TRAINING REPORT ON
IMPACT-BASED FORECASTING (IBF)

Facilitation guide

WISER
Weather and Climate Information Services

ABOUT THIS TRAINING AND GUIDE

This facilitation guide was developed as part of the MENA Istibak project, a two-year regional initiative implemented by a consortium including the British Red Cross (BRC), the Red Cross Red Crescent Climate Centre (RCCC), the International Federation of Red Cross and Red Crescent Societies (IFRC) and the World Food Programme (WFP). The Istibak project is a component of the UK Met Office WISER MENA programme, funded by UK International Development.

The overarching goal of the Istibak project is to strengthen the climate resilience of internally displaced persons (IDPs), refugees and host communities in Iraq, Yemen and Syria. This is achieved by enhancing and promoting the co-production of forecast-based early action across local, national and regional coordination mechanisms.

The training was designed and led by Dr Guigma Kiswendsida (RCCC) and Dr Luke Norris (UK Met Office) and was facilitated by Mr Eddie Jjemba and Ms Karine Zoghby (RCCC).

A valuable case study on impact-based forecasting (IBF) and communication was contributed by Ms Khadika Maleek from BBC Media Action.

This facilitation guide was developed in June 2025 by Karine Zoghby and Mary Anne Zeilstra of the RCCC.

We would like to thank Irene Amuron and Dr Rana El Hajj (RCCC) for reviewing the guide.

For further information on these materials, please contact: anticipatoryaction@climatecentre.org.

OBJECTIVE OF THE FACILITATION GUIDE

This facilitation guide is designed to support trainers in delivering a comprehensive learning experience on impact-based forecasting (IBF) for anticipatory action. It aims to equip participants with the foundational knowledge, practical tools and collaborative strategies necessary to co-develop and implement effective early-warning systems that help in taking timely, risk-informed decisions.

By the end of the training, participants will be able to:

- understand the fundamentals of anticipatory action and the rationale for using an IBF approach within early-warning systems

- describe the key concepts, principles and steps involved in designing and implementing an IBF warning service

- identify and analyse the needs and decision-making processes of different users of IBF systems

- explore the role of risk assessment (including hazard, vulnerability and exposure) and relevant tools for assessing risk in both data-rich and data-poor contexts

- recognize the importance of partnerships and stakeholder engagement in co-producing effective IBF services

- identify strategies for effective communication and dissemination of impact-based forecasts and warnings

- apply principles of user-centred communication, including the use of appropriate language and channels for diverse audiences

- reflect on good practices and case examples from across the MENA region to contextualize and apply learning in real-world scenarios.

This guide encourages active participation, peer learning and collaborative problem-solving to strengthen the development of inclusive, anticipatory early-warning services.

TABLE OF CONTENTS

ACRONYMS

AA	Anticipatory action
EWS	Early warning system
FBF	Forecast-based financing
IBF	Impact-based forecasting
MENA	Middle East and North Africa
SOP	Standard operating procedures

DAY 1
INTRODUCTION TO IBF TRAINING

PREPARATION AND SET-UP

- Have copies of all the module presentations (Module 1: Introduction to IBF and Module 2: Understanding user needs).

- Prepare the agenda (a template is shared under Annex 1).

- One icebreaker for the introduction: trip to the moon.

- Prepare sticky notes for the start of the module.

- Prepare two flip charts (varies depending on the number of participants).

- Preparation and set-up

INTRODUCTION

The introduction will consist of two parts: an icebreaker and a setting of expectations.

Part 1:
Ice breaker (30 minutes)

Welcome the participants, introduce yourself and say that you will be facilitating or leading the training on "Impact-based forecasting and anticipatory action" over the next three days.

Clarify that this is a participatory training where everyone's contributions matter.

1. Start the training with an icebreaker for the participants to get to know each other and begin thinking creatively. In this session, we will start with a "**trip to the moon**" (1 minute).
"Imagine you're one of a select few chosen to travel to the moon. It's a once-in-a-lifetime opportunity, but there is a catch: You are only allowed to bring one personal item with you. What would that be and why?"

2. Ask the participants to take 2 minutes to think quietly and write down the answer to this question:
"What is the one thing you would take with you to the moon, and why?"

3. Group sharing (20-25 minutes, depending on the number of participants).

   Each participant must share the following:
   - their name
   - the organization they represent and their position
   - the one thing they would take to the moon, and why.

   Example: *"I am John. I am the Head of Forecasting at the Met Office in XX. I would take my dog with me to keep me company."*

Part 2:
Setting of expectations (30 minutes)

- Ask participants to write on a sticky note what they expect to learn and acquire at the end of the training.

- Participants can say them out loud while you capture the notes on a flip chart and ensure alignment with the training objectives.

- Place the sticky notes on a flip chart or large paper to be reviewed at the end of the training to make sure that the expectations were met.

- Finally, present the training objectives.

Training objectives and agenda

Provide a brief overview of the training objectives, agenda and methodology.

The primary objective of the training on impact based forecasting (IBF) is to enhance the capacities of practitioners and the community of practice in understanding and integrating IBF within anticipatory action (AA) frameworks, fostering co-production, collaboration and partnerships among producers, intermediaries and users of weather services. Additionally, the training aims to lay the groundwork for integrating IBF into national and local disaster risk reduction (DRR) frameworks, thereby enhancing preparedness, reducing risks and improving early-warning systems and anticipatory actions.

