

**Strengthening the delivery of global and regional  
climate services**

**ClimAdapt workshop —  
How to use climate information to  
support climate adaptation activities**

**Participants' manual**

**Prepared for the World Meteorological Organization**

## What is the purpose of this manual?

This participant manual is one of the elements within the “Strengthening the delivery of global and regional climate services” learning programme provided by the World Meteorological Organization.

The complete programme is as illustrated in Figure 1.

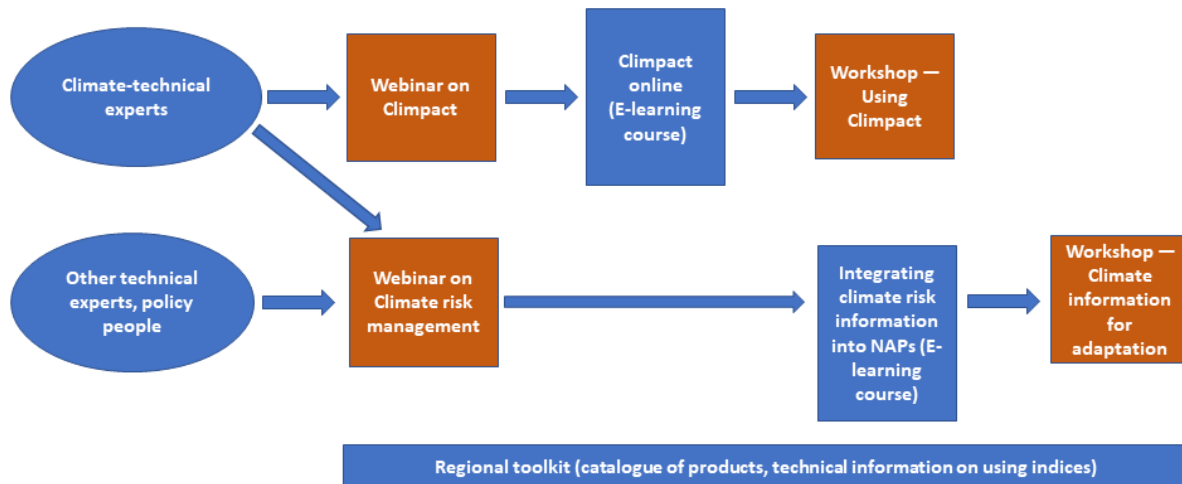


Figure 1: Syllabus for "Strengthening the delivery of global and regional climate services"

There are two streams within the programme. At the top of the diagram is a stream focusing on the use of Climpact, a software tool for calculating climate indices. The second stream focuses on using climate information for adaptation.

There are two formal learning elements for the climate information for adaptation stream:

- “Integrating climate risk information into NAPs”, an e-learning course available through UN CC:e-learn<sup>1</sup>
- The online workshop “Climate risk management”.

Supporting all of these elements is a regional toolkit of products and other technical information about using climate indices, along with a collection of guidance documents.

## Before you attend the workshop

It is essential that before you attend the workshop that you complete the “Integrating climate risk information into NAPs” online course. This manual summarises information from that course in support of the workshop sessions, but it does not provide a complete guide to the subject.

## What to expect in the workshop

This workshop will be delivered as a number of sessions lasting a maximum of about two hours. These extend over a two-week period.

After some sessions you will be expected to do some work in order to prepare for the following session. These activities will be collaborative, and you will work with other participants using an online forum dedicated to this workshop.

<sup>1</sup> <https://unccelearn.org/course/view.php?id=60&page=overview>

Before each session you should also read through the “What this session looks at” sections in this manual. These will give you important background information for what the session will discuss, and will help you to be better prepared when you join the session.

## **Completing the workshop**

When you complete the workshop satisfactorily you will receive a Certificate of Satisfactory Completion.

To do this you must satisfy the following:

- Attend at least five out of the nine online sessions.
- Make a contribution to each forum activity.

## How the workshop will be delivered

The table below summarises how sessions will be delivered.

