

# Guideline

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## **Development of the Global Framework for Climate Services at the national level**

Date: 3 September 2013

**Acknowledgments:**

We would like to highlight the tremendous work done by Dr Tall in developing and tailoring her 'Early Warning & early Action' Workshops in a way that yielded incredible success in three West African countries. These countries benefited from Dr. Tall's enthusiasm for climate information and services for the end users and the vulnerable communities. She challenged the staff of the national meteorological services to take the lead in their countries to implement frameworks for climate services at the national level. The meteorological services felt very much empowered after completion of the workshop and felt ready to engage effectively with the user communities. Much of the current guidelines were taken from Dr Tall's final report on the workshops. Phase 2 of this guidebook, in particular, has been developed entirely by her.

We would also like to thank Dr. Sivakumar, who has fostered the idea of climate services over many decades. He has developed many thought pieces describing the necessary infrastructural capacities national meteorological services should have to deliver climate information and in part climate services to the user communities.

Lastly, we would like to thank Mrs. Avellan for revising and compiling the work that has been accomplished by WMO and others in order to come up with these guidelines.

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# 1. Purpose of this guide

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This document is intended to support climate services providers, such as the National Meteorological and Hydrological Services, to develop and set-up a framework for climate services at the national level. These guidelines are intended to demonstrate one approach towards the development of the framework at the national level which shall help in designing, delivering and using climate services for enhanced decision making. The national entities are free to use these guides in their entirety or the pieces that they find useful.

The first part of this document briefly describes the background to the Global Framework for Climate Services and some lessons-learned from experiences in setting up frameworks for climate services at the national level. The pages are divided into two parts: on the left you will find the running text and the description of the methodology, on the right you will find useful Key Points and questions that may help you in guiding your thoughts as you dive into the process.

The methodology of developing a plan for the framework for climate services at the national level includes a three phased approach. We think this will produce a coherent and cohesive plan that ensures stakeholder involvement and buy-in:

- **Phase 1: Assessing the baseline (duration 2-6 months)**
- **Phase 2: Initial National Consultation Workshop (4 days plus 3 months prep time)**
- **Phase 3: Elaborating implementation plans (9 - 12 months)**

For the Framework to achieve its objectives a coherent complete system with strong inter-linkages between participants of the framework representing the various pillars/components and priority areas needs to be set up. The widespread and effective use of climate services requires significant interaction among many organizations and people, including government, civil society, communities, partners and donors, and must involve decision makers, climate experts and sector disciplines. It is our intent to make this plan as useful as possible to foster strong partnerships and successful climate services that enhance climate sensitive decision making.

## KEY POINTS:

Provide feedback to the GFC Secretariat ([gfc@wmo.int](mailto:gfc@wmo.int)) so that they can show case success and improve the guidelines based on common experiences.

## 2. Background

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### 1. Climate Services – What are they?

There is a growing need to improve our understanding of climate, climate predictions and our use of climate information to serve society's needs better. Many countries are attempting to address these challenges by developing climate service capabilities. A climate service is considered here to be the provision of climate information in such a way as to assist decision-making by individuals and organisations. The service component involves appropriate engagement, an effective access mechanism and responsiveness to user-needs.

Effective climate services will facilitate climate-smart decisions that will reduce the impact of climate-related disasters, improve food security and health outcome, and enhance water resource management, for example.

Climate services involve the combination of the:

- Accumulation of knowledge about the past, present and future state of the climate system;
- Identification of the type and form of services involving information about the climate and its effects that are needed within the community at large and within specific sectors that are particularly sensitive to climate variability and change;
- Development and delivery of advice and a range of 'products' based on climate knowledge and driven by identified needs; and
- Effective uptake and application of the advice and products to help achieve desired outcomes.

#### Box 1: Some basic definitions, as used in the GFCS Implementation Plan

**Climate data:** Historical and real-time climate observations along with direct model outputs covering historical and future periods. Information about how these observations and model outputs were generated ("metadata") should accompany all climate data.

**Climate product:** A derived synthesis of climate data. A product combines climate data with climate knowledge to add value.

**Climate information:** Climate data, climate products and/or climate knowledge.

**Climate service:** Providing climate information in a way that assists decision making by individuals and organizations. A service requires appropriate engagement along with an effective access mechanism and must respond to user needs.

For additional definitions see the Glossary in the High-Level Taskforce

#### KEY POINTS:

Make sure all national stakeholders agree to this common definition. Often times, different communities have different definitions for the same expressions.

**Climate services will be most beneficial when they are tailored to suit a particular purpose:** political leadership for advice on long-term policy making (climate change projections); governmental and private agencies for guidance on medium-term decision-making (inter-annual climate variability); and the wide diversity of community interests, including agriculture, industry and commerce for short-term decision making (weather and climate forecasts and warnings up to seasonal time scales). The process will typically involve the translation of temporal and spatial information about the climate into decision support tools to suit the needs of specific sector applications, with the means of carrying out the translation underpinned by applied climate research that targets each climate sensitive sector.

*The development and implementation of a targeted climate service will generally require multidisciplinary and multi-institutional collaboration to assess the climate-related risks across the spectrum of activities associated with the targeted sector.*

All countries are facing difficulties in coping adequately with the increasing effects of hydrometeorological disasters, whether through a growth in the number of severe events, through increased exposure, heightened vulnerability, or all three. **Financial and institutional efforts have to be directed towards strengthening capacities at national and local levels, drawing on international support where necessary.** See **Annex I: Categories of service delivery for NMHSs** for the description of the requirements to fulfill different levels of capacities of climate services delivery. Critical will be **the creation of enabling mechanisms** that support development decisions with respect to mitigation and opportunity, as well as to the building of resilience towards future climate risks.

*The socio-economic consequences of hydrometeorological hazards are often most severely felt at the local level; consequently, climate risk management requires that decision-making be based on climate information that can be 'downscaled' to a local context.*

## **2. The Global Framework for Climate Services**

The Global Framework for Climate Services aims to enable society to manage the risks and opportunities arising from climate variability and change better, especially for those who are most vulnerable to such risks.

The Framework will have a strong emphasis on user involvement and capacity development, and the engagement of all partners in this concerted effort is designed to maximise benefits for all users. Though the initial focus will be on the four priority sectors – water, health, agriculture and food security and disaster risk reduction - all climate-sensitive sectors stand to benefit in the long run.

### KEY POINTS:

Think about you national context: What are the most pressing needs in your country for climate services? Which areas of interest are you already working with, which ones do you feel you have not connected to properly?

### KEY POINTS:

Think about assessing services in terms of cost-benefit analyses. International studies have found that this helps in convincing the Ministries of Finance in supporting operational services.

**Box 2: The vision of the GFCS, as defined in the GFCS Implementation Plan**

The **vision** of the Framework is to enable society to manage better the risks and opportunities arising from climate variability and change, especially for those who are most vulnerable to climate-related hazards. This will be done through developing and incorporating science-based climate information and prediction into planning, policy and practice.

**KEY POINTS:**

Find out more about GFCS in general and on the implementation plan, in particular, online under [www.wmo.int/gfcs/](http://www.wmo.int/gfcs/)

The Framework has five overarching **goals**:

1. Reducing the vulnerability of society to climate-related hazards through better provision of climate information;
2. Advancing the key global development goals through better provision of climate information;
3. Mainstreaming the use of climate information in decision-making;
4. Strengthening the engagement of providers and users of climate services;
5. Maximising the utility of existing climate service infrastructure.

Effective development and use of climate services will be of great value for decision-making in many economic and social sectors, value that has not yet been properly assessed by providers or users.

The Framework includes the following eight **Principles** for guiding successful achievement of its over-arching goals:

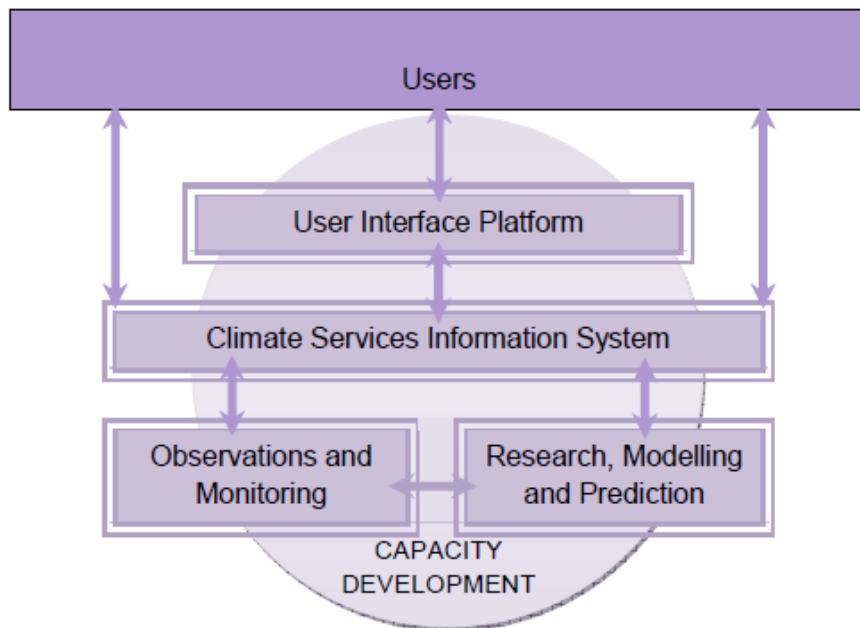
1. All countries will benefit, but priority shall go to building the capacity of developing countries vulnerable to the impacts of climate change and variability.
2. The primary goal will be to ensure greater availability of, access to and use of enhanced climate services for all countries.
3. Activities will address three geographic domains: global, regional and national.
4. Operational climate services will be the core element.
5. Climate information is primarily an international public good provided by governments, which will have a central role in its management.
6. Promote the free and open exchange of climate-relevant data, tools and scientifically based methods while respecting national and international policies.
7. The role of the Framework will be to facilitate and strengthen, not to duplicate.
8. The Framework will be built through user-provider partnerships that include all stakeholders.

