost assessments* • *…*	• *Train adaptation focal points on scenarios* • *Train management team on the 4-step approach* • *Train selected experts on cost assessment methods*	• *Joint impact assessments with water and climate change experts* • *Cross-check projected developments with existing country data* • *Evaluate performance of adaptation measures*
Information management Adaptation concerns: integrate up-to-date climate info into water programmes	Policy documents published on the website	• *Develop water sector related interpretations of climate data* • *Make them available to municipal water and agriculture authorities* • *…*	• *Train staff to interpret climate data and produce guidance for other authorities* • *Develop structure for information sharing* • *…*	• *Organise a conference to discuss adaptation project's performances and develop guidelines for the future* • *Establish cross-sectoral round tables*

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Module 8: Local climate stresses, vulnerability and resilience

Rationale

- Global climate change phenomena are manifested locally. Here you can observe CC's impacts on livelihoods, but also people's capacities and how they respond to climate change within their context.
- The **objective** of this step is to develop an understanding of local knowledge on climate variability/change, vulnerability perceptions and adaptation options.
- Desired **outcomes**:
    - Definition of vulnerability functions from a stakeholder group's perspective.

Entry points

- **Local government planning processes** – village, district or city plans - can consider climate change trends or scenarios and no-regrets adaptation (with strong co-benefits in the absence of climate change). These primarily have a 1-5 year time horizon.
- **Local service provision**, i.e. technical expertise and information related to climate change adaptation can be provided to resource managers or farmers.
- **Civil society processes** play an important role in advocating for local people, informing research agendas, raising awareness, capacity development and service delivery in some cases (such as health, disaster risk reduction, etc.).
- **Participatory rural appraisal processes** can incorporate the identification of climate vulnerability factors and integrate discussions about trends, priorities and options for adaptation.

Main lessons learnt

- Local refers to a **sub-national scale**, but can mean something as specific as a particular area or place. (Local includes urban and rural settings, but the exercise deals with rural settings only.)
- Local level analysis gives insight into **climate change impacts on the ground**, i.e. how people's lives and everyday activities are affected and how they deal with challenges.
- Adaptation is a **multi-level planning process**. Local interests need and deserve to contribute to planning processes in order to ensure uptake and the sustainability of initiatives. Local assessments can guide targeted action from other levels (regional, national) towards highly vulnerable communities and areas at the highest risk (bottom-up).
- **Sensitivity and adaptive capacity**
    - at the local level are influenced by many factors, *e.g. income level, education, settlement patterns, infrastructure, ecosystem and human health, gender, political participation and individual behaviour* (for an exhaustive list see IUCN 2010).
    - shape the way in which people are able to reduce exposure to, cope with, and/or recover from negative impacts of climate change or, alternatively, take advantage of the opportunities afforded by climate change.

- Individuals, households, communities and municipalities have longstanding **experience in responding to climate variability** and change, but with varying levels of success. These coping strategies can be used to form the basis of successful adaptation strategies. However, some of these coping strategies could prove to be unsustainable over time as climate change progresses, leading to a greater risk of maladaptation, *e.g. short-term adaptation strategies in response to a decrease in rainfall could include over-exploitation of groundwater resources, which could actually exacerbate vulnerability over the longer term*.
- **Poverty** is an important determinant of vulnerability to climate change; and precarious livelihoods will be further challenged through climate change. Lower-income groups are hit hardest because of greater sensitivity (*e.g. those living in makeshift housing on unsafe and/or remote sites*) and less capacity to cope and adapt (*e.g. lack of assets and insurance*).
  There are strong **complementarities between reducing poverty and reducing vulnerability to climate change**, *e.g. higher incomes increase the adaptive capacity of households*.
- Adaptation to climate change requires **bottom-up thinking**.
  On the one hand, local knowledge on climate change and response options enlarges the overall management capacities, *e.g. climate information from local observation may bring historical information far beyond meteorological observation*.
  On the other hand, local people's participation is a development value as such and especially important to avoid conflicts.
  Participatory Rural Appraisal (PRA) Tools can support the vertical integration in planning and make interventions more targeted.
- However, conflicts do not only occur between vertical levels, but also between **competing interests at local level**. Some have structural reasons and need support from outside to be solved, some can be solved at the local level.

Dealing with local climate information

- Local information on climate change and coping strategies is highly relevant for practical action.
- Triangulation ensures its validity for further interpretation.
- To gather the necessary information
  - ask precise and targeted questions,
  - contact local knowledge holders (e.g. community leaders, leader of women's group, shop owners, etc.) or experienced information hubs (e.g. extension services).

