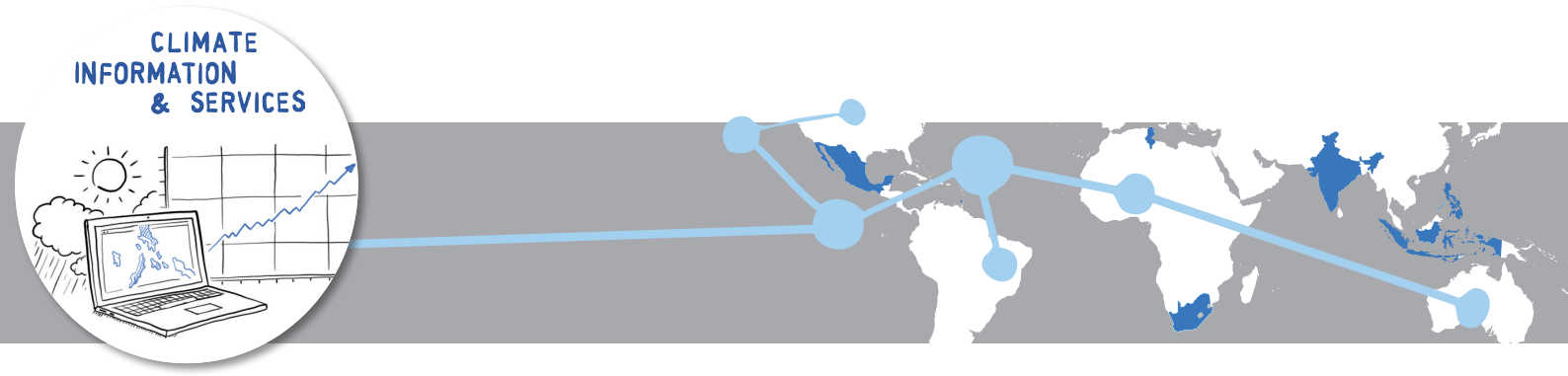


A closer look at Climate Information and Services

WHY DO WE NEED CLIMATE INFORMATION?

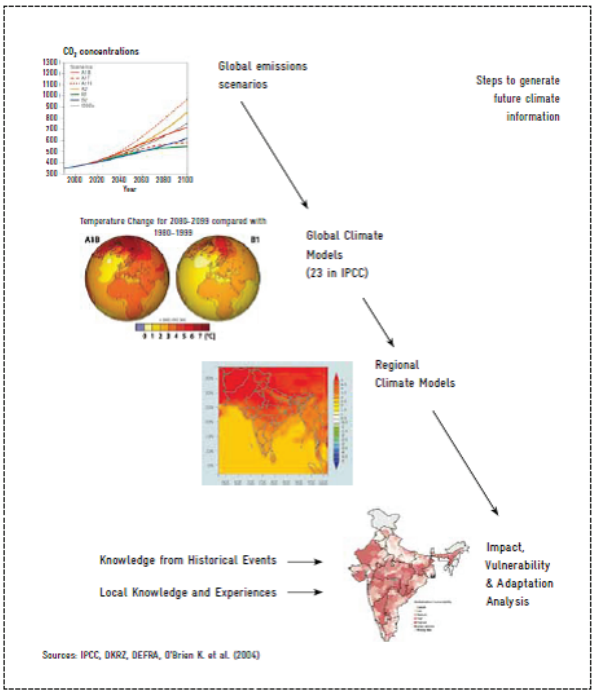
'Adapt to what exactly?' is the first question a decision-maker may ask when faced with the need to prepare for the consequences of climate change. Without knowing the expected changes in climatic conditions, proactive and anticipatory adaptation approaches are difficult. We might identify no-regret measures that are suitable to different climate change scenarios, but the more we know, the better our responses can be. In a changing climate we therefore need usable climate information and services to support adaptive management and decision-making.

WHAT ARE CLIMATE INFORMATION PRODUCTS AND SERVICES?

Climate information products range from global emission scenarios and climate model outputs to information about local impacts and vulnerability to climate change. Generating these products requires meteorological, hydrological, oceanographic, terrestrial (collectively, the Essential Climate Variables, or ECVs), and socio-economic data, along with information from various other fields of research. Providing information about climate change entails the provision of historical data sets as well as generating future predictions of weather elements on monthly, seasonal or decadal timescales and their impact on natural and human systems. It is, however, no trivial undertaking to know about the future climate, and there are differing sources of data and information. There are different levels of certainty with regards to information, and it varies in terms of complexity, completeness, usefulness and usability. Within this context, it is important for adaptation decision-makers to understand how climate information is generated.

There are traditional means of predicting climate variability as humans have always had to adapt. This form of adaptation was not only reactive, and many cultures observed changes in their environment and interpreted what we today call bio-indicators e.g. migration patterns or mating seasons of animals or blossom periods of plants. This traditional knowledge might be of use, but no longer seems to be sufficient with a view to the long time-scales of human-induced climate change.