The training encompasses four core interconnected modules:

1. Understanding IBF

2. Understanding user needs

3. Risk analysis

4. Communication and dissemination.

Each module includes presentations, case studies, group exercises and country-specific exchanges, allowing participants to contribute contextualized expectations, challenges and action points related to their respective countries **(Annex 1: Training agenda).**

NOTE:
The facilitator guide provides the overall approach, key content, delivery guidance and examples for each module. It is not intended as a slide-by-slide script. While it references the associated PowerPoint presentations, the guide does not explain the content or purpose of every individual slide.

MODULE

1

INTRODUCTION TO IMPACT-BASED FORECASTING (IBF)

LEARNING OUTCOMES

The opening session introduces the core concepts of impact-based forecasting (IBF) and anticipatory action (AA) in the context of weather and climate-related risks, with a specific focus on the MENA region. The goal is to help participants in understanding the principles of anticipatory action, the function and setup of IBF warning services and the shift from traditional weather forecasting which focuses on what will happen to impact-based forecasting which emphasizes what the weather will do.

SESSION CONTENT

Each module includes instructions and explanations of the main themes and slides. The session content outlines the key messages and discussion points to be used as guidance. The following important slides are highlighted to help facilitators lead meaningful discussions and emphasize important content.

This module explores how weather and climate forecasts enable anticipatory action, guiding participants through the shift from traditional hazard-focused forecasts to impact-based forecasting which integrates hazard, exposure and vulnerability data. Participants are introduced to the four pillars of anticipatory action (risk analysis, triggers, early actions and funding), presented with the IBF framework, and regional challenges and solutions such as data gaps in conflict zones (e.g., Syria, Yemen) and policy integration needs to turn forecasts into life-saving decisions.

MODULE 1

MAIN SLIDES EXPLANATION
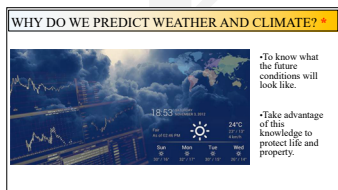
Slide 3:
### The role of weather and climate prediction

The role of weather and climate prediction as essential tools for early-warning systems and anticipatory action, particularly in contexts of high vulnerability. Participants explore the differences between weather prediction and forecasting, including their respective time ranges and applications.

Slides 4-5-6:
Why the interest of the humanitarian sector in forecasts

To emphasize the use of weather forecasts to protect lives and assets.

· Ask participants why forecasts are important for humanitarian sectors.

· Provide examples where necessary: examples to illustrate how extreme heat and drought are contributing to the displacement of rural communities, or how in pre-conflict countries such as Syria, drought conditions were considered a contributing factor to the country's instability such as impacting livelihoods, displacement, poverty, etc.
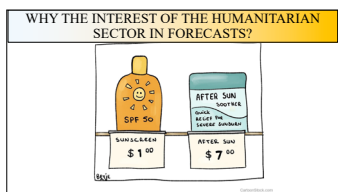
Slide 8:
Forecast-based financing and anticipatory action

Traditional forecasts focus on meteorological phenomena (e.g., rainfall or temperature), whereas IBF integrates three components: hazard, exposure and vulnerability to assess and forecast potential impacts. This transition enables more targeted and actionable early warnings.

· Ask the participants at the start to differentiate between the traditional way of working and anticipatory action.

MODULE 1

Slide 9:
Anticipatory action

Explain that AA and FBF are the same and that universally, the term AA is more adopted. FBF is an anticipatory action approach. Explain that impact-based forecasting **drives actions** that save lives and protect property and livelihoods. Impact-based forecasting provides information on the level of risk a hazard poses to a specific area. Impact-based forecasts and warnings provide an assessment of the forecast weather or climate hazard and an **assessment of the possible impacts**, including when, where and how likely the impacts are.

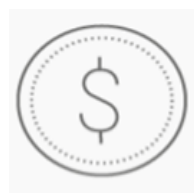## Slide 10:
Key components of anticipatory action

Present and discuss the four pillars of AA:

· **Risk analysis:** Understanding the type of hazard with a focus on weather and climate-related hazards, duration, potential impact of hazards and vulnerability data.

· **Triggers:** Defining a threshold (notice of hazard before it occurs) for deciding when and where to activate early actions.

· **Early actions:** Taking pre-emptive steps (e.g., pre-positioning supplies) before a disaster strikes.

· **Funding mechanisms:** Securing financing ahead of crises which is activated automatically once a forecast is triggered, enabling the effective implementation of early actions while sending a message that "every dollar spent on preparedness saves seven dollars in response", to emphasize the cost-effectiveness of proactive investments.

Print the icons: Risk analysis; triggers, early action, and funding mechanisms to create a visual learning space on the wall for each group or by country, depending on the participants, and use the icons as a tool throughout the training.

For instance, if the participants are divided into working groups by country, let them use this visual space to identify each component.

Example: Components of the risk analysis and gaps can include floods, drought and cyclones, triggers for heatwave. Components of early action can include IFRC distribution of sandbags and funding from DREF. By the end of the day, there will be notes to use and build on during the training.

Risk Analysis

Triggers

Early Actions

Funding Mechanism

Slide 12:
Traditional weather warnings

· Read the warnings one by one.

· Explain that while all these warnings are important and form the foundation of weather forecasting, they are not sufficient for early action. Traditional warnings tell us what the weather will be in the coming hours or days, but they do not tell us how it impacts people, communities or the economy.