Example from the module's case work

	A Stakeholder group perspectives	B What PRA tool(s) could you use to explore this issue further? How would you use them?
Key climate-related stresses on livelihoods	*Farmers* • loss of soil during heavy rains • lack of drinking water • increased food insecurity • pests • … *Pastoralists* • drying wells • degradation of pasture • increased food insecurity • …	*Farmers and Pastoralists* • seasonal calendar… • visual history • mapping • …
What makes your group sensitive to climate change?	*Farmers* • dependency on rain for agriculture • poor soils • crops that need regular rains at a certain stage and cannot cope with changes • limited market access: poor road to Talaran capital • … *Pastoralists* • animals cannot cope with dry spells • limited market access: poor road to Talaran capital • …	*Farmers and Pastoralists* • seasonal calendar… • mapping • …
What adaptive and/or coping capacities does your group have?	*Farmers* • against erosion: grow cover crops and build rock lines • alternative incomes • diversify crops • … *Pastoralists* • sell livestock • diversify • …	*Farmers and Pastoralists* • Venn diagram • prioritisation matrix • …

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Module 9:
Take action at local level and beyond

Rationale

- Climate change adaptation means dealing with local circumstances. Some opportunities for interventions may be found at the local level, others require action at higher levels. Some activities at higher levels directly affect the local context.
- The **objective** of this step is to define possible adaptation options for local vulnerabilities; this may include activities at the local level or at regional or national levels.
- Desired **outcomes**:
    - Collection of adaptation options for local vulnerabilities
    - First thoughts on next steps
    - Definition of responsibilities at different levels

Entry points

- As at other levels, **assessing adaptation options locally** is a key step towards a clear recognition of climate risks and the need for adaptation within relevant policies and/or projects. This step is especially effective when carried out during **policy formulation, strategy development and project identification and design**.
- **Integrating local stakeholders** in this step is a fundamental requirement to the successful integration of adaptation into local development processes and beyond.

Main lessons learnt

Local action is inter-linked with regional and national levels

- **Top-down**: The efforts to integrate adaptation into development processes at the regional, national, sectoral and project levels should ideally create a set of conditions that allow sub-national actors to understand the changing risks they face and take actions to reduce their vulnerability to these risks. They also frame the range of adaptation options at the local level.
  Local actors are ideally, but not always, consulted during these processes. Often vulnerability assessments at the regional or national level do not appropriately depict the variations in vulnerability at local levels.
- **Bottom-up**: Local assessments can guide targeted action in highly vulnerable communities and in areas at the highest risk.
  Lessons and experiences with adaptation at the local level could provide valuable operational knowledge at higher decision-making levels.
  To be effective and sustainable, local adaptation is often dependent on cooperation with higher levels.

How to ensure effective adaptation at the local level?

- At the local level adaptation should not be planned separately from other development, but **planning should strive for integration**.
- In order to ensure uptake, sustainability and overall success of higher level initiatives, they should be devised with **participation** from sub-national actors (state and non-state).
- Appreciating **local climate knowledge** and established structures and processes in dealing with climate variability facilitates adaptation discussions.
- **Integrate local knowledge and scientific data** from regional and national levels to support the decision-making process.
- Effective use of scientific sources requires **target-group oriented information and awareness raising**, i.e. 'translating' complicated information to make it more tangible so that all relevant stakeholders are on the same page and can participate in the decision-making process. Appropriate communication to spread information is of crucial importance and media should be carefully devised (e.g. Participatory Rural Appraisal tools, local radio, Community Theatre, posters, etc.).

Implementation at local level with assistance from beyond

- In some instances, governments and civil society need to assist the implementation, e.g. through funding, training, facilitating access to knowledge and technologies, etc. However, it is important that assistance acknowledges and builds on existing capacities.
- If there is not enough leverage at the local level, a broader view (**'enlarge the cake'**) including other levels might help, *e.g. conflicts over resource use can possibly only be solved at the district level by offering additional resources or alternatives...*
- Higher level decisions can **create beneficial framework conditions**, which are a necessary precondition for sustainable local solutions:
    - Incentive structures to get finance on the ground.
    - A national policy framework promoting process-orientation and flexible policy processes.
    - A development-oriented institutional set-up, e.g. participatory budgeting, etc.
    - Good practices knowledge base.

Specific requirements for vulnerable groups

- At the local level and especially in poor rural communities, women and children tend to be particularly vulnerable. Information about climate change and adaptation measures needs to respond to their needs in a gender-sensitive way.
- When developing and implementing adaptation strategies at the local level it is critical to consider the gendered effects to avoid contributing to differences between men and women in their vulnerability to climate change.

The 'barriers' approach' to defining adaptation action

In order to prioritise necessary adaptation options, you may want to walk through the following questions:

- What are the vulnerabilities?
- What would be the best-adapted situation?
- Why do affected stakeholders not develop this situation?
- What should be done to enable them to develop the desired situation?