Today we have sound scientific knowledge about past, current and future climatic conditions. This is thanks to scientific progress over the last decades that has provided a new, additional and very well-founded source of knowledge about current and future climatic conditions. Based on past climate observations and research, we understand – at least partly – how the climate functions within the earth system, and therefore can make projections of the future climate.



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Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

The so-called Global Climate Models (GCMs) are key to these projections. They build on the bio-physical understanding of climatic processes and interactions on earth, and are tested and calibrated using climatic parameters like temperature, precipitation, etc. from the past.

Can we look into the future? In order to model the future climate, we have to include important demographic and socio-economic parameters. How many people will live on earth, which forms of energy will they use, and what are the resulting GHG emissions? There is no way to know this with certainty, and the only way to deal with these issues is to model the climate against different possible worlds and assumptions. In the IPCC's 5th Assessment Report (forthcoming), these different possible worlds are called Representative Concentration Pathways (RCPs) and range from high to low future GHG emission scenarios.

Several global climate models have been developed so far, incorporating processes between the atmosphere, oceans and land. Limiting factors for these models include computing power as well as our still imperfect knowledge of the Earth's systems. Climate models therefore have to approximate some of the key processes that affect climate change. Different models come up with different results, but there are often clear trends and patterns. For instance, all models project a warming of the climate in nearly all parts of the world – the uncertainty stems not so much from the models, but rather from the fact that we do not know which emission pathway humankind will take.

As the resolution of many of the GCMs is rather low, two main techniques have been developed to downscale these results into regional climate models: a) statistically downscale results of the global model to match local conditions; b) embed a regional climate model within the global model. Alternatively, one can also run high-resolution global models on a very powerful computer to better represent regional conditions.

Decision-makers and adaptation practitioners need information about local impacts and vulnerabilities. Regardless of which model is used, it can only provide us with projections on various climate variables, such as temperature and precipitation. But decision-makers want to know the potential impact of such changes on socio-economic parameters, like crop production or infrastructure assets, and their vulnerability towards such changes. Impact and vulnerability assessments are therefore conducted, building on climate model results.

From projections to forecasts. The above-mentioned information products describe changes in the climate (as the averages of atmospheric, oceanic and terrestrial conditions over a long period of time), often over long time scales (2050/2100). They cannot forecast weather events or conditions for a specific day, month or year. Over the last years, seasonal and decadal predictions and forecasts have been developed that can provide a probabilistic assessment of specific weather events and climate conditions over time – a vital tool for decision-making in various sectors. While the quality of seasonal climate forecasts proves to be quite good in some regions, decadal predictions still require a considerable amount of additional research.

WHO PROVIDES CLIMATE INFORMATION AND SERVICES?

With regards to providing climate change information and services, there is no long-standing, well-established tradition. There is still a rather new and rapidly expanding field of activities and actors that are taking future climate developments into account. As there are various types of climate information, there are also various sources of support ranging from national research institutes to National Meteorological and Hydrological Services (NMHSs) to global and regional information platforms. Recently, a growing number of governments are starting to customise climate information and target it to specific users based on their experience with weather forecasting. Nevertheless, in many countries the responsibilities, roles and modes of cooperation among different information and service providers are not always clear. The development of standardised climate services is still in its early stages. While several initiatives exist that aim to deal with climate services (e.g. the Climate Services Partnership, CSP), the Global Framework for Climate Services (GFCS), led by the World Meteorological Organization (WMO) is the formal UN-wide umbrella for the development of climate services. Initiated in 2009, it aims to 'enable better management of the risks of climate variability and change and adaptation to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale'.

The table below provides an idealised overview of who provides what climate information.

Climate Information Products	Climate Information Providers						
	Meteorological services	Research institutes	Global web-based climate information portals	Consultancy firms	Insurance companies/ private enterprises	Government departments (excl. meteoro-logical services)	WMO
Raw data on Essential Climate Variables	X		X			X	X
Emission scenarios		X	X				
Global models	X	X	X				
Downscaled/regional models	X	X	X	X	X		X
Seasonal and decadal forecasts and predictions	X	X	X				X
Impact, risk and vulnerability assessments		X	X	X	X	X	
Local knowledge/ historical records		X	X	X	X	X	

There are several web-based climate information portals that provide climate data and information as well as tools for analysis. Below are some links:

- Climate Information: Global and Regional Adaptation Support Platform (ci:grasp)
- Climate Change Knowledge Portal of the World Bank
- IPCC Data Visualization – Data Distribution Centre (DDC)
- SERVIR
- NOAA Climate Services
- PREVIEW (UNEP)
- Regional Climate Centres (RCCs)
- Regional Climate Outlook Forums (RCOFs)
- Global Producing Centres for Long Range Forecasts (GPCs)
- Climate Wizard
- Weadapt
- Deutscher Klimaatlas
  (German Climate Atlas, in German only)
- KlimafolgenOnline
  ("Climate Impacts Online", in German only)
- Knowledge Navigator
- Climate Change Agriculture and Food Security
- UNDP Country Profiles
- UK MetOffice
- Adaptation Learning Mechanism

The Climate Knowledge Brokers (CKB), formed in 2011 as an informal network, has the objective to forge closer collaborative links between climate knowledge brokers working in the climate and development area. The ultimate aim is to improve access to reliable information and robust methods for those working in these sectors, particularly in developing countries, and to enhance their ability to share lessons and experience. For further information please follow the link.