Day	Date	Session no	Session start times					Duration (mins)	Session titles
			Geneva (UTC+1)	Nigeria (+1)	South Africa (+2)	Iran (+3½)	India (+5½)		
1	8-11-21	1	09:00	09:00	10:00	11:30	13:30	120	Introduction and background
2	9-11-21	2	09:00	09:00	10:00	11:30	13:30	70	The role of climate information in adaptation planning: <ul style="list-style-type: none"> <li>• how climate information contributes to adaptation planning</li> <li>• integrating climate science and sectoral needs</li> </ul>
3	10-11-21	3	09:00	09:00	10:00	11:30	13:30	85	Assembling technical resources to assess climate risk: <ul style="list-style-type: none"> <li>• what technical skills are needed to use climate information effectively</li> </ul>
4	11-11-21								Off-line assignment
5	12-11-21								Off-line assignment
6, 7									
8	15-11-21	4	09:00	09:00	10:00	11:30	13:30	80	Reporting back on developing technical resources: <ul style="list-style-type: none"> <li>• obstacles to developing technical resources</li> <li>• action planning to overcome obstacles</li> </ul>
		5	11:00	11:00	12:00	13:30	15:30	75	The role of National Meteo-Hydrological Services in adaptation planning: <ul style="list-style-type: none"> <li>• strengths and weaknesses in local NMHS</li> <li>• action planning to strengthen local NMHSs</li> </ul>
9	16-11-21	6	09:00	09:00	10:00	11:30	13:30	80	The importance of climate information in prioritising action: <ul style="list-style-type: none"> <li>• identifying local priority actions for adaptation</li> </ul>

									<ul style="list-style-type: none"> <li>deciding what climate information is needed to meet priorities</li> </ul>
10	17-11-21	7	09:00	09:00	10:00	11:30	13:30	80	<p>How climate products and services support adaptation:</p> <ul style="list-style-type: none"> <li>understanding what climate products and services are</li> <li>identifying national weaknesses in using climate products and services</li> </ul>
11	18-11-21	8	09:00	09:00	10:00	11:30	13:30	85	<p>Developing partnerships for using climate data:</p> <ul style="list-style-type: none"> <li>identifying existing partnerships</li> <li>action planning for strengthening partnerships</li> </ul>
12	19-11-21	9	09:00	09:00	10:00	11:30	13:30	60	<p>Workshop review:</p> <ul style="list-style-type: none"> <li>what has been learnt</li> <li>thinking about what happens next</li> </ul>

## Session 2 — The role of climate information in adaptation planning

### Aim of this session

The aim of this session is to help you to think about what sort of climate information is of particular value to your country.

### Prerequisite

Before taking part in this session, it is important that you study the following modules in “Integrating climate risk information into NAPs”:

- Module 2 — Understanding climate risks
- Module 4 — Climate science for adaptation

### What this session looks at

Typically the data collected about weather and climate relates to precipitation, temperature and wind. Long periods of record-keeping and recent advances in modelling techniques mean that it is increasingly possible to make predictions about weather and climate for periods of between a few days ahead up to the coming decade. However, climate data is only of value if it meets the needs of people who need to use it, so providing climate information relies on good relationships between climate information providers such as National Meteo-Hydrological Services and users such as government agencies, private interests and academia.

Various types of climate prediction services are available to support adaptation planning:

- Extended-range forecasts look at the following 30 day period, and maybe useful for predicting extreme climate events and for probabilistic forecasts for rainfall and temperature, for example.
- Long-range forecasts look at periods of up to one year ahead, and can provide predictions about potential deviations from previous climate patterns and the potential for extreme events, for example.
- Interannual predictions cover from one year to several years ahead, predicting trends in precipitation, temperature and sea level atmospheric pressure.
- Decadal predictions consider what may happen during the next 10 year period, taking into account natural variations, such as solar variability, and human activity such as greenhouse gas and aerosol emissions.

An international network of Global Producing Centres of Long-Range Forecasts (GPCLRF) provide these predictions. You should look at the list of these centres in the WMO document referenced below and look at the websites of those which may be relevant to your particular needs.

It is also important to understand the role of a National Framework for Climate Services. A key concept within this is that of the five ‘Climate Services Pillars’, which are:

- Observations and monitoring
- Research, modelling and prediction
- Information Systems
- User Interface
- Role of users.

Each of these is related to climate information.

### Background reading

[Use of Climate Predictions to Manage Risks](#), WMO-No. 1174

[Step-by-step Guidelines for Establishing a National Framework for Climate Services](#), WMO-No. 1206

## What to do before the session

Think about answers to these questions:

- What do you think are going to be the major implications of climate change for your country in the coming decades?
- What climate-related information will be of particular importance to you?
- What new skills will you or your team need in order to be able to gather and use this information effectively?