Example from the module's case work

A Vulnerabilities to climate change in Talaran district	B Adaptation options	C Next steps	D Who has the capacity to take action?
Pastoralists have to deal with loss of grazing areas due to overuse of lands and drought.	• *Change of breeds, animals* • *Income diversification* • …	• *Find out which breeds are adapted to future climate conditions* • *Market analysis: products? prices? resources needed?* • …	• *Agric. ext. services (implementation); Univ. of Lapa, Dept. Animal husbandry (breeds)* • *Local community with some support in value chain marketing* • …

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Module 10:
Integrate adaptation into the project cycle

Rationale

- Most development projects/programmes are likely to be affected by climate change.
- The **objective** of this step is to systematically screen and assess development projects/programmes in order to avoid maladaptation and misallocation of development funds and seek the opportunities from climate change – and, last but not least, to ensure that the project/programme continues to address priority development needs.
- Desired **outcomes**:
    - A systematic screening to efficiently select the priority concerns for further assessments
    - A systematic assessment of priority aspects to ensure that adaptation needs are integrated into the project design
    - Definition of entry points to integrate adaptation into the project cycle
    - Definition of practical implications of addressing adaptation concerns (time, information, expertise required)

Entry points

- This climate change adaptation assessment can be used for **projects at all levels: national, sectoral and local**.
- Entry points for adaptation to climate change exist **at every step in the project cycle**:
    - For efficiency and effectiveness in decision-making, it is easiest to do the assessments during the project identification, appraisal and design.
    - Adjustments may be needed during implementation. An active adaptive management approach will bring lessons learnt that may be implemented with immediate effect.
    - The evaluation phase, the thorough cross-check of the implemented activities, is especially important to the emerging issue of climate change adaptation, which relies on learning from experience.

Main lessons learnt

Development projects, their objectives and activities, are influenced by climate change.

- There is a risk that funds could be misallocated if climate change signals and impacts are not assessed in time, *e.g. an infrastructure project in coastal areas may have to deal with sea level rise and increased storm surges*.
- If not planned ahead, development activities could lead to maladaptation, i.e. business-as-usual development, which, by overlooking climate change impacts, inadvertently increases/does not really reduce vulnerability to CC, *e.g. a poverty alleviation programme supporting small-holder coffee plantations may have to deal with the fact that coffee will no longer grow in the area in 10 years and that other interventions are necessary*.

Integrating adaptation at the different steps of the project cycle

- In the first step of **project identification**, when the project's key features are established, the project should be assessed whether it is in principle climate-sensitive or whether it may affect the vulnerability of a human or natural system.
- In the following **project appraisal**, a more detailed climate risk assessment (e.g. 4-step approach) provides the opportunity to reduce the climate change risks and to take advantage of any opportunities that may arise from climate change in the project's **detailed design**.
- During **implementation**, adaptation activities are integrated within the project and implemented.
- Given the limited experience with the integration of adaptation into projects, **monitoring and evaluation** is the opportunity for building knowledge through learning-by-doing and feeding it back into future projects. (for more on M&E see M6)

Planning climate-resilient projects

- The potential effects of climate change are also determined by the country-specific context. During **screening** (first general step) it is therefore important to check whether the project may be affected by climate change or if activities will interfere with adaptation. If this first step is answered positively ("yes, there is sufficient probability"), the project should be carefully **assessed**. The assessment can also use the **4-step approach**: assessing vulnerability – identifying adaptation options – selecting adaptation options – developing an M&E-system.
- **Critically assess projects' side-effects** on the environment (strategic environmental assessment) as well as on the socio-economic side to avoid increasing exposure and putting development at stake, *e.g. new roads may lead to new settlements in areas not suitable for housing due to high-risk of floods*.
- Do not only check opportunities for minimising risks, but seek to **actively explore opportunities**, *e.g. temperature increases may lead to more biomass production which can be of use to plantations if the right tree species are chosen*.
- Direct your limited time and capacities towards the **most urgent issues**. A systematic assessment of climate change risks is particularly important for sectors directly related to development prerequisites, *e.g. health, biodiversity conservation*, as well as sectors dealing with large sums or long time-spans, *e.g. infrastructure investments*.
- Work towards efficient and effective adaptation by **integrating activities into ongoing processes**. This also means that adaptation solutions should be tailored to recent circumstances (e.g. funding, political acceptance, etc.).
- Ensure **participation by relevant stakeholders** throughout the process. Transparent communication, cooperation at certain stages, open discussion and workshops facilitate the creation of ownership – and increase the stakeholders' adaptive capacity by learning about climate change and adaptation options.

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Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn/Deutschland
T +49 61 96 79-0
F +49 61 96 79-11 15
E climate@giz.de
I www.giz.de