WHAT MAKES CLIMATE INFORMATION USABLE?

In order to make a well-informed adaptation decision, decision-makers and their advisors have to make use of climate information. The information provider-user relationship is crucial here. Due to different perspectives, there is often a gap between what providers understand as useful information and what users recognise as usable. Information providers may not completely understand the decision-making processes and contexts of potential users, so sometimes the information that is produced remains unused. Given their limited understanding of the matter, decision-makers might also misinterpret climate information and make the wrong decisions. Explaining the level of uncertainty associated with a particular product is also vital, and therefore the exchange and dialogue between the user and the provider side is of utmost importance. Based on this exchange, climate information products and services need to be customised to the needs of individual users in order to be considered in decision-making for adaptation. Information brokers often play an important role in facilitating exchange between providers and users of information, especially if they have an understanding of both domains. But one should not forget that in the end it is the responsibility of the decision-makers (not the scientists or information brokers) to decide under the given uncertainty which future climate scenario to assume. In this context, it can be very helpful if governments officialise assumptions on future changes as an official basis for planning.

WHAT ARE LESSONS FROM EFFECTIVE USE OF CLIMATE INFORMATION?

There are several challenges with regards to effective use of climate information and services by decision-makers. The inventory of methods showcases approaches on how to deal with them. It can be used to continuously capture experiences with the provision and use of climate information both from within the AdaptationCommunity and beyond. Please follow this link for various Method Briefs on climate information and services.

FURTHER READING

Guides, manuals and reports from adaptation experiences

[Manual] GTZ (2009): Climate Change Information for Effective Adaptation: A Practitioner's Manual

[Guide] International Research Institute for Climate and Society (IRI, 2012): Climate Services for Climate-Smart Development: A Preliminary Guide for Investment

[Guide] National Communications Support Programme Guidance and Resource (UNDP/UNEP/GEF, 2012): Applying Climate Information for Adaptation Decision Making

[Journal paper] Maria Carmen Lemos*, Christine J. Kirchhoff and Vijay Ramprasad: Narrowing the climate information usability gap, Nature Climate Change, 2012:, Review Article, Published Online: 26 October 2012 | DOI: 10.1038/NCLIMATE1614

Workshop reports

[Workshop Report] CDKN (2011): Climate and Development Knowledge Brokers Workshop. Eschborn, Germany, 3 – 5 June 2011, organised by CDKN and GIZ

[Workshop Report] CDKN (2011): Climate and Development Knowledge Brokers Workshop. Bonn, Germany, 18-20 May 2012, organised by CDKN and GIZ

[Workshop Report] GIZ (2012): Documentation of the Workshop 'Adaptation to climate change: putting knowledge into action'. 24-25 November 2011 in Durban, Republic of South Africa

[Workshop Report] GTZ (2009): International Workshop on Mainstreaming Adaptation to Climate Change. Guidance and Tools GTZ House Berlin, Potsdam Square 28-30 May 2009 organised by DFID, GTZ, USAID, World Bank

[Workshop Report] GTZ (2010): Second International Workshop on Mainstreaming Adaptation to Climate Change. Managing Adaptation Processes, 10–12 November 2010, New Delhi, organised by ADB, DFID, GTZ, USAID, World Bank

TOOLS AND TRAINING MATERIAL

Available training courses

'Integration Climate Change Adaptation into Development Planning'

Tools

GIZ (2011): Metadata Catalogues – Data Management for Climate Change Impact Analyses and Adaptation Measures. Desk study and prototype

Further links

For resources related dealing with the issue of climate services, please follow the links below:

- Information on adaptation planning tools: www.climateplanning.org
- Global Framework for Climate Services, GFCS: http://www.wmo.int/gfcs
- Case studies of WMO-GFCS: http://www.wmo.int/pages/gfcs/casestudies_en.php
- Global Climate Observing System, GCOS: http://gcos.wmo.int
- GCOS Cooperation Mechanism, GCM: http://www.wmo.int/pages/prog/gcos/index.php?name=GCOSCooperationMechanism
- Data rescue projects: http://www.wmo.int/pages/prog/wcp/wcdmp/CDM_2.php
- Case studies on CSP: http://www.climate-services.org/resource-type/case-studies
- ESA Climate Change Initiative: http://www.esa-cci.org

➔ Discuss about climate information & services here: AdaptationCommunity.net

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