## Technical instructions for Session 2

During Session 2 you will be asked to type text into a shared whiteboard. The facilitator will explain how to do this, but here are the instructions for your reference:

- When the facilitator opens the shared whiteboard you will see at the top of the screen a tab called "View options". Click on this.
- Click on "Annotate".
- Click on "Text".
- Click somewhere in the screen where there is no other text. A text entry window will open.
- Type your response.

## Sessions 3 and 4 — Assembling technical resources to assess climate risk

### Aim of these sessions

These two sessions aim to identify what local strengths and weaknesses are for an NFCS, and to develop an action plan which will contribute to its strengthening.

### Prerequisite

Before taking part in this session, it is important that you study the following modules in “Integrating climate risk information into NAPs”:

- Module 5 — Building better NAPs
- Module 6 — National dialogues for climate action

### What this session looks at

Climate services is the term used to describe the interaction between the providers and users of climate data. The effective and efficient implementation of climate services relies on a sustained dialogue between these two groups.

To enable this dialogue to happen, a number of different actors need to be involved:

- National Meteorological and Hydrological Services (NMHS), each country's centre of climate expertise which acts as a central point for coordinating climate service activity.
- Academia, which can add value through its research capabilities and access to indigenous knowledge.
- Boundary organisations, such as the media, NGOs, community-based organisations and others, who can play an essential role in disseminating climate information.
- Enablers, international organisations whose work is affected by climate issues: for example, WMO, FAO, WFP, UNEP and several others.
- Users who depend on climate information, such as those working in agriculture, healthcare, energy, construction, tourism, etc, and associated policy and decision-makers.

At a global level these actors are brought together in the Global Framework for Climate Services (GFCS), a global partnership of governments and organisations that produce and use climate information and services. The GFCS is driven by government representatives and its primary forum is the World Meteorological Congress, and this is supported by the WMO and other UN agencies. You can find more information about the GFCS at <https://gfcs.wmo.int/>.

At a national level, states may establish a National Framework for Climate Services (NFCS). An NFCS needs to be able to carry out the following functions, to:

- act as a platform for coordination, collaboration and co-production of information between government ministries at its various levels
- create a legal framework for collaboration
- bridge gaps between providers and users at national, subnational and local levels
- keep up to date with and synthesise scientific information
- create a bridge between climate research, NMHS and other relevant national institutions to strengthen collaboration
- link climate information with action on the ground
- ensure that climate information feeds into the national adaptation planning process.

### What to do before the session

Think carefully about and make some notes about the following:



- How strong do you think your local capacities are for integrating climate information into adaptation planning?
- What capacities do you think you need to strengthen, who could be involved in this, and what external support do you think you need?
- What other organisations or individuals in your country do you think you need to work with more closely?
- What difficulties do you think there may be in doing this?

## Session 5 —The role of National Meteorological and Hydrological Services (NMHSs) in climate adaptation processes

### Aim of this session

The aim of this session is to explore the strengths and weaknesses of local NMHSs in delivering effective climate services.

### Prerequisite

Before taking part in this session, it is important that you study the following modules in “Integrating climate risk information into NAPs”:

- Module 6 — National dialogues for climate action

### What this session looks at

The NMHS in a country plays a central role in strengthening climate services. However, how this happens varies considerably from one country to another and it is difficult to summarise how a ‘typical’ NMHS operates. It is therefore useful to look at the different issues that NMHSs around the world face, and we can do this by looking at the results of a survey carried out by WMO in 2010<sup>2</sup>. Although this information is now a little dated, it nevertheless provides some interesting information which can contribute to this session in the workshop.

The survey indicated a number of key roles which NMHSs play:

- Providing information to policymakers and/or government officials related to topics such as adaptation and mitigation.
- Taking part in activities related to climate change adaptation, such as contributing to National Adaptation Strategies.
- Providing climate-related information to sectoral experts in government ministries and NGOs, particularly relating to the environment, agriculture, science and transportation.
- Contributing technical expertise to adaptation work being carried out as part of the Nairobi Work Programme (NWP).

The survey also highlighted a number of problems which people within NMHSs seemed to encounter. These included:

- Not having a sufficiently high visibility within their country.
- Not having a dedicated liaison person in government ministries to facilitate their contact with senior decision-makers.
- A lack of understanding about the value of the services that the NMHS could provide.
- A lack of legislation within the country which could strengthen its position.
- Weak connections with other relevant organisations.
- Structural weaknesses.
- Technical constraints, such as the number of professional staff, access to necessary hardware, software and Internet access.
- Inadequate financial resources.