MODULE 1 /
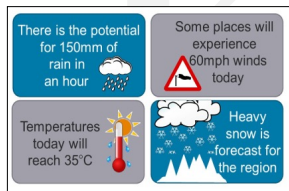
Slide 13:
Traditional weather warnings – Examples vs IBF examples

Ask participants to observe the two images and reflect on the key differences. In working groups, discuss what sets them apart, the advantages of impact-based forecasting and why these differences are important.

Slide 14, 15 and 16:
Aim of IBF

Use Slide 14 to introduce the core topic: the shift from traditional forecasts to IBF and warnings; then, with Slide 15, use the examples to start a discussion by asking how they differ from standard forecasts and how they support decision-making. Finally, conclude with Slide 16 by highlighting that the goal of this shift is to inform decisions and enable early, effective action.

Slide 17:
IBF triggers and early action

Focus on the importance of FBF with example of IBF used in Mongolia. Here is the link of the IFRC Mongolia case study or, if time permits, show the related video available at this YouTube link.

MODULE

1

DAY 1:
Introduction
MODULE 1:
Introduction to impact-based forecasting (IBF)
MODULE 2:
Understanding user needs

Slide 18:
Process and methods for IBF

Methodological Framework of Impact-based Forecasting (IBF) and Warning Service
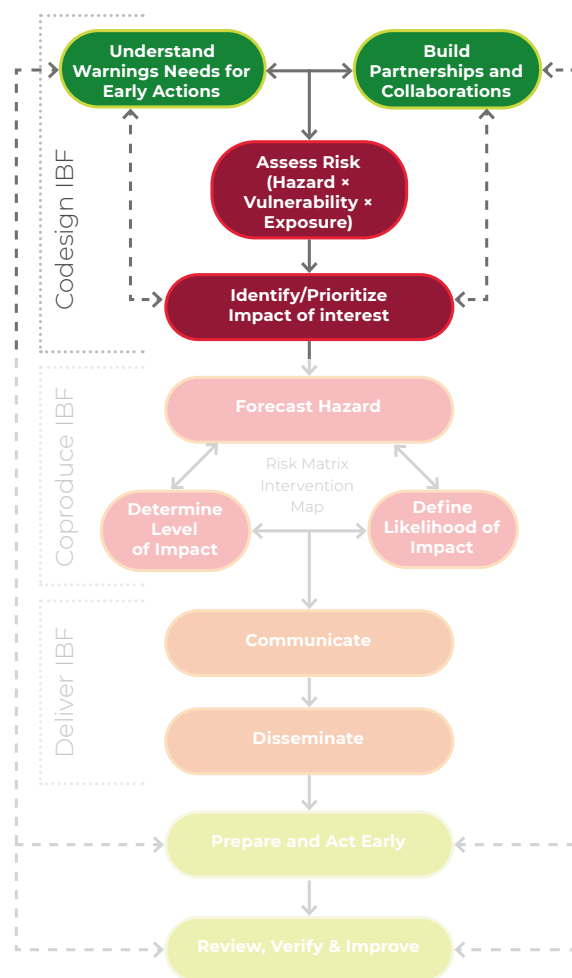
Effective IBF systems require collaboration between meteorologists, governments, humanitarian actors and communities. Show the visual on screen and walk participants through the framework step by step.

Step-by-Step explanation of the IBF framework

The framework is divided into **three phases**: **co-design**, co-produce, and **deliver**.

A. Co-design IBF

This phase ensures the system is user-centred, context-relevant and built through partnerships.

1. **Understand Warning Needs for Early Actions:** Engage stakeholders (e.g., disaster managers, communities) to understand what forecast information is needed to trigger action.
   · Who needs to receive early warnings in your context?
   · What types of early actions are most appropriate (e.g., evacuation, pre-positioning resources, awareness campaigns)?
   · What lead time is useful?
   · What actions can be taken?

2. **Build partnerships and collaborations:** A multi-sectoral strong collaboration is foundational for IBF success.
   · Which agencies or actors are currently involved in early warning and response?
   · Are there formal coordination mechanisms between meteorological services, disaster risk managers, humanitarian agencies and local actors?

3. **Assess Risk (hazard × vulnerability × exposure):** Integrate hazard data with vulnerability and exposure assessments to define **where and who** is at risk. (Explain that this section will be expanded in another module).
   · What are the main hazards affecting your area or country?
   · Which populations or sectors are most exposed and vulnerable to these hazards?

4. **Identify or prioritize impacts of interest:** Based on the risk profile, determine which impacts are most important to anticipate (e.g., flooding of schools, livestock loss).
   · What types of impacts are most critical for communities (e.g., displacement, food insecurity, health risks)?
   · Have these priority impacts been identified in collaboration with local stakeholders?