The Framework will be built upon the following five components, or **pillars** (see Figure 1):

- *User Interface Platform*: a structured means for users, climate researchers and climate information providers to interact at all levels;
- *Climate Services Information System*: the mechanism through which information about climate (past, present and future) will be routinely collected, stored and processed to generate products and services that inform often complex decision-making across a wide range of climate-sensitive activities and enterprises;
- *Observations and Monitoring*: to ensure that climate observations and other data necessary to meet the needs of end users are collected, managed and disseminated and are supported by relevant metadata;
- *Research, Modelling and Prediction*: to foster research towards continually improving the scientific quality of climate information, providing an evidence base for the impacts of climate change and variability and for the cost-effectiveness of using climate information;
- *Capacity Development*: to address the particular capacity development requirements identified in the other pillars and, more broadly, the basic requirements for enabling any Framework-related activities to occur.

**KEY POINTS:**

Start assessing your capacities under each of the pillars. What is it that your national Met Service is good at? Where do you see room for improvement? What other institutions play a relevant role?



**Figure 1:** The functional components of the GFCS.



The **User Interface Platform** is the most novel component and reflects the fact that the involvement of users in helping to establish the needs, develop appropriate products, identify capacity development requirements and influence the direction of observational investments and research efforts is crucial to achieving the Framework's goals. It is essential to understand that the User Interface Platform **influences the development of all the other pillars of the framework**. The present guideline helps establish a successful User Interface Platform. The Annex to the Implementation Plan concerned with the description of the User Interface Platform identifies a set of activities that need to be in place. Namely:

1. Feedback
  - Establish in each priority area at the national level a systematic process to gather and analyse the requirements for climate information.
  - Undertake surveys of user-focused networks, collaborations, partnerships, forums, centres and learning exchanges relevant to each of the priority areas.
2. Dialogue
  - Interact with other pillars of the GFCS to articulate user needs and perspectives as required.
  - Build a suitable means (web site, social media cloud facility) for the UIP to foster the gathering, analysis and dissemination of user needs for climate information and its application.
3. Outreach
  - Formulate key messages about the Framework, in consultation with representatives of user organizations and the other components of the Framework.
  - Contribute guidance and support to facilitate user engagement in the projects undertaken for Capacity Building. Support other actors, particularly in developing countries, to undertake these tasks at regional and national levels.
4. Monitoring & Evaluation
  - Organise in each priority area a specific assessment of the most promising areas for introducing new or improved climate services to existing collaborative mechanisms.
  - Coordinate the monitoring of user perspectives and feedback on the functioning of the Framework, and provide user-oriented support to the other pillars of the Framework.

**KEY POINTS:**

Think about your national context: Which of these interfacing activities are currently being carried out in your country? By whom? Is it successful?

The Framework will **support and promote effective collaboration** with global, regional and national stakeholders and efforts. At the global level the Framework will focus on defining the global goals, needs and large-scale activities required for successfully implementing the Framework. At the regional level the Framework will cooperate with multilateral efforts to address regional needs, for example through knowledge and data exchange, infrastructure development, research and training and by providing services regionally to meet requirements.

*At the national level it is expected that the Framework will be developed and coordinated by each national government and key national organisations to ensure that all participants can express their needs and requirements for successfully implementing climate services that serve the population of the country.*

### ***3. Lessons learned from Pilot Projects***

In July-September 2012, the World Meteorological Organization (WMO) piloted projects in Burkina Faso, Niger and Mali to build the Global Framework for Climate Services (GFCS) user interface platform (UIP) where such platforms are most critically needed: at the national level.

Conceived as the national declinations of the GFCS, the Frameworks for Climate Services at the National level were proposed and introduced to serve as the **national mechanisms to bridge the gap** between the climate information being developed by scientists and service providers and the practical needs of users, from global to community levels, main objective of the GFCS. For such a Framework to be obtained at the national level, however, national stakeholders had to drive the process and design it in a manner that addresses national needs and priorities in climate service provision and utilization.

Box 3 illustrates the 10 pre-requisites that were identified as the essential starting points for the successful development of a framework for climate services.

#### KEY POINTS:

Find out more about the pilot projects in West Africa and elsewhere under:

<http://www.wmo.int/pages/gfcs/PilotProjects.php>

What are you doing in your country? Share your experiences with the GFCS Secretariat at [gfcs@wmo.int](mailto:gfcs@wmo.int).

**Box 3:****10 Pre-requisites for a successful framework at the national level**

1. Provide a strong institutional anchorage for the Framework for Climate Services
2. Meet the demand for tailored climate service provision in the priority climate-sensitive sectors in the country (Agriculture & Food security, Health, Disaster Risk Management, Construction/Infrastructure/Transport sector, etc.)
3. Build the capacity of the NHMS and other technical services to jointly elaborate salient climate products and services, building on pluri-disciplinary knowledge and expertise from each sector
4. Improve the Communication / widespread distribution of Climate Services
5. Diversify communication channels, use innovative channels to broadcast (aside from TV)
6. Modernize and increase the density of the national hydro-meteorological observing network, improving capacity to meet end-user needs
7. Improve collaborative climate research, towards more salient end-user driven climate research outputs
8. Develop and strengthen the Capacity of end-users to further appropriate and utilize climate services
9. Sustain the newly defined Framework for Climate Services at the national level
10. Engage all national stakeholders involved in the production, interpretation, communication and utilization of climate services in a national dialogue around climate service provision, to identify country needs and charter a course for the provision of user-tailored climate services at the national and sub-national levels.

### 3. A three phased approach towards a framework

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#### *Phase 1: Assessing the baseline*

Before starting the involvement with the stakeholders and addressing the planning of the implementation of GFCS it is critical to answer the following questions:

- a) What are the capacities of the country in the five pillars of the GFCS?
- b) Who are the stakeholders/users/clients/partners?
- c) What climate services are currently being provided?

#### **a) What are the capacities of the country in the five pillars of the GFCS?**

Assessing the level of capacities of the climate service providers in the country including the National Meteorological and Hydrological Services (NMHSs), will **help identify the critical gaps** that exist to deliver climate services and determine opportunities of improvement. We suggest using the questionnaire in the **Annex II: Questionnaire for the self assessment of the countries capacities to deliver and use climate services** as a first attempt to the critical assessment. Having analyzed one's capacities, it will be easier to address the user community. If the user's demand a certain information or product that currently cannot be delivered, **common strategies can be sought to find a solution** to the bottleneck. Synergies can then be forged and national resources saved by joining forces and aligning goals.

#### **b) Who are the stakeholders/users/clients/partners?**

Mapping and critically scrutinizing the stakeholders that could be involved at the national level is essential for the successful implementation of a framework. **Stakeholders should come from all four priority areas and all five pillars**. Over the course of the process, these stakeholders will learn to actively listen to each other, share their knowledge (on the science of climate/weather forecasting on the one hand, and on community indicators, experiences and information needs on the other), and learn from each other. At the heart of the process is the fervent belief that both communities of practice have a tremendous amount to learn from each other; however they have to come to that realization by themselves and develop a thirst for additional interaction and sustained communication with each other. Through guided activities, formal and informal discussions and interactive games, they will indeed come to that realization by themselves (**Annex III: Questions that can help define the stakeholders**).

#### KEY POINTS:

This can also help feeding WMO's Country Profile Database. Regular updates of this Database will help showcasing national improvement on a global platform.

#### KEY POINTS:

It may be useful to have this analysis be done by somebody outside of the organization providing the climate services. This could be an independent firm, a user community or somebody from an(other) NMHS.

#### KEY POINTS:

Include media and communicators, social media correspondents, such as bloggers and facebook community leaders. Don't forget the private sector! Who might have a stake at climate services, maybe the local utilities company or the dam manager?

However, careful selection of participants, the artisans of ‘the bridging the gap’ endeavor at the national level, is a pre-requisite to a successful dialogue. As such, this step is the most critical of all, as **the quality of participants will determine the quality of the outcome**. Successful participant selection proceeds from a targeted mapping of national stakeholders involved in the production, communication and utilization of climate services at all levels.

In general, in any given country, the main institutional actors in the **climate science community** are:

- Forecasters at the National Hydro-Meteorological Service (NHMS) and/or civil aviation agency— main national institution mandated to issue weather and climate forecasts;
- Climate change modelers and researchers at National University Laboratories and other climate research hubs in the country;
- Scientists at other para-statal institutions such as ecological monitoring centres and other national hubs for applied research on environmental hazards;
- Hydrologists at the Water Resources Management Service, bureau or Ministry (if they are not housed in the NHMS);
- Others, according to countries structures and specifications.

Selecting the main stakeholders to invite from the **user community** is a more tricky issue. Being diverse in nature, the “end user community” is in fact a heterogeneous mix of stakeholders from national, sub-national and community levels. What brings them together is their collective ability to reap the societal value of climate services. Each user indeed finds a benefit (potential or actual) in using climate services.

#### **Box 4: An example of the diverse user community**

When the agricultural expert at the Department of Agriculture or the researcher at the National Agricultural Research Institute receives a rainfall forecast bulletin for the next 10 days (**climate information**), they will overlay this piece of information with their knowledge base on the state of the growing season for farmers in a given region of the country, stage of planting, plant phenology and multiple other agricultural parameters (**sector-specific knowledge**), in order to produce a tailored rural advisory based on the received climate information, or an agro-met advisory (**the climate service**). Similarly, the public health planner at the Department of Health will use received information on wind speed and forecast rainfall amounts for the season, and interpret them in light of their knowledge on disease epidemiology (**sector-specific knowledge**), in order to determine whether the season is likely to be prone to an epidemic breakout of a vector-borne disease (malaria, meningitis or Rift Valley fever), and produce a health advisory to be distributed through the public health system chain of the country (**the climate service**).

To make things even trickier: **not all users are end-users**. Indeed, some national stakeholders (for instance, the technical staff of the Department of Agriculture or the researcher at the National Agricultural Research Institute; or yet again the public health planner at the Department of Health) have as their vocation to directly receive climate information (i.e., trend projections and forecasts of various climate and weather parameters: rainfall, temperature, wind, insolation, humidity, etc.) and interpret, analyze and transform this information/data in light of sector-specific knowledge in order to produce a useable, tailored and integrated climate service that can then be communicated to end-users.

In this regard, **some users are actually partners of the NHMS in producing climate services**, and will have to work hand in hand with climate/weather forecasters to transform climate information into climate services. Such users are labeled “**intermediary users**” of climate services. They are the national stakeholders in charge of masticating/treating received climate information (input) to produce a sector-tailored climate service (output). *They generally include all of the line ministry technical staff from all climate-sensitive sectors in the country.*

Intermediary users are very different from the **final end-users** of climate services. The latter do not need climate information/data per se, but a finished useable climate service or product that they can use as input into their decision-making. The latter category generally encompasses farmers, pastoralists and vulnerable communities, the last rungs in the climate services chain. Final end-users can also include national level decision-makers and planners such as sustainable development planners, natural resource managers, etc. who need finished climate information products at longer timescales (climate projections). Final end-users can also be conceived of as the **final beneficiaries of the climate/weather information, products and services**.

This distinction between users and end-users is important to keep in mind though when mapping “the user community” in any given country. Selecting the key stakeholders to invite under each category of User and End-User is critical to ensure a well-balanced representation of all Met service clients and partners in the endeavor to build a well oiled Framework for Climate Services at the National level.

The main **boundary organizations** capable of serving as middle links between providers and users of climate services need not be forgotten. In past workshops, these have included:

- Prominent state media as well as private press organizations with a vested interest in communication of climate information;
- National networks of journalists specialized in climate change communication (where these networks exist);
- NGOs and CBOs active in climate change adaptation;

Key Points:

Make a list of all those agencies and institutions you currently work with. With which of these do you develop climate services; with which do you think you could develop climate services?

KEY POINTS:

Think about your national context: Do you have any connection to national media? Are you satisfied with it? If not, what is hampering your relationships with the media?

- Rural radio networks.

Finally, in choosing whom to invite among national level stakeholders from the user community, a balance is needed between **high-level decision-makers** (directors of line ministry departments, ministry officials, etc.) and **technical staff**, to ensure both technical relevance and political awareness-raising and support at the highest levels for the commitments that will emanate from the national dialogue on climate services. Personal visits to invited partners, explaining the background and incentive can help in ensuring buy-in from the start. All occasions of personal interactions at meetings, conferences or national convocations should be used to personally engage the technical and high-level officials of all stakeholders.

Thus, when mapping the user community in a given country, one should proceed with a **methodological but dynamical mapping of stakeholders**, iterative in nature and informed by the various interactions one has with experts at the national level experienced with climate services provision and communication.

### c) What climate services are currently being provided?

Along with the capacities and the stakeholders comes the analysis of the current provision of climate services, by the NMHS but also by other institutions.

Many ministries, institutions, research centers and other entities provide climate services using climate information provided by the NMHS and others. The User Interface Platforms calls for '*a suitable means to foster the gathering, analysis and dissemination of user needs for climate information and its application*'. **A centrally located but decentrally managed system, with feeds from user communities, partner entities, intermediary institutions can help show case the collectively existing national capacities.** At the same time it will allow assessing the weaker links. For instance, are communicators part of the dissemination channels? Are climate services provided in all priority areas? Are all pillars represented?

Answering the following basic questions will kick-start the discussions:

- 1) What is the best in terms of climate products and services available in the country that you have to offer to end-users?
- 2) Who in the country is best able to train end-users on using each of the climate forecasting products and services on offer?
- 3) Which climate products/modules do you think will be most useful to the end-user community? Please rank them by order of assumed usefulness.

#### KEY POINTS:

The UIP can be a coordination mechanism such as the National Platform for Disaster Risk Reduction, an institutionalized structure such as a committee, or an interactive website or social media platform providing space for sharing of information, ideas and feedback.

## Box 5: Example of a 'suitable means'

Germany launched a climate portal ('Deutsches Klimaportal' [http://www.deutschesklimaportal.de/EN/All\\_Partners/alle\\_partner\\_node.html](http://www.deutschesklimaportal.de/EN/All_Partners/alle_partner_node.html)) gathering all climate service partners, including climate information providers and users. Each partner's specific service delivery page is linked into the portal for quick and easy browsing. This is a first step towards a one-stop-shop for all national climate service information.

The screenshot displays the German Climate Portal website. At the top, there is a navigation bar with links for 'Philosophy', 'Topics', 'All Partners', 'Latest news', 'Events', and 'Forum'. A search bar is located in the top right corner. Below the navigation bar, a breadcrumb trail indicates 'You are here: Homepage > All Partners'. The main content area features a large blue banner with a portrait of Michel Jarraud and a quote: 'Reliable scientific information lies at the heart of adaptation to climate change'. Below this, the 'All partners' section is introduced, stating that public bodies, institutions, and organizations participate to pool information on climate services. Two featured partners are shown: the Bundesanstalt für Gewässerkunde (BfG) and the Bundesanstalt für Straßenwesen (BAST). The BfG section includes its logo and a brief description of its role as a scientific institute for hydrological questions. The BAST section includes its logo and a description of its role as a practice-oriented research institution for road infrastructure. On the left side, there is a sidebar with a 'Sectors' menu listing various areas like Agriculture, Biodiversity, Building Industry, Coastal Protection, Disaster Reduction, Energy Industry, Financial Sector, and Fisheries. Above the sectors menu, there is a map of Germany divided into states, with a header 'Climate services for the Länder' and a row of state coats of arms.



## ***Phase 2: Initial National Consultation Workshop***

One of the main objectives of the Framework is to bridge the gap between the climate information being developed by scientists and service providers and the practical needs of users. As such, one key pre-requisite is **a national dialogue around the priority needs of the country in climate services** to support effective climate risk management and adaptation. Such a dialogue, however, cannot happen in a vacuum, and needs to be mediated.

For this first national gathering we propose to use a methodology that was tested in the pilot projects in West Africa. While certainly regular meetings and workshop formats may also result in successful communications, we have made the experience that this particular method leads to enhanced understanding and insight of the participants.

We propose the following ten steps to successfully deliver an initial national workshop on climate services (the two first steps should have largely been addressed in Phase 1):

### **Box 6: 10 Steps to deliver the national consultation workshop**

#### **STEP 1: Stakeholder mapping and careful participant selection**

Take the time to carefully select participants at both ends of the discussion table. Careful participant selection is key to the success of the workshop. Indeed, the rich mix of selected participants (both on the end-user and the climate experts' side) brings to the national workshop a range of different experiences and expertise and gives the dialogue all of its dynamism and richness. Selected participants will become the champions of the national gap bridging endeavor.

#### **STEP 2: Stakeholder engagement: Door to door visits**

After having carefully mapped out national stakeholders, it is key to take the time to engage workshop participants. Participants at both ends of the discussion table need to be engaged with the workshop's concept, and come to the workshop with a mindset to both contribute to and benefit from the dialogue. Conduct door-to-door visits to each targeted national stakeholder, and draw a door-to-door visiting schedule. A 1:5 ratio of scientists to users is also helpful to promote a balanced dialogue between the two communities of practice.

#### **STEP 3: Training of Trainers: Consensual definition of the workshop training curriculum**

Hold a mandatory pre-workshop training of trainers (ToT) session for all invited climate scientists to introduce scientists to their interlocutors- the users (who they are, what they do, how they function) and have them keep them in mind as they prepare their module presentations. Installing a *no Powerpoint-rule* also forces them to adapt their modules to needs of their audience, and keep the clinic "user-focused".

#### **STEP 4: Pre-workshop Briefing of user participants and definition of possible Early Actions**

It is important to address end-users separately prior to the beginning of the workshop and work with them to define a provisional list of early actions they could potentially carry out in response to a forecast (from Response to Preparedness). Ensure that end user participants arrive early enough to partake in this pre-workshop briefing.

#### KEY POINTS:

The choice of the location to host the National workshop is also contingent upon the balance between high level decision-makers and technicians, as the location needs to be outside of the city centers (to enable a true retreat dedicated to the brainstorming on rendering climate services operational) but also close enough to enable the participation of high-level officials.