### Background reading

[Role of NMHSs in adaptation to climate variability and change](#), WMO-No. 1562

### What to do before the session

So before attending Session 5, think about these roles and problems:

- Which of these can you identify with?

<sup>2</sup> "Role of NMHSs in adaptation to climate variability and change", WMO/TD No. 1562

- Which are particular problems for you?
- Do you have any problems which are not included in this list?

Session 5 will give you an opportunity to share your thoughts with others and perhaps identify some sources of help.

## Session 6 — The importance of climate information in prioritising action

### Aims of this session

The aim of this session is to look at what types of climate information are of particular importance in your country.

### What this section looks at

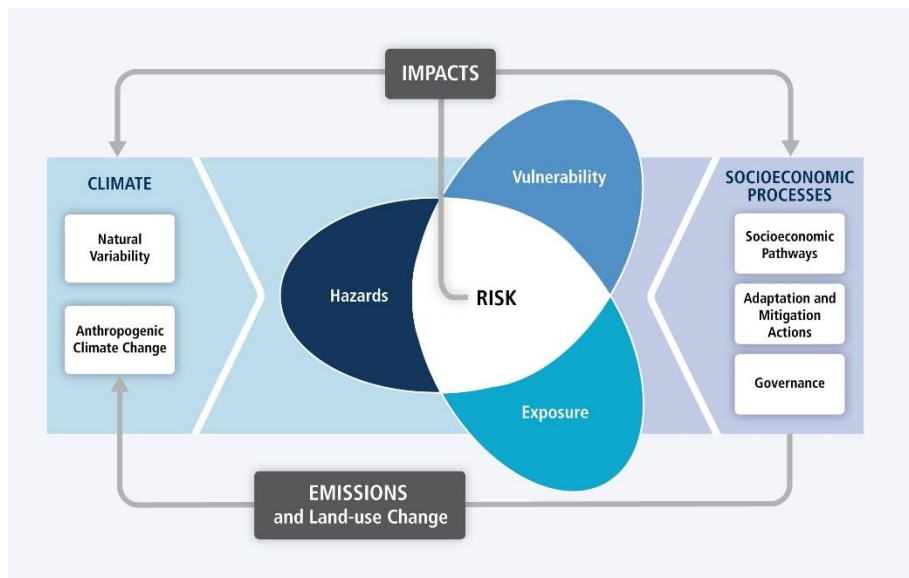


Figure 2: Contributory factors to climate-related risk, from *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (IPCC), p.3

The type of climate information and the form of climate products and services needed will depend on the climate-related risk within any particular country or region. The level of climate-related risk depends on the combination of hazards, vulnerability and exposure that any country or region faces (as shown in Figure 2). It is useful to define what these three terms mean:

- A hazard is the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury or other health impact, as well as damage and loss to property, livelihoods, service provision, ecosystems and environmental resources.
- Vulnerability refers to the likelihood of being adversely affected, which depends on various factors such as the susceptibility to be harmed and the capacity to cope and adapt.
- Exposure refers to the presence of people, livelihoods, ecosystems, environmental functions, services, resources, infrastructure or economic, social or cultural assets that could be adversely affected.

Levels of vulnerability and exposure are strongly affected by non-climatic factors, such as those related to economic and social development. For example, people who are marginalised in some way (socially, culturally or otherwise) are likely to be especially vulnerable to climate-related hazards.

The IPCC has identified five 'reasons for concern' (RFCs) which summarise key risks:

- Unique and threatened systems, such as Arctic sea ice and coral reef systems as well as social cultures.
- Extreme weather events such as heat waves, extreme precipitation and coastal flooding.
- Distribution of impacts being uneven, and generally greater for disadvantaged peoples.

- Global aggregate impacts resulting from global warming, biodiversity loss and failure of ecosystem services.
- Large-scale singular events acting as a tipping point leading to irreversible global changes, such as loss of the Greenland ice sheet.

The reasons for concern may lead to a wide variety of specific risks:

- Death, injury, ill-health or disrupted livelihoods in coastal zones and island states.
- Ill-health and disrupted livelihoods in large urban centres due to flooding.
- Breakdown of critical infrastructure networks and services due to extreme weather events.
- Increased mortality during extreme heat events.
- Increased levels of food insecurity caused by warming, flooding or drought.
- Loss of rural livelihoods and income due to inadequate water supplies.
- Loss of marine and coastal ecosystems.
- Loss of inland water ecosystems.