DAY 2:
MODULE 3:
Understanding risk and impacts
MODULE 4:
Building partnerships and collaboration

DAY 3:
MODULE 5:
Communication and dissemination
MODULE 6:
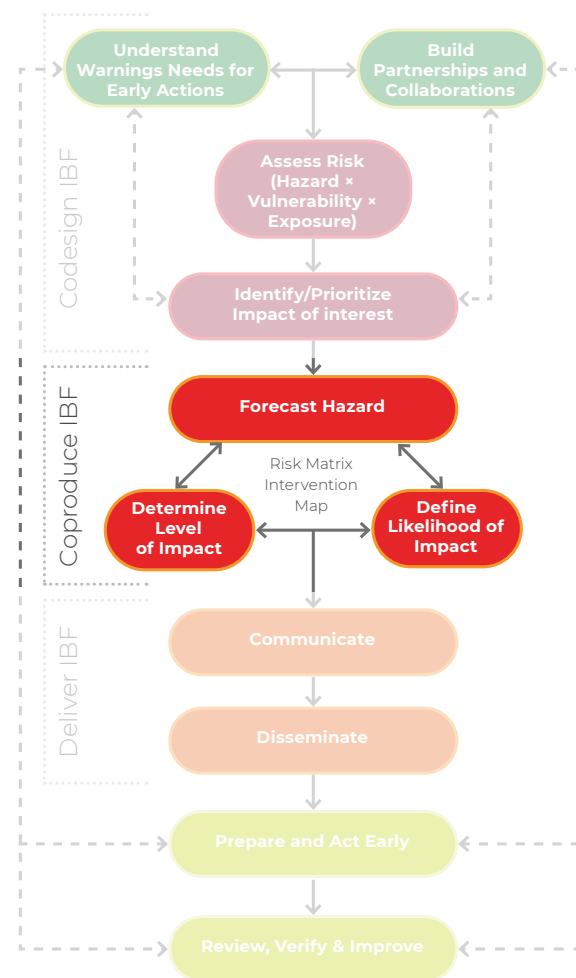Forecast verification – from prediction to learning
FINAL REFLECTIONS AND RESULTS

ANNEXES

Methodological Framework of Impact-based Forecasting (IBF) and Warning Service

B. Co-produce IBF

In this phase, forecast data is integrated with impact knowledge to generate actionable information.

5. **Forecast hazard:** Models to predict **when and where** a hazard might occur.
- What forecasting systems are currently in use for key hazards?
- Are forecasts accurate and localized enough to support timely early action?

6. **Risk matrix or intervention map**
- Do you use a risk matrix to assess the level of risk based on severity and likelihood?
- Are specific actions linked to different risk levels in an intervention plan or standard operating procedures (SOP)?

7. **Define likelihood of impact:** Estimate **how likely** it is that an impact will occur (e.g., "high likelihood of flooding in villages with poor drainage").
- How is the likelihood of the impact estimated?
- Is this likelihood information clearly communicated to decision-makers?

8. **Determine the level of impact:** Evaluate the **severity** of expected impacts using thresholds, impact tables or risk matrices. This helps to trigger early actions and interventions.
- How is the severity of potential impacts assessed (e.g., historical data, modelling, expert judgment)?
- Are social and economic factors considered in the impact assessment?

MODULE

1 /

Methodological Framework of Impact-based Forecasting (IBF) and Warning Service

C. Deliver IBF

This is the implementation stage translating forecasts into action.

9. **Communicate:** Develop clear, actionable messages tailored to different users (e.g., government, communities). (Explain this will further be developed in another module). Avoid jargon and use local languages and preferred formats.
   - What communication channels are used to share forecast and warning information (e.g., SMS, radio, social media)?
   - Are the messages tailored to the needs and understanding of different user groups?

10. **Disseminate:** Ensure that messages reach the right **people on time** through multiple channels (SMS, radio, meetings, etc.).
    - How quickly and effectively can warnings be disseminated to all levels, including at-risk communities?
    - Are there any barriers (technical, cultural or geographic) that limit access to warnings?

11. **Prepare and act early:** Based on forecasted impacts and thresholds, take anticipatory actions (e.g., pre-position supplies, evacuate livestock).
    - Are there predefined early actions that can be implemented when a warning is issued?
    - Are resources and funding available in advance to support early action?

12. **Review, verify and improve:** After the event, assess what worked, what did not, and update protocols and thresholds accordingly. This builds a feedback loop for continuous improvement.
    - After a hazard event, do you assess whether the forecast and early actions were effective?
    - How are lessons learned used to strengthen future IBF systems?

Group exercise or open panel discussion

At the end of the framework explanation, ask the participants as part of working groups by country to answer the following two questions: (if possible print the IBF process on large sheets so that participants can fill in the blank next to each section):

- Where Is your country in the IBF process? Participants explain if they have moved forward and implemented the process or not and what challenges and solutions they face. At this stage, they just set the general context analysis of the process which supports them in identifying where they stand and the progress that was made in developing and implementing IBF.

- What steps has your country already taken in implementing impact-based forecasting?

MODULE
1

Challenges and solutions:

Data and forecasting gaps, particularly in conflict-affected areas. For example, Syria currently lacks a functional national weather bulletin system, hindering timely warnings. In contrast, Yemen's joint risk analysis framework was presented as a promising solution, integrating anticipatory action into existing planning.

There is a strong call to integrate impact-based forecasting (IBF) into national policies and institutional frameworks to improve early-warning and response systems.

REAL-WORLD EXAMPLES FROM SIMILAR TRAININGS IN THE MENA REGION:

- **Iraq and Syria:** Climate-induced drought has driven significant rural-to-urban displacement. In Iraq, rising temperatures and water scarcity have impacted agricultural productivity and increased the vulnerability of farmers. Participants stressed the urgent need for national meteorological agencies and other relevant institutions to provide seasonal forecasts and conduct comprehensive risk assessments to inform anticipatory measures.
  In Syria, drought patterns before the 2011 conflict were identified as a contributing factor to the onset of the crisis. Both cases underscored the interconnectedness of climate risks, humanitarian needs and political fragility, highlighting the importance of early warning rooted in both environmental and socio-political contexts.