<p><b>STEP 5: Dispense modules on Early Warning tools using the participatory methodology</b></p> <p>Dispense modules in small groups using the participatory methodology for group work activity/dispensing of training modules in small mixed groups of climate scientists and end-users.</p>
<p><b>STEP 6: Hold end-user restitutions on usefulness of sampled climate products</b></p> <p>Following modules dispensing, hold restitution by end-users to their former morning “teachers” using the same small group setting, with end-user groups stationary and climate scientists rotating from group to group.</p>
<p><b>STEP 7: Game activity and discussion: From Early Warning to Early Action</b></p> <p>Activity instrumental in exhorting participants to achieve strategic objectives 2 and 3 of the workshops, which consist of finding areas for joint collaboration and closing the gap between the two communities of practice.</p>
<p><b>STEP 8: Identification of Capacity-building Needs</b></p> <p>Open a space for workshop participants to take a step back and ask themselves a fundamental question: “What structural obstacles prevented/prevent our institutions from interacting with each other to provide salient climate services to those most in need of such services?”</p>
<p><b>STEP 9: Closing plenary on Way forward to sustain the Scientist-User Bridge: Devising the Framework for Climate Services</b></p> <p>Ask national stakeholders to devise a National Framework for Climate Services Action Plan, to be proposed for political validation following the national workshop. The Action plan clearly proposes:</p> <ul style="list-style-type: none"> <li>- An appropriate institutional anchorage for the framework</li> <li>- An Implementation strategy, with activities defined in the Short and Medium-to-Long terms;</li> <li>- A communication Strategy</li> <li>- A Monitoring &amp; Evaluation Strategy.</li> </ul>
<p><b>STEP 10: Community field visit</b></p> <p>Final workshop activity, a means to bring climate scientists into community spokespeople’s reality of vulnerability to climate hazards and make all participants commit to sustaining the initiative of the Framework for Climate Services at the national level.</p>

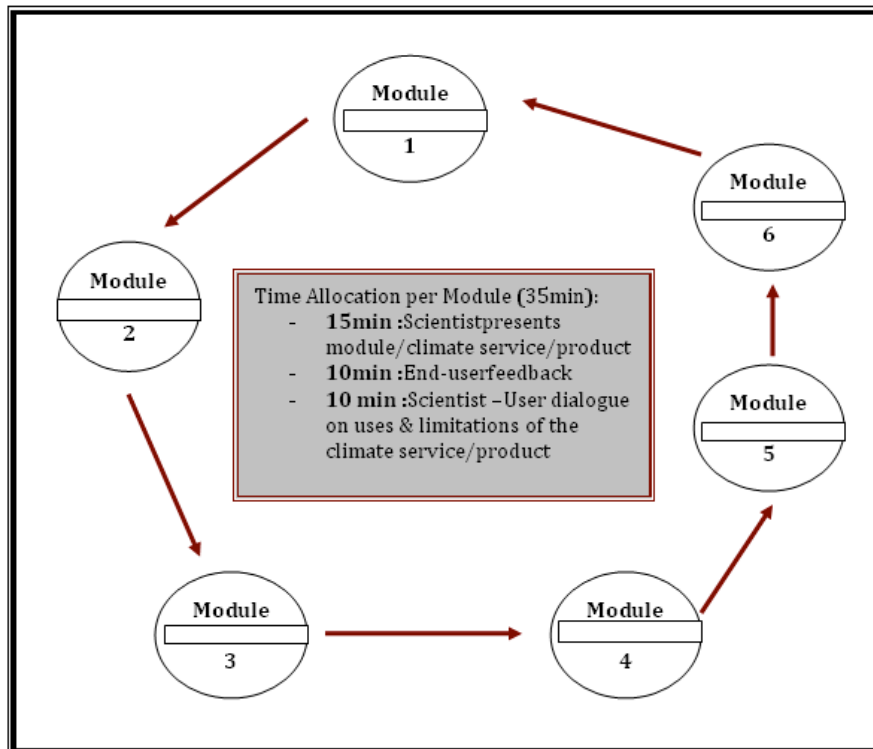
There are a few critical elements that make this interaction so successful:

1. The use of **power point presentations is forbidden**. This forces the climate services provider community to explain their science in simple terms.
2. The **game activity makes all participants more aware** of the usefulness of climate information, their availability at different time scales and their effect on decision making.
3. The combination of break-out sessions for providers/users with plenary sessions enhance the **tempo of the discussions** and raise awareness of the gap dividing them.
4. The final field visit to a vulnerable community **relays a sense of ground truth** to the whole exercise and reminds the participants of their common goals.

Think about having a Training for trainers session one week prior to the start of the workshop, with all participating climate scientists and invited experts in charge of presenting modules during the National workshop. This may include the following elements:

- Introduce climate scientists to the users and end-users they will be meeting (who they are, what they do, what decisions they make that need to be informed by climate knowledge);
  - Reiterate the objectives of the National workshop for climate services;
  - Begin to demonstrate the extent of the gap separating climate scientists from end users at the national level;
- Brief climate scientists on the participatory methodology that will be used throughout the course of the National workshop for effective two-way knowledge sharing between the two communities of practice.

Akin to a knowledge café, this method consists of forming small groups of 5 to 6 trainees (in this case: users from all climate-sensitive sectors in the country) and assigning one climate scientist (or pair of scientists) to each group. Various modules on climate change processes and the science and applications of climate/weather forecast products are then imparted within this small group setting (Figure 2), enabling a direct and more intimate interaction between scientist and users, and fostering bilateral exchanges on the scientific material being shared.



**Figure 2:** Set-up of scientific modules and timing. Subsequently the inverse set-up (users are static and scientist move) is used.

The initial national Consultation Workshop for Climate Services adopts a format and an agenda consisting of the following activities:

1. Day 0:	1.1 workshop preparation, 1.2 arrival of end-user participants and preliminary separate briefings of end-user participants and climate scientists.
2. Day 1- morning (Exposing the climate/weather forecast products and services available at national level):	2.1 Workshop kickoff, welcome survey, presentation of workshop objectives <b>(Annex IV: Survey Questionnaire Template)</b>
	2.2 Introduction of the two communities of practice and Icebreaker activity
	2.3 Module dispensing in small groups for rest of the morning; <b>(Annex V: Guidelines for Module Development)</b>
3. Day 1- afternoon (End-user group restitutions)	3.1 Closing plenary restitution session on the usefulness of climate/weather forecast products and services; <ul style="list-style-type: none"> <li>▪ <i>Which module(s) did you find most useful? Rank them by order of usefulness.</i></li> <li>▪ <i>To what extent do you plan to utilize your new knowledge of climate products/services available at the national level? What will you do from now onwards differently?</i></li> <li>▪ <i>Do you have any concrete recommendations to sustain the dialogue you had today with climate scientists?</i></li> </ul>
4. Day 2 (From early warning to early action):	4.1 Game activity “linking early warning with early action at all timescales” (simulations of forecast scenarios and triggering of early actions by end-users based on early warnings), <b>(Annex VI: Rules of the EW&gt;EA Game)</b>
	4.2 mediated dialogue on cross-institutional experience-sharing on the use of forecast tools and products to inform climate risk management decisions and support decision-making under a variable climate;

KEY POINTS:

Guide end-users to draw a list of early actions at all timescales, which they can trigger in response to received early warnings for different national hazards, giving them an opportunity to reflect on possible actions *ex-ante* occurrence of a climate-related hazard.

KEY POINTS:

For practical purposes, the optimal number of modules that climate scientists ought to present is six, with a maximum being seven modules. Be sure to enforce a strict 1:5 ratio of climate scientists to end-users within each module to maintain a balance in speaking time between the two communities.

KEY POINTS:

Use the same set-up as for the modules but inversed: End-users, still in their small groups of 5-6, remain stationary, and climate scientists rotate this time around.

<p>5. Day 2 (From early warning to early action):</p>	<p>5.1 afternoon brainstorming within each community of practice (climate scientists, users, boundary organizations) to identify needs and pre-requisites to be able to play their role in an established Early Warning – Early Action information chain <b>(Annex VII: Template for the identification of capacity building needs and solutions to address needs)</b></p>
<p>6. Day 3 (Sustaining the dialogue between providers and users of climate services, Devising the Action Plan to establish a National Framework for Climate Services):</p>	<p>5.2 Closing face-off between the three communities of practice exposing their needs and solutions to move forward.</p>
	<p>4.1 Final closing plenary to define scope, action plan, implementation strategy and Monitoring and Evaluation strategy of the National Framework for Climate Services, as well as next steps from the workshop,</p>
<p>7. Day 3 Closing community visit:</p>	<p>4.2 Exit survey <b>(Annex IV: Survey Questionnaire Template)</b></p>
	<p>Ideally, the National Consultation Workshop ends with a visit to a local community vulnerable to the impacts of rising climate-related hazards, where representatives were chosen from to attend the National Workshop. Therein a community dialogue takes place to validate the relevance of National Framework for Climate Services scope and Action Plan, and gather community feedback on priority needs in climate services. This visit ends with the launch of the NFCS initiative before the community.</p>

KEY POINTS: Try answering the following question:  
“What structural obstacles prevented/prevent our institutions from interacting with each other to provide salient climate services to those most in need of such services?”

KEY POINTS: Hold the workshop, if possible, at a venue near the target vulnerable site to make it possible to visit the community where the urgency of sustaining the bridge between the two communities of practice will be illustrated.

### ***Phase 3: Elaboration of the implementation plan(s)***

This initial national consultation workshop will yield specific recommendations and steps to be taken in the future. Often, the lack of a structured means to follow up on the proposed activities hampers their actual implementation. We therefore suggest adding a **9 to 12 month structured process or strategy** to the outcome of the initial national consultation workshop. This in-depth and user targeted reiterated interaction with key stakeholders of the diverse priority areas and communities of practice will allow forming relationships and mutual understanding. It will deepen the knowledge gained in the first meeting and enhance the collaboration and cooperation.

*Avenues for interaction between participants of the framework should be given both in the planning phase as well as in the implementation of activities that lead to enhanced delivery, use and application of climate services.*

These include industry conferences, training workshops, professional societies, sector and interdisciplinary working groups, integrated research studies, technical publications, national committees, national forums, regional forums and international programmes, among others.

**The goals, needs and gaps, identified through this participatory and engaging process, define the activities of the observations, research and delivery and communications components and instruct on the necessary capacity development to deliver those.**

Feedback on the performance of all pillars, through risk management and monitoring and evaluation, define the next round of planning, eventually adjusting the goals and objectives set out previously.

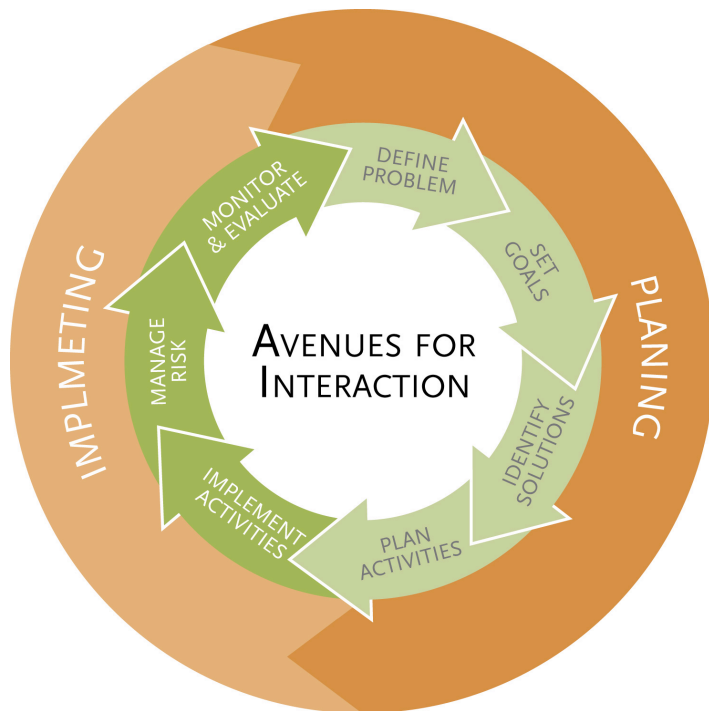
We suggest a **time lag of 4 to 6 weeks between each meeting block** allowing for enough time to prepare for the next meeting and accomplish the necessary homework. Leaving too much time between meetings will risk the loss of momentum and engagement and hence the failure of the endeavor.

The result of this phase should be a complete implementation plan with actionable items at the national level supported and endorsed by all participating parties – the key stakeholders at the national level.

The essential steps that need to be addressed by each meeting are depicted in the planning phase of the graphic below.

#### KEY POINTS:

Check if you have enough staff and capacities to carry out this planning phase. If not, plan early to make provisions for extra staff. Ask the WMO Secretariat for the appropriate help.



**Figure 3:** Graphical representation of the planning and implementation cycle that lead to avenues of interaction.

A step-by-step strategic approach could look like this:

<p><b>National consultation workshop (as described in Phase 2)</b></p> <p><b>Month 1</b></p> <p><b>Overall meeting between all communities</b></p> <ul style="list-style-type: none"> <li>➤ Awareness raising</li> <li>➤ Get to know each others problems and aspirations</li> </ul> <p>OUTCOME: Each community defined the problems (key challenges) and goals they want to achieve with the Framework and a set of key actions.</p>
<p><b>Meeting 2: Month 3</b></p> <p><b>Define problems and set Goals</b></p> <p>The Met community will meet with each priority community separately (suggested 0.5 day meetings each)</p> <ul style="list-style-type: none"> <li>➤ Define goals for framework for each community</li> </ul> <p>HOMEWORK: Each community to assess which solution options they could see realized in the Framework to achieve goals and make a list of challenges attached to each option</p>

**Key Points:**

Use the 'Exemplars' that have been developed by the sector specific GFCS communities. You may want to specifically review the gaps and requirements defined there as well as the suggested activities. Do these fit your needs? Do you have other concerns? Provide feedback to the GFCS on these at [gfc@wmo.int](mailto:gfc@wmo.int)

**Meeting 3: Month 5****Present solutions and identify gaps**

The Met community will meet with each priority community separately (suggested 0.5 day meetings each)

- Identify preferred solution option for the framework for each community
- Identify key challenges attached to that solution option

HOMEWORK: Each community to assess activities that are necessary within the solution option and devise mechanisms to overcome challenges

**Meeting 4: Month 7****Present key activities and assign roles & responsibilities**

The Met community will meet with each priority community separately (suggested 1 day meetings each)

- Provide a work plan for each activity, including timelines, roles & responsibilities, costs and finance mechanisms
- Revise goals if necessary

HOMEWORK: Provide a final plan that summarizes the goals, solution and gaps, and the work plan of the activities

**Meeting 5: Month 9****Overall closure meeting**

Communities should present their findings to each other.  
High level meeting where plans are endorsed and signed off (i.e. through MoUs)

**Key Points:**

Review your plan on a regular basis, i.e. after two years, and evaluate progress on a yearly basis at the least. Plan for another 'kick-off' type meeting after two years and compare the responsiveness of the communities at that point in time.



## 4. Conclusion

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The final end product of this three phased approach should be a **binding workplan with clear roles and responsibilities, timelines and budgets that all parties agree upon**. Part of the process could be envisioned for the development of project proposals for the acquisition of the necessary funds to implement the suggested activities. Synergistic funding mechanisms should be thought of making maximum use of the existing overall national capacities. This can include secondments and interchange of staff between organizations and entities, or the valorization of students and research institutions in the delivery of some of the initial products. Interaction with other entities beyond the national borders could also help overcome some of the initial gaps.

Overall these guidelines shall help kick-start the national process of the development, delivery, uptake and use of climate services. Regular feedback, monitoring and evaluation is necessary to ensure the successful and sustainable implementation of the framework.

## 5. Annexes

### *Annex I: Categories of service delivery for NMHSs*

Currently, NMHS engagement in the delivery of climate services occurs mostly through the making of climate observations, managing and analyzing the data collected, and distributing descriptive products about the climate – its past, present and possible future states. The engagement diminishes to varying degrees as one moves into the value-added domain of customised climate products and the application of tools.

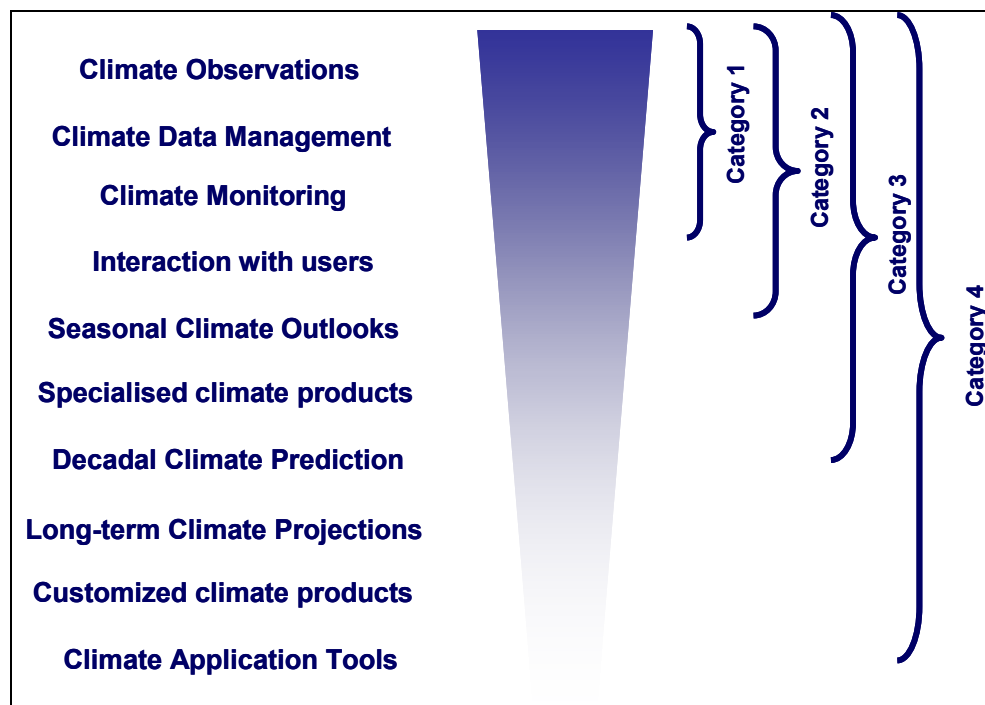


Figure 3: Hierarchy of national climate services

An incremental hierarchy of national climate services (Figure 3) can be categorised as follows:

- Category 1: A basic range of climate data services and information products;
- Category 2: Essential climate data services and information products;
- Category 3: A comprehensive range of climate data services and information products; and
- Category 4: Provision of advanced climate services.

The functional capabilities of these categories are described in the following paragraphs, together with the expected capabilities of NMHSs contributing to or delivering the services at each level.

#### **Category 1: Basic climate data services and information products**

Functions of a Category 1 capability include design, operation and maintenance of national observing systems; data management including QA/QC; development and maintenance of data archives; climate monitoring<sup>1</sup>; oversight on climate standards; climate diagnostics and climate analysis; climate assessment; dissemination via a variety of media of climate products based on the data; participation in regional climate outlook forums and some interaction with users, to meet requests and gather feedback.

<sup>1</sup> Climate monitoring is the process of describing through analysis of observational data the characteristics of past and current climate states over specified domains and time periods.

All NMHSs should be able to function at the Category 1 level, i.e. performing the basic functions of a national climate centre. At present all but a very few NMHSs provide some measure of the basic climate services through their observing, archiving, data services and basic analysis capabilities. Optimally, climate service staff should be proficient in climate statistics, including basic homogeneity testing and quality assurance techniques, etc. They should also be capable of interpreting products provided by RCCs in order to place national/local conditions within a broader scale context.

### **Category 2: Essential climate data services and information products**

In addition to encompassing all Category 1 functions, Category 2 climate services should include the capacity to develop and/or provide monthly and longer climate predictions including seasonal climate outlooks, both statistical and model-based; be able to conduct or participate in regional and national climate forums; interact with users in various sectors to identify their requirements; provide advice on climate information and products; and get feedback on the usefulness and effectiveness of the information and services provided.

A NMHS delivering Category 2 climate services would add value from national perspectives to the products received from RCCs and in some cases GPCs, conduct climate watch programmes and disseminate early warnings. Staff in category 2 NMHSs should be proficient in the development and interpretation of climate prediction products, and in assisting users in the application of these products.

### **Category 3: Comprehensive range of climate data services and information products**

In addition to encompassing Category 2 services, organisations delivering Category 3 climate services would have the capacity to develop and/or provide specialised climate products to meet the needs of major sectors and should be able to downscale long-term climate projections as well as develop and/or interpret decadal climate prediction (as and when available). They would serve to build societal awareness of climate change issues, and provide information relevant to policy development and National Action Plans.

NMHSs delivering Category 3 climate services would be capable of supplying climate information to all the elements of Climate Risk Management, and would include products supporting risk identification, risk assessment, planning and prevention, services for response and recovery from hazards. They could also supply information relevant to longer-term climate variability and change, as well as advice related to adaptation.

A NMHS functioning at the Category 3 level would contribute to regional-level climate activities and could serve as a node in a Regional Climate Centre Network. Category 3 NMHSs would have staff with special knowledge in risk assessment and risk management, and who may have knowledge of financial tools for risk transfer.

### **Category 4: Advanced climate services**

In addition to the ability to deliver Category 3 services, organisations delivering the Category 4 services would have certain in-house research capacities, and would be able to run Global and Regional Climate Models. They would be able to work with sector-based research teams to assist them in developing applications models (e.g. to combine climate and agriculture information and produce food security products), and to develop software and product suites for customised climate products.

NMHSs functioning at the Category 4 level could serve as a Global Producing Centre, a Regional Climate Centre or as a node in a Regional Climate Centre Network. Staff would have modelling and statistical expertise in a multi-disciplinary context, and would be able to downscale global scale information to regional and national levels. They would also be required to receive and respond to user requirements for new products

*All countries should assess their current capabilities using the above criteria as guidance and, as appropriate, aim to establish fully functional institutional capacity to deliver climate services at the level of one of the specified categories.*

*All national CSIS providers especially NMHSs need to strengthen the production, availability, and delivery of their climate data and information products. They also need to work closely with users in various sectors, either directly or through ‘boundary organisations’<sup>2</sup> to ensure the most effective application of their data and products.*

In delivering products directly to end-users, CSIS entities are acting in a UIP role and need to adhere to the underlying principles. In many instances, however, CSIS efficiency and cost effectiveness will lie in CSIS entities collaborating with UIP oriented ‘boundary organisations’ that already have close relationships with end-users within specific sectors. Adopting this strategy would likely be more efficient than striving to develop separate relationships and client understandings within the inevitably broad range of national sectors that exhibit sensitivities to climate variability and change. Where such ‘boundary organisations’ do not exist within a country, these capabilities could be developed through the collaboration of existing national agencies, using the NMHS, if appropriate, as the core provider of primary climate services. As an interim or indeed an alternative approach, support could be sourced from one or more multi-disciplinary agencies already operating at a regional level that would be willing to collaborate with and support the efforts of national institutions, including NMHSs, in providing a country’s climate services.

While all efforts have to be made to improve the scope and breadth of national climate services beyond a basic level, the GFCS is designed to provide new opportunities for any country that is presently constrained with respect to human, technical and financial resources to make use of a Regional Climate Centre or other regional centres of excellence to obtain products and information that are beyond its own capacity to generate.

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<sup>2</sup> A ‘boundary organisation’ may be defined as one that has capabilities in interpreting and using primary climate data and information in combination with other relevant information, with the aim of providing advice and guidance to particular climate sensitive sectors

***Annex II: Questionnaire for the self assessment of the countries capacities to deliver and use climate services***

**Questionnaire on countries state of readiness to create a framework for climate services at the national level**

This questionnaire is intended to support the National Meteorological and Hydrological Services to develop and set-up a framework for climate services at the national level. It should be used together with a set of guidelines that are intended to demonstrate one approach towards the development of the framework at the national level.

This questionnaire will help the national entities to assess their capacities and state of readiness for the creation of a framework for climate services at the national level. The questions revolve around the five pillars of the GFCS, namely the User Interface Platform, the Climate Services Information System, the Observations and Monitoring, the Research, Modelling and Prediction and the Capacity Development aspects.

**\* Required**

Country \*

Institution responding to the Questionnaire \*

Name and position of the person responding to the Questionnaire \*

Areas of Responsibility \*Major areas including all activities, e.g. "Meteorology" includes observations, data processing, forecasting etc.

- Meteorology
- Hydrology
- Climate
- Air/Water quality
- Oceanography
- Agriculture
- Health
- DRR
- Energy
- Urban planning
- Other:

**I. Background information on the National Meteorological and Hydrological Services (NMHS)**

1. Exact Title of the National Meteorological or Hydrometeorological Service (NM(H)S) \*Please provide the title in the local language and the translation in English

2. Title of the parent organization (Ministry, Agency, etc)

3. What is the legal status of the NMHS (e.g., Agency, Department, State owned enterprise, etc)

4. Is the NM(H)S responsible for operational hydrology

- Yes  
 No

5. If your answer on the preceding question is "No", please provide the name of the National Hydrological Service. When responsibility in the fields of operational hydrology and water-resources assessment activities is shared among different institutions, or a National Hydrological Service as such does not exist, NHS is normally understood as the institution from which the Hydrological Adviser has been designated.

6. In your country, is there a law, decree or other legislative act on meteorology (or hydrometeorology, or similar)

- none  
 law  
 decree  
 Other:

7. Provide the title of the primary legislative act that determines the functions of your Service

8. Please indicate any other regulatory framework applicable to the functions of your Service at the level of Ministry; LoAs or MoUs with other agencies, etc. Limit your answers to major ones, e.g., agreement with Civil Protection agency for warning information, etc

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9. Please indicate any other entities, organizations, institutions (including research) that deliver climate information and services in your country:

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## II. User Interface Platform

*User Interface Platform:* a structured means for users, climate researchers and climate information providers to interact at all levels;

1. Please indicate which kind of fora, platforms, engagement mechanisms your institution participates in that support climate services/climate adaptation mechanisms:

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2. Please indicate which kind of fora, platforms, engagement mechanisms a framework for climate services could/should link into (i.e. a National Platform for DRR, Adaptation platform, etc.):

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3. Indicate which areas require climate service according to your national context in order of decreasing priority (i.e. 1 most pressing need: dam management)

water  
 agriculture  
 DRR  
 Health  
 Energy  
 Urban Planning  
 etc.

4. Development Planning: is there a development/strategic plan covering the next 3-5 years in place

- yes  
 no

5. Development Planning: if the answer of the question above is "yes", please indicate the main priority areas in your plan

- Enhancing the monitoring infrastructure
- Improving the management and institutional arrangements
- Improving operational forecasts including the warning products
- Enhanced climate services (implementation of the Global Framework for Climate Services (GFCS))
- Extending services to new user sectors
- Improved IT (including better use of web services and social media)
- Automation of the observing networks
- Implementation of WIS
- Implementation of WIGOS
- Development and implementation of new commercial services
- Training and education of staff
- Research & development
- Other:

6. Please indicate which climate-related projects you are aware of in your country (bilateral/multilateral donors, International agencies, Development Banks etc.):

### III. Climate Services Information System

*Climate Services Information System:* the mechanism through which information about climate (past, present and future) will be routinely collected, stored and processed to generate products and



services that inform often complex decision-making across a wide range of climate-sensitive activities and enterprises;

1. Quality Management: is there a Quality Management (QMS) programme in place as part of your management practices
  - yes
  - no
  
2. Quality Management: status of QMS implementation
  - QMS implemented for the whole institution
  - QMS implemented for aviation branch
  - none
  - Other:
  
3. Is your forecasting branch sufficiently staffed to meet current needs:
  - Yes
  - No
  
4. What type of EWS is/are being offered by *your institution* \* (It is expected that all NM(H)Ss provide some type of warning services. This question refers to the implementation of a EWS that is recognized part of the national regulatory framework on disaster risk management)
  - Hydrological (floods)
  - Hydrological (droughts)
  - Temperature (heat)
  - Temperature (cold)
  - Air pollution/ozone
  
5. What type of EWS is/are being offered by *other institutions* (It is expected that all NM(H)Ss provide some type of warning services. This question refers to the implementation of a EWS that is recognized part of the national regulatory framework on disaster risk management)
  - Hydrological (floods)
  - Hydrological (droughts)
  - Temperature (heat)
  - Temperature (cold)
  - Air pollution/ozone
  
6. Is there a dedicated warning programme in place?
  - yes
  - no

7. Does your institution provide the following services based on real-time monitoring of hazards?
- Hydrometeorological maps based on observational sources
  - Special Statements
  - Advisories (preparation to take action for impending hydro-metrological hazards)
  - Watches
  - Warnings
  - Technical briefing material
8. Do you provide seasonal outlooks of probabilities of potential hazards?:
- yes
  - no

#### IV. Observation and Monitoring Component

*Observations and Monitoring:* to ensure that climate observations and other data necessary to meet the needs of end users are collected, managed and disseminated and are supported by relevant metadata;

1. Indicate the number of sites available in your country of the following:
- Surface observations:
  - Radio sonde/pilot balloon observatories:
  - Aviation current weather observations:
  - Rainfall radar stations:
  - High wind recording stations:
  - Satellite receiving stations:
  - Data Collection Platforms through INSAT:
  - Hydrological observations:
  - Non-departmental raingauge stations:
  - Snowgauges:
  - Agrometeorological observations:
  - Evaporation stations:
  - Evapotranspiration stations:
  - Ozone-sonde observations:
  - Surface ozone observations:
  - Background pollution observations:

- Urban Climatological Units:
- Soil moisture recording stations:
- Other:
- Other:
- Other:

**V. Research Modelling and Prediction Component**

*Research, Modelling and Prediction:* to foster research towards continually improving the scientific quality of climate information, providing an evidence base for the impacts of climate change and variability and for the cost-effectiveness of using climate information;

1. Does your institution do climate modeling?

- Yes
- No

2. On which time scales?

- Long term climate projections (50-100 years)
- Medium term climate projections (10-30 years)
- Decadal forecasting (10 years)
- Seasonal climate predictions (3-12 months)
- Intraseasonal climate prediction (1-3 months)
- Other:

3. Please indicate any other entities, organizations, institutions (including research) that do climate modeling in your country:

**VI. Capacity Development**

*Capacity Development:* to address the particular capacity development requirements identified in the other pillars and, more broadly, the basic requirements for enabling any Framework-related activities to occur.

1. Capacities: According to the categories of capacities described in the guidelines, which category do you think your service fits into?\*

- Category 1: A basic range of climate data services and information products;
- Category 2: Essential climate data services and information products;

- Category 3: A comprehensive range of climate data services and information products
- Category 4: Provision of advanced climate services

2. Budget: main sources of funding of your entity (multiple answers possible)

- government
- commercial activities
- cost recovery (e.g., for provision of aviation services)
- Other:

3. Infrastructure - Indicate areas where you consider your institution/country is lacking adequate equipment and infrastructure or there has been deterioration during the recent years

- Surface observations
- Upper-air observations
- Weather radar observations
- Hydrological observations
- Agrometeorological observations
- Automation of the observing networks
- Telecommunication facilities (national)
- Telecommunication facilities (international)
- Data management systems
- IT (web site, etc.)
- Other:

4. Human capacities - Indicate areas where you consider your institution/country is lacking adequate human resources or there has been deterioration during the recent years

- Number of staff
- Level of technical capacity of staff
- Access to technical training of staff
- Level of soft skills of staff
- Access to training for soft skills of staff
- Number of young staff
- Number of staff reaching retirement
- Access to trained personnel
- Other:

5. Procedural capacities - Indicate areas where you consider your institution/country is lacking adequate processes or there has been deterioration during the recent years

- operational forecasting capacity (dedicated 24 hours a day, every day of the year forecasting service)
- established communication routes between climate service providers and users
- 
- 
- 
- 
- 
- Other:

6. Institutional capacities - Indicate areas where you consider your institution/country is lacking adequate support or there has been deterioration during the recent years

- visibility of climate services providers in the national context
- avenues of interaction between climate service providers and users/clients
- adequate mandates of climate services providers to deliver products
- 
- 
- 
- 
- Other:

### ***Annex III: Questions that can help define the stakeholders***

As such, proceed with the following specific tasks:

**❖ Identification of all climate-driven problems encountered in the country, which climate services at all timescales could play a role in resolving.**

- Hazards (Civil protection/disaster prevention)
  - Floods
  - River flooding
  - Drought
  - Strong Winds
  - Thunderstorms
  - Hurricanes/Tropical Cyclones
  - Other?
  
- Diseases & epidemics sensitive to weather/climate (health)
  - Heat/cold waves
  - Diarrhea
  - Flu epidemics
  - Malaria
  - Meningitis
  - Rift Valley Fever
  
- Food Security (Agriculture, Livestock)
  - Excess/deficit rainfall impacting national production
  - Pests
  - Crop diseases
  
- Water
  - Dam and reservoir management
  - Irrigation
  - Ecosystem flow
  - Ground- and surface water recharge
  - Water supply to urban areas
  - Impact on water quality
  
- Other key sectors impacted by climate/weather variability and change?

**❖ Identification of Stakeholders working on each problem (potential actors in the production and communication of climate services across the information chain), at all levels of decision-making from national to community level.**

#### **Questions to ask:**

- Who are the key stakeholders already mandated to provide climate information and/or climate services to vulnerable communities?
  - Who is making use of the information/services, whose task could be improved with climate information/services?
  - Who has a potential interest in utilizing climate services?

- Who are the critical decision-makers/institutions to invite to the Discussion table, in order to establish a Framework on Climate Services (production, packaging and communication to vulnerable communities)?

**Selection Criteria:**

- Decision-makers of highest political rank (to anchor the process)
- Up & coming early career professionals and technicians (to sustain the process)

**Key issues to address for a Framework on Climate Services:**

- Requisite processes to enable information flow from the National Met service to relevant institutions (an MoU?) for the provision of salient climate services to vulnerable communities
- Define appropriate Institutional framework for climate service provision and clarify institutional mandates
  - Who is in charge of producing the information
  - Who is in charge of interpreting & packaging the information for target end-users (climate service production- all partners in this endeavor)
  - How does the chain of information work
- Whetting further demand for climate services from other stakeholders (not present at the workshop)
- Firmly placing the National met at the service of development
  - Consensually defining appropriate institutional framework for the NFCS
  - Establishing a national framework for Climate Services, starting with the national Met and ending with the vulnerable communities.

## ***Annex IV: Survey Questionnaire Template***

### *a) Welcome Questionnaire*

Right after the official kick-off, a questionnaire was distributed to all participants (both climate scientists and end-). The purpose of this welcome questionnaire was to get the pulse of participants and collect their expectations from the workshop, as well as test their abilities and understanding of a number of key climate forecasting concepts and tools pre-workshop.

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### **QUESTIONNAIRE - DAY 1**

(fill the blank or circle correct option)

1. Name/ Nom: \_\_\_\_\_
2. Gender/ Genre:     a) Male   b) Female
3. Age: \_\_\_\_\_     4. Organization: \_\_\_\_\_
5. Level of education completed / Niveau d'éducation:  
a) None                               b) Primary                               c) Secondary  
d) Tertiary                           e) University (undergraduate)       f) Masters or PhD
6. Type of work you do/ Travail: a) scientific                   b) humanitarian                       c) other:

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7. Geographic area you cover in your work/ / Aire géographique couverte:  
a) Global                               b) Supranational                       c) National  
d) Provincial                           e) Municipal                           f) Village
8. Using only four words or less (not more!) describe what you do in your work / En 4 mots ou moins (pas plus !), décrivez ce que vous faites :
  
9. Indicate one thing that you would hope to accomplish during this two-day workshop/ /Décrivez une attente que vous avez de cet atelier:
  
10. Imagine that it is early May 2010 and a Senegalese Red Cross disaster manager working at regional level receives the following seasonal forecast: "For the period June-August 2010, Southern and Central Senegal are likely to receive normal to above normal rains. The probability of seeing precipitation that would rank in the top third of the historical record is now enhanced to 45%."  
Imaginez que nous sommes en début Mai 2010 et Youcef Ait-Chellouche, Coordonnateur de la Gestion des Catastrophes a la FICR/Dakar, reçoit la prévision suivante : « Pour la période Juin-Aout 2010, il est probable que le Sud et le centre du Sénégal recevront des pluies normales à en dessus de la normale. Ce scenario de pluies est probable a 45% »
  - 10.1. In your opinion, how clear is this forecast for that Red Cross person? / A votre avis, cette prevision est-elle claire et limpide pour cet agent de la Croix-Rouge?  
a) Absolutely clear/ Très claire                   b) Sufficiently clear / Suffisamment claire  
c) Somewhat confusing / Quelque peu confus   d) Incomprehensible/ Incompréhensible
  
  - 10.2. In your opinion, how useful is that forecast for the RC person to make decisions about humanitarian action? ? / A votre avis, quelle est l'utilité de cette prévision pour un acteur humanitaire?  
a) Absolutely useful / Absolument utile   b) Sufficiently useful / Suffisamment utile  
c) Potentially misleading / Potentiellement trompeuse                   d) Useless/ Inutile



11. Imagine that it is August 10, 2009, and the same disaster manager working receives the following rainfall prediction: "Over the next 24 hours, Southern Senegal is likely to receive above normal rains. The probability of seeing precipitation in excess of 200 mm in parts of the Ziguinchor region is now enhanced to above 75%."

Imaginez que nous sommes maintenant le 10 Aout 2009, et Mamadou Sonko, Coordonnateur de la Gestion des Catastrophes a la CRS, reçoit encore une prévision : « durant les prochaines 24h, il est probable que le Sud du Sénégal recevra des pluies en dessus de la normale. La probabilité de recevoir des précipitations excédant 200mm dans des zones de la région de Ziguinchor est de 45% »

11.1. In your opinion, how clear is this forecast for that Red Cross person? ? / A votre avis, cette prévision est-elle claire et limpide pour cet agent de la Croix-Rouge?

- a) Absolutely clear/ Très claire      b) Sufficiently clear / Suffisamment claire  
c) Somewhat confusing / Quelque peu confus      d) Incomprehensible/ Incompréhensible

11.2. In your opinion, how useful is the forecast for the RC person to make decisions about humanitarian action? / A votre avis, quelle est l'utilité de cette prévision pour un acteur humanitaire?

- a) Absolutely useful / Absolument utile      b) Sufficiently useful / Suffisamment utile  
c) Potentially misleading / Potentiellement trompeuse      d) Useless/ Inutile

Exit survey

Finally before each participant took off, they were asked to each fill out the following exit survey:

## QUESTIONNAIRE - DAY 2

(fill the blank or circle correct option)

1. Name: \_\_\_\_\_

2. Using only four words or less (not more!) describe what you do in your work. (examples: "I cook meals", "I run blood tests", "I remove cancer cells". You can use different words from yesterday if you want)

10. Imagine that it is early May 2010 and a Senegalese Red Cross disaster manager working at regional level receives the following seasonal forecast: "For the period June-August 2010, Southern and Central Senegal are likely to receive normal to above normal rains. The probability of seeing precipitation that would rank in the top third of the historical record is now enhanced to 45%."

10.1. In your opinion, how clear is this forecast for that Red Cross person? / A votre avis, cette prévision est-elle claire et limpide ?

- a) Absolutely clear/ Très claire      b) Sufficiently clear / Suffisamment claire  
c) Somewhat confusing / Quelque peu confus      d) Incomprehensible/ Totalement incompréhensible

12. Indicate 2-3 things that you think you have accomplished during this two-day workshop

13. This workshop was intended to help forecasters and disaster managers learn from each other. Indicate 2-3 things that you think your colleagues from the other discipline have gained from the dialogue

14. Imagine that it is early August 10, 2009 and a Senegalese Red Cross disaster manager working at regional level receives the following rainfall prediction: "Over the next 24 hours, Southern Senegal is likely to receive above normal rains. The probability of seeing precipitation in excess of 200 mm in parts of the Ziguinchor region is now enhanced to above 75%."

14.1. In your opinion, how clear is this forecast for that Red Cross person?

- a) Absolutely clear      b) Sufficiently clear      c) Somewhat confusing      d) Incomprehensible

14.2. In your opinion, how useful is the forecast for the RC person to make decisions about humanitarian action?

- a) Absolutely useful      b) Sufficiently useful      c) Potentially misleading      d) Useless

15. Indicate 1-2 things that you liked best about this workshop

16. Do you intend to do anything different because of this workshop to help reduce impacts of predictable natural hazards on vulnerable people through timely disaster risk management? If yes, what?

17. How can we improve this workshop when we do it in other countries? (please use separate sheet)

## ***Annex V: Guidelines for Module Development***

### ***Guidelines for Module development: Note to Climate Scientists***

Dear Climate Scientist participants,

For the purposes of the upcoming National Early Warning –Early Action Workshop, you have been tasked with preparing a 15-minute module on your “climate service/product”, which you could offer to the potential end-users you will be meeting. However this will need to be done in a way that appeals to potential end-users, in an attempt to get them to use the climate information / service that you readily produce.

Please find below important guidelines to keep in mind in the development of your training modules:

- 1) **Use of PowerPoint is strictly forbidden**; only audio-visual aides can be used to impart your knowledge and discuss your module with end-users;
- 2) **No jargon, nor technical words**. You will have to communicate in lay language that the untrained non-climate scientist can comprehend;
- 3) Your module will have to explain:
  - a. How you produce the climate information/service you are proposing to end-users
  - b. Uses of your product
  - c. Limitations of your product
  - d. Examples of potential applications
  - e. Thus the title of your module will have to read as follows: “Climate product xx: Uses, Limitations and Potential Applications”

Additionally, during the National Early Warning –Early Action Workshop, an innovative participatory methodology will be used to aid you in sharing your knowledge and information to the non-scientists (community end-users and disaster managers) you will be faced with during the workshop.

This methodology will consist of forming different small groups of 5-6 end-users and assigning one to two “lead” scientists in charge of delivering the module to each group. Modules on the science of climate forecasting and uses/limitations of weather/climate forecast products (your modules) will then be imparted to each small group, to foster a dialogue within the groups on the scientific material being shared rather than a unilateral knowledge transfer, and enable direct interaction between scientist and communities.

Each small group of end-users and 1-2 scientists will then have two hours and fifteen minutes during which to share, discuss and exchange on the module/early warning tool assigned to them.

Please do not fret if this innovative methodology appears complicated.

Upon your arrival at the workshop venue on day 0 of the Workshop, we will hold a pre-workshop briefing during which we will go over the participatory methodology one last time before the workshop begins.

Good luck preparing your training module,  
I look forward to meeting you at the workshop!

All best, Your Workshop Facilitator

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## *Annex VI: Rules of the EW>EA Game*

### **EW>EA Game: A GAME OF FORECASTS AND ACTION RULES:**

*A decision-making game designed to introduce the weather forecasts and possible actions to take against natural disasters through different roles.*

Full game rules/examples and playing card decks can be found on the following link:  
<http://petlab.parsons.edu/redCrossSite/rulesBTS.html>

#### **- MATERIALS:**

Game cards. Materials can be printed from the templates provided. It is preferable to print on heavy card stock. Cut each card out with a paper cutter or scissors. **NOTE:** There should be some blank cards. This is part of the game!

#### **- TIME:**

The entire experience takes about 45 to 90 minutes, depending on how much time is dedicated to discussion.

Players: This game can be played in a group of 4-7. It is possible to run multiple tables of the game (up to 60 or more players) in “tournament style” as described at the end of this document.

#### **- GAMEPLAY:**

1. Place the time cards (12h, 48h, 10 days) in chronological order on the table from left to right. These represent the lead-time of a forecast: how much time is expected to elapse between the issue of the forecast and the actual occurrence of the forecasted event.

2. Shuffle the forecast cards and place one in front of each time card.

3. Shuffle the action cards and distribute four cards to each player. Some cards might be blank, this is ok!

4. Select one of the players as the Decider for the first round.

**Decider** - Each person in the group takes turns acting as the Decider. The eldest person acts as the Decider first. Each round the Decider chooses which action card (pre-written or player-generated) they think is most appropriate in each time slot. This role rotates clockwise at the end of each turn.

**Advisor** - The players not acting as the Decider. Each round the advisors must select which action cards are most appropriate for each time slot from their hand, or use blank cards to write their own actions.

5. Advisors must recommend a plan for disaster preparedness in response to the forecasts. For each of the time cards, advisors select a pre-written action card from their hand or write their own action card (if they have a blank card) to respond to the forecast in each time slot, and place them in front of the respective time cards, face down. **IMPORTANT:** when a player writes their own card, they must only write down one action (not multiple actions).

6. Each round, the Decider looks at all the recommended action cards, and chooses one (pre-written or player-generated) s/he thinks is most appropriate in each time slot, given the probability and severity of the forecast. The Actors whose cards are chosen receive 1 point for each pre-written action card and 2 points for each player-generated action card.

7. Challenge! Actors may challenge the Decider’s choice. The challenging Actor then advocates for his/her action, and the Decider defends his/her decision. All other players except for the player with the winning card may vote to either uphold the Decider’s decision, or overturn the decider’s decision and award 1 point to the challenger. If the challenger loses the vote, they lose 1 point.

**NOTE:** there can only be one challenge per round (due to time constraints inherent in planning disaster preparedness measures.)

8. At the end of each round, shift the forecast cards to the left, drawing a new forecast card for the 10-day time slot. Deal out one more card to each player. The role of the Decider passes clockwise

**- SCORING**

The game is over once each player has played the role of the Decider once (or, you may choose twice for a longer game). The player with the most points wins!

**-VARIANTS TOURNAMENT OPTION** (for large group/workshop setting) For the first round, play proceeds as normal. Once all teams have finished the first round of play, each team will select a person to represent them in the second round. The cards that were chosen by the teams in the first round will serve as their draw pile for the second round of play.

***Annex VII: Template for the identification of capacity building needs and solutions to address needs***

Concretely, groups were tasked with filling out table 2, for each capacity development need identified by the specific community of practice.

**Group: \_\_\_\_\_ (climate information provider/intermediary user/ information relay/ final end-user- circle one)**

<b>Capacity Needs</b>	<b>Solutions</b>	<b>Funding sources</b>
1.		
2.		
3.		
4.		

Be sure to provide enough time for groups to be able to fill out table 2, a minimum of two hours being advised from the experience of previous workshops.