### **Background reading**

[Climate Change 2014: Impacts, Adaptation, and Vulnerability](#) (IPCC)

### **What to do before the session**

Think about these definitions of hazard, vulnerability and exposure:

- What do they mean for your country?
- What specific risks mentioned above are particularly relevant in your situation?
- What other specific risks have you identified as being potentially serious in your country?

## Session 7 — How climate products and services support climate adaptation

### Aim of this session

The aim of this session is to identify weaknesses and other needs in the way in which a country can utilise climate products and services to support its NAP process.

### Prerequisite

Before taking part in this session, it is important that you study the following module in “Integrating climate risk information into NAPs”:

- Module 5 — Building better NAPs

### What this session looks at

As examined in Session 2, a considerable amount of data is available to inform adaptation planning. However, this data is only useful if it is provided as an effective service. Climate ‘product and services’ describes how data is made into useful information. There are three stages to this process:

- User engagement
- Delivery of products and services
- Feedback, monitoring and evaluation

User engagement describes the process of identifying who users of climate information are and what their needs are, in terms of decision-making cycles, dependencies, etc. A number of general groups can be identified:

- Expert meteorologists, working in academia or NMHS, who use climate data for research or producing climate predictions.
- Sector experts, for example in agriculture, health, energy or water sectors, who need climate data to inform both short-term and long-term activities.
- Policymakers, who may be responsible for local, national or regional planning across a wide range of sectors.

User engagement requires extensive and ongoing conversations between people in these three groups to make sure that products and services are designed effectively, in terms of what they contain, how they work and how they are delivered, for example.

Delivery of climate products and services takes place through a range of mechanisms, designed to meet the needs of the users. Typically this will be through mechanisms such as web portals, email, phone calls, mobile apps, television and radio. It also needs to take into consideration issues such as translation into different languages, making interaction with users possible and providing opportunities for collaborative decision-making. As examples:

- Farmers may need ‘seamless’ forecasting services, incorporating a range of short-term and long-term climate predictions which will help them to make decisions about what crops to plant, when to use fertilisers or pesticides, and when to harvest crops.
- Local and international civil crisis mechanisms, such as police and ambulance, local Red Cross organisations and international aid agencies may need about the likelihood of extreme weather events, so that they can make sure that appropriate Disaster Risk Reduction measures are in place.

Feedback, monitoring and evaluation is essential to make sure that users’ experiences are captured and used to improve the delivery of climate products and services. This can also help to prove the benefits of climate products and services, important in ensuring adequate financial and human resourcing.

## **Background reading**

[\*Use of Climate Predictions to Manage Risks\*](#), WMO-No. 1174

For more information about climate products and services, look at the website for the [Global Framework for Climate Services](#) (GFCS).

## **What to do before the session**

Think carefully about and make some notes about the following:

- How effectively are climate products and services used in your country?
- What do you think are the weaknesses?
- What obstacles may there be to using them effectively?

## Session 8 — Developing partnerships for using climate products and services

### Aim of this session

The aim of this session is to identify the strengths, weaknesses, opportunities and threats for partnership working in order to strengthen the provision of climate services in the country.

### Prerequisite

Before taking part in this session, it is important that you study the following modules in “Integrating climate risk information into NAPs”:

- Module 5 — Building better NAPs
- Module 6 — National dialogues for climate action

### What this session looks at

The WMO guidance “Capacity development for climate services” (WMO No. 1247) explains the importance of partnership working in enhancing the effectiveness of local NMHS practices. As the NMHS level of capability increases, so should its involvement in partnership working. A fully developed NMHS should be taking a leading role in active partnerships with various other bodies.

This should include partnerships with public and private sector organisations, and academic institutions, as recommended for National Frameworks for Climate Services.

### What to do before the session

Download and read the WMO guidelines “[Capacity development for climate services: Guidelines for National Meteorological and Hydrological Services](#)”.

Think carefully about and make some notes about the following:

- What partnerships helping the effective use of climate information exist in your country?
- What international partnerships exist?
- Where would new or stronger partnerships help you to use climate information more effectively?



## **Session 9 — Workshop review**

### **Aim of this session**

The aim of this session is to reflect on what you have learnt during the workshop and to provide some feedback which will help us to improve the workshop.

### **What to do before the session**

Open the 'Course reflection' forum by clicking on the link in the Session 8 Moodle page.