- **Yemen:** Some UN agencies such as UNFPA shared experiences with anticipatory action, including the use of pre-positioned stock and forecast-based risk analysis. While these efforts demonstrate the potential of IBF, participants also noted that securing timely and adequate funding remains a persistent challenge.

Slide 20:
UK Met initiatives in the region: Yemen and Syria

Explain some of the UK Met initiatives for Syria and Yemen that go beyond simply reporting weather conditions and highlight potential real-world impacts. For example, the Syria assessment outlines the likelihood of heavy rainfall, strong winds and dust storms, indicating where and when these might occur and how severe they may be. The assessments incorporate hazard maps, risk levels (low to moderate) and clear hazard criteria such as thresholds for rainfall, wind speed and visibility which help local decision-makers understand how these weather events could affect people, infrastructure, agriculture and mobility.

In the Yemen assessment, a similar approach is used to forecast localized heavy showers in mountainous areas, noting risks like flash flooding. By combining weather data with geographic and seasonal contexts, the reports help humanitarian actors prioritize areas of concern, guide early actions and communicate more effectively with communities. As part of IBF, these assessments support proactive planning, allowing responders to prepare for impacts before they occur, ultimately helping to reduce vulnerability and improve outcomes.

MODULE

2 UNDERSTANDING USER NEEDS

LEARNING OUTCOMES

- Identify and analyse stakeholders across the components of early-warning systems.

- Understand the different types of users who rely on impact-based forecasting (IBF) and their specific needs.

- Link forecast information to meaningful, timely decisions.

- Strengthen communication and coordination between technical and non-technical actors.

SESSION CONTENT

Each module includes instructions and explanations of the main themes and slides. The session content outlines the key messages and discussion points to be used as guidance. The following important slides are highlighted to help facilitators lead meaningful discussions and emphasize important content.

This module introduces and identifies stakeholders across the components of early-warning systems (risk knowledge, monitoring, response capacity, warning communication) and analyses diverse user needs for impact-based forecasting (IBF). Through structured exercises like hazard-specific stakeholder mapping using real examples (e.g., Palestine's cold wave response), participants learn to connect with stakeholders affected by forecasts, decision-makers and those who take action for at-risk groups.

MODULE 2/

## MAIN SLIDES EXPLANATION

Slide 3:
EW components

Start by explaining the four essential components of early-warning systems:

· **Risk knowledge:** Understanding risk through the analysis of hazards, exposure, vulnerability, and adaptive capacity.
· **Monitoring and forecasting:** Detecting, observing, and analysing hazards through meteorological and hydrological services.
· **Response capacity:** Enhancing the ability of institutions and communities to act effectively upon receiving a warning.
· **Warning communication:** Ensuring that risk information and warnings are delivered to the right people in a timely, understandable and actionable format.

A key focus of the session is to highlight the role of stakeholders, particularly those most affected in co-producing and implementing early-warning systems that enable anticipatory action.

Slide 5:
Analysing users and their needs
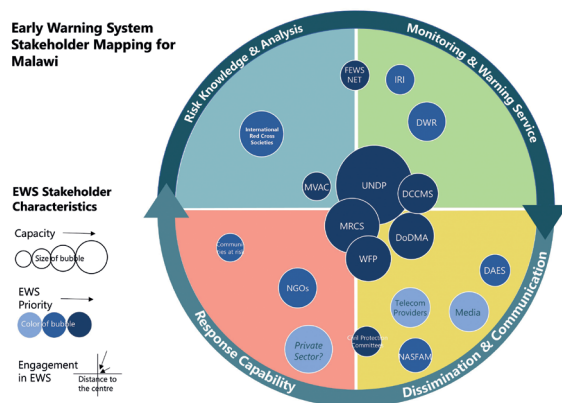
Guide the participants through a process to identify the relevant actors across each component of the early-warning chain. Use the example of Malawi, as per the figure from slide 5, to demonstrate how actors from national meteorological services to community leaders utilize forecasts to inform action.

Introduce a structured stakeholder-mapping exercise, adapted per hazard type and country context. The exercise should help participants identify:
· risks facing people in a given area
· the most at-risk groups and how best to protect them
· who should be involved in decision-making
· the specific roles and responsibilities of each actor.

MODULE 2

Slide 6:
Analysing users and their needs

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EXAMPLES FROM PALESTINE – HAZARD: COLD WAVE

1. Stakeholder mapping:
- **Vulnerable groups:** Farmers, rural communities, Bedouins, women, children, and elderly populations.
- **Forecast producers:** Meteorological offices, numerical weather prediction models, Ministry of Transport.
- **Needs:** Increase the number of weather stations and trained personnel; establish coordination mechanisms.
- **Challenges:** IBF is not prioritized due to the ongoing conflict.
- **Decision-makers:** Defence Council, Ministry of Agriculture, local governments, Ministry of Labor, Ministry of Health.
- **Needs:** Accurate and timely early warnings; inclusion of the Met Office in the national DRM crisis unit.
- **Challenges:** Bureaucracy, low community awareness and weak trust between ministries and communities.
- **Action-takers:** Department of Agricultural Guidance, INGOs (UN, Red Cross Red Crescent), media outlets, religious leaders, CBOs, municipal councils, hospitals or EMTs.
- **Needs:** Simplified, targeted messages and reliable communication channels.
- **Challenges:** Lack of co-production, difficulties in reaching last-mile users, and issues of trust.

This is an exercise for stakeholder-mapping and identifying user needs.
Conduct the exercise in two phases as follows:

Phase 1
- Choose one type of hazard by country.
- Identify the vulnerable groups.
- Personal reflection (2 min)
  Each participant reflects on who uses IBF in their context and what those users need.
- Group work (5 min)
  Teams list as many potential user groups of IBF as possible, placing them on sticky notes.
- Plenary presentation (3 min)
  One group presents their results, and others are invited to complement or expand.

Phase 2
In the same working groups, participants work in country teams to assess:
- the status of forecasting systems for key climate hazards (e.g., heatwaves, droughts, floods)
- the stakeholders that are most affected
- current gaps and needs
- opportunities for partnership and coordination.
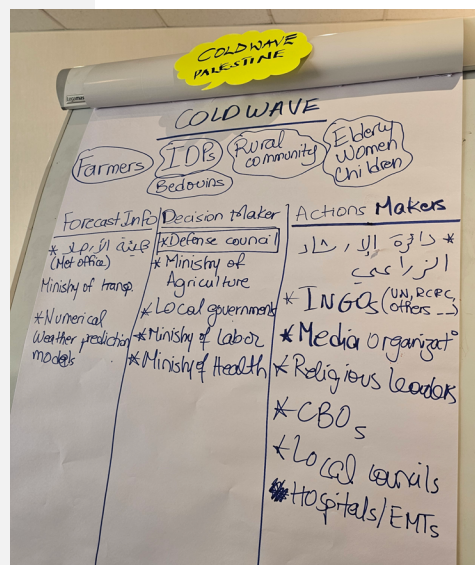
This hands-on approach enables participants to apply the concepts of IBF directly to their national contexts, fostering peer learning and practical insights into how to build inclusive early-warning systems.

This exercise emphasizes the importance of adapting forecasts to user needs.

This session is important to set the foundation for connecting technical forecasting with community-centred action. It also emphasizes the necessity of *co-production* – designing messages and systems alongside users rather than for them.

DAY 1

WRAP-UP:

CONGRATULATIONS! DAY 1 IS COMPLETED.

Facilitators should briefly recap the key topics covered, highlight any major insights or discussion points from the day and thank participants for their engagement.

Remind the group of the start time for day two and provide any relevant logistical details (e.g., materials to review, location, or online access). Optionally, invite participants to reflect on one takeaway or question they will be carrying into the next session.

DAY 1:

Introduction

MODULE 1:

Introduction to impact-based forecasting (IBF)

MODULE 2:

Understanding user needs

DAY 2:

MODULE 3:

Understanding risk and impacts

MODULE 4:

Building partnerships and collaboration

DAY 3:

MODULE 5:

Communication and dissemination

MODULE 6:

Forecast verification – from prediction to learning

FINAL REFLECTIONS AND RESULTS

ANNEXES

DAY 2 UNDERSTANDING RISK AND IMPACT, AND PARTNERSHIP AND COLLABORATION

PREPARATION AND SET-UP

- Have copies of all the module presentations (Module 3: Understanding Risk and impacts and Module 4: Partnerships and collaboration).

- Prepare the agenda (a template is shared under Annex 1).

- One icebreaker for the introductory reflection: circle, square, triangle.

- Prepare sticky notes for the start of the module.

- Prepare two flip charts (varies depending on the number of participants).

- 3 blunt pencils (that do not write at all), 1 pencil sharpener, 20-30 small pieces of paper (8x8cm or similar).

- Preparation and set-up

LEARNING REFLECTION

Reflection on Day 1: circle, square, triangle

Duration: 15 minutes
Format: Group panel reflective exercise

This activity is designed to recap and consolidate learning, identify unresolved questions and align expectations for the next sessions. (See Session Lab Exercise Overview for more details: https://www.sessionlab.com/methods/circle-square-triangle).

Instructions

1. Introduce the activity and explain the purpose:
   "We will use three simple symbols to help us reflect on what we have learned so far and what remains unclear."

2. Explain the meaning of each symbol:
   - **Triangle** ($\triangle$) – What are three key takeaways you can apply in your personal or professional life?
   - **Circle** ($\bigcirc$) – What is still going around in your head? What do you still not fully understand?
   - **Square** ($\square$) – What is "squared away"? What do you now clearly understand?

3. Invite participants to reflect and share:
   - They may share insights for all three symbols or choose at least one.
   - Sharing can be done in a panel format, in small groups or in plenary – depending on group size and time.

4. Facilitator tips:
   - Encourage participants to listen actively to one another.
   - Highlight common themes or unique insights as they emerge.
   - Emphasize the importance of turning circles into squares by:
     – following up on unclear topics
     – pointing participants to relevant resources or upcoming sessions that may provide clarity.

5. Close the reflection by reinforcing:
   - the value of diverse perspectives in shared learning
   - the importance of staying curious and collaborative.

MODULE

3 UNDERSTANDING RISK AND IMPACTS

LEARNING OUTCOMES

The session aims to enhance participants' understanding of the role of national and localized risk analysis in guiding anticipatory action and risk-informed decision-making. Specifically, the objectives include:

- identifying hazards

- describing methods to assess risk (hazard, vulnerability, and exposure)

- discussing tools and data sources for risk analysis

- identifying and interpreting impacts associated with hydrometeorological hazards and their potential impact.

SESSION CONTENT

This outlines the key messages and discussion points to guide the session. The following important slides are highlighted to help facilitators lead meaningful discussions and emphasize important content.

This module explains the foundations of impact-based forecasting (IBF) by guiding participants through understanding risk, impacts, and the value of anticipatory information. Through scenario-based exercises, participants explore the components of risk (hazard, exposure, vulnerability, coping capacity), learn how to trace cascading impacts of hazards like drought or floods, and examine how timely and targeted information enables early action. A hands-on scenario is applied where participants apply IBF principles to real-life contexts like heatwaves, highlighting localized impacts, early actions, and data needs.

MODULE 3

MAIN SLIDES EXPLANATION

Slide 3:
What would you like to know to act early:

Purpose: This exercise is designed to highlight to the participants the importance of risk information in enabling early action.

Scenario: Heavy rainfall is forecasted.

Discussion prompt:
"What would you want to know from the national weather service if heavy rainfall is forecasted, to help your community prepare and respond?"

Instructions:
- Encourage participants to reflect individually or in small groups.
- Capture responses on a flip chart or digital board.
- Examples might include:
  - How much rain is expected and over what time?
  - Which areas are most at risk?
  - What infrastructure or services might be affected?
  - How confident is the forecast?
  - What protective actions should be taken and by when?

Slide 4:
Why do you want to learn this?

Key message: This is where IBF becomes essential.

IBF shifts the focus:
- from: what the weather **will be** (e.g., "100mm of rain is expected")
- to: what the weather **will do** (e.g., "Flooding is expected to affect roads and homes in low-lying areas").

Why it matters: IBF provides actionable information **before** the disaster happens, enabling better decision-making, risk communication and timely early action.

Facilitator tip: Use this moment to connect back to participants' earlier responses and highlight how IBF answers the critical "so what?" questions behind weather forecasts.

MODULE 3

Slide 5:
What do you mean by impacts?

Objective: Introduce the four components of risk and how they inform impact-based forecasting (IBF).

Explain the four components of risk:
- Hazard: The physical event (e.g., drought, flood, heatwave)
- Exposure: Who or what is in harm's way (e.g., people, assets, infrastructure)
- Vulnerability: The susceptibility of people or systems to be harmed
- Coping Capacity: The ability to manage and recover from the hazard

Types of Impacts to Highlight:
- Forecasted hazard – e.g., heavy rainfall
- Cascading hazards – e.g., floods or landslides resulting from rainfall
- Primary impacts – e.g., property damage, crop loss
- Secondary impacts – e.g., displacement, food insecurity, disrupted livelihoods

Facilitator tip: Frame these elements as the building blocks of any risk assessment, and therefore critical to any anticipatory action or early-warning system.

Slide 6:
How to identify impacts?

Objective: Demonstrate how to unpack the impacts of a hazard using qualitative driver analysis.

Use visual diagram (flow chart for qualitative driver analysis) on slide 6 to show how we can unpack and trace the different impacts of a hazard. In this case, drought. Start with primary impacts like crop failure and water scarcity, which lead to secondary impacts such as food insecurity, malnutrition, and eventually increased mortality or migration.

Explain the color-coding used in this example:
- **Blue:** Hazard type
- **Yellow:** Primary impacts
- **White:** Secondary drivers
- **Red:** outcomes / humanitarian impacts

This is called a **qualitative driver analysis**. This visual tool helps to highlight the cause and effect and not just what happens, but why, and what to prioritize.

After presenting the slide, conduct a short group exercise:

MODULE

3

Group activity: Tracing impacts by hazard
Duration: ~25–30 minutes

Divide participants into 3 groups:
·   Group 1: Floods
·   Group 2: Droughts
·   Group 3: Sandstorms

Instructions:
1.   Start by identifying the main hazard.
2.   Use "Yes, and..." thinking: "Yes, this happens... and then what?"
3.   Map out primary and secondary impacts.
4.   Use arrows to connect causes and effects.
5.   Prioritize the most urgent, preventable or hardest-to-reverse impacts.

Facilitator notes:
·   Encourage systems thinking: how do factors interact?
·   Highlight real-world relevance: how this thinking supports anticipatory action planning and prioritization.

Slide 10:
Assessing risk

Key message:
"**Disaster happens at the intersection of hazard, exposure, vulnerability and capacity.**
All four must be assessed to determine the true risk."

Use a diagram or Venn diagram to visualize this intersection.

MODULE 3/

INDICATORS OF VULNERABILITY*

Questions for participants

What are indicators of vulnerability in your country?
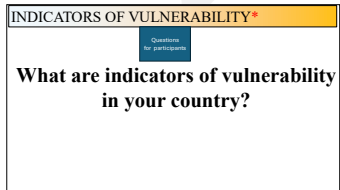
Slides 12-13-14:
Indicators of vulnerability, vulnerability and coping capacity

Discussion prompt:
What are the main indicators of vulnerability in your country or community?

Encourage open sharing from participants' lived experience and expertise:
· Consider age, disability, displacement, housing type, income level, etc.

Highlight sources of vulnerability data:
· Global datasets: INFORM Risk Index, Multidimensional Poverty Index (MPI), HDX
· National reports: government statistics, disaster risk assessments
· NGOs & academia: humanitarian needs assessments, research publications
· Community-based data: local knowledge, participatory assessments, stakeholder workshops.

Emphasize the value of do it yourself - DIY methods too, such as conducting community-level assessments and stakeholder workshops. Encourage participants to think critically about what sources they rely on, and how reliable or inclusive those sources are.

Critical considerations:
· data availability vs. accessibility: some data exist but may not be shared between ministries or agencies due to sensitivity of information sharing
· the need for dynamic data: especially for displaced populations, accessibility, or seasonal vulnerabilities
· value of historical data to define impact thresholds: global indices such as the INFORM Risk Index and Multidimensional Poverty Index (MPI) can help support risk analysis. Incorporating risk assessments distinguishes IBF from traditional forecasts and warnings
· importance of validating local thresholds through participatory methods.

Key session highlights:
· Integrating vulnerability and capacity data is what **distinguishes IBF** from traditional early-warning systems that only focus on the hazard.
· The importance of historical data to define thresholds.
· The need for dynamic vulnerability data (e.g., on displaced populations or accessibility needs, as in Yemen).
· The value of participatory methods to validate local hazard thresholds.

MODULE 3

Slides 15-16:
Risk mapping high/low tech and vulnerability and coping capacity:

Risk mapping can be approached in diverse ways, these included:
- **Low-tech tools:** Community-based hand-drawn risk maps from vulnerability and capacity assessments (VCAs); like the one in Buzi, Mozambique.
- **High-tech tools:** Hazard, vulnerability, and capacity overlays (limited by data availability) high-tech visualizations of composite risk indices, as seen in Malawi.

A critical takeaway is that the selection of indicators and their weights must be validated by experts to ensure accuracy and relevance in risk assessment. Together, these slides showcase the flexibility and expert-driven nature of effective vulnerability and risk mapping.

Slides 18:
UK experience with vulnerability data

Emphasizes the importance of localized and dynamic vulnerability data, as demonstrated by the UK MET's work in Pakistan's agricultural sector. This underscores that effective forecast services must adapt to the ever-changing nature of local vulnerabilities to be truly impactful.

Handson exercise: heatwave scenario

Divide the participants into country teams and task them with responding to a hypothetical heatwave. Ask them to:
- identify vulnerable populations (e.g., the elderly, children, displaced groups, outdoor labourers);
- choose one affected individual (e.g., a farmer) and reflect on what they feel, think, and fear;
- identify primary and secondary impacts on that individual;
- define early actions (e.g., distribution of water and protective gear, health messaging, livestock protection);
- discuss data needs (e.g., meteorological trends, displacement statistics, access to public health services).

MODULE 3

Kifah: Empathy Mapping

(photo generated using AI)

DAY 1:
Introduction
MODULE 1:
Introduction to impact-based forecasting (IBF)
MODULE 2:
Understanding user needs

DAY 2:
MODULE 3:
Understanding risk and impacts
MODULE 4:
Building partnerships and collaboration
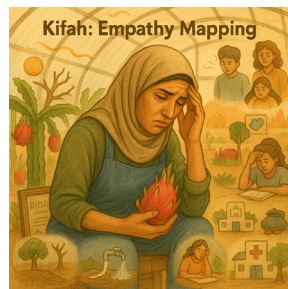
DAY 3:
MODULE 5:
Communication and dissemination
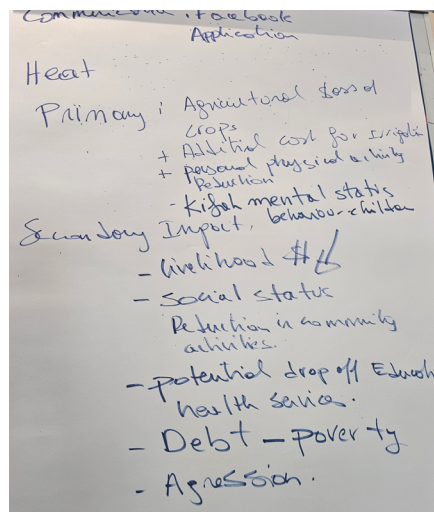**MODULE 6:**
Forecast verification – from prediction to learning
FINAL REFLECTIONS AND RESULTS

ANNEXES

Example of Kifah case from Palestine:

Kifah, a 26-year-old woman, is the head of a five-person household. Although she holds a university degree, she has been unemployed for more than two years. With support from the **Palestinian Agricultural Relief Committees (PARC)**, she established a one-dunum greenhouse where she grows dragon fruit – now her main source of income.
She takes pride in her work but feels the heavy burden of responsibility. She is increasingly anxious about the future, particularly the rising threat of extreme heat events that could jeopardize her livelihood.

Empathy mapping revealed that Kifah feels proud yet stressed and fearful. She constantly worries about her family's wellbeing and the risk of crop loss. Her actions are shaped by this anxiety, as she strives to maintain production under difficult conditions.

Primary impacts of a heatwave:
- agricultural losses;
- increased irrigation costs;
- reduced physical activity due to heat;
- deteriorating mental health from stress.

Secondary impacts may include:
- reduced investment in her children's education;
- less engagement in community activities;
- inability to afford essential health services;
- potential debt accumulation.

These pressures may affect her behaviour at home, possibly leading to tension or social withdrawal, further reinforcing a cycle of poverty and isolation.

Common challenges:
- lack of real-time sub-national vulnerability data
- weak coordination between ministries and humanitarian partners
- formal protocols linking risk levels to early action

MODULE

4 BUILDING PARTNERSHIPS AND COLLABORATION

LEARNING OUTCOMES

- Summarize the importance of working in partnership for the development, implementation and sustainability of an IBF service.

- Identify common engagement strategies and challenges in fostering collaboration across stakeholders, with emphasis on co-production processes.

- Reflect on the role of media and local actors in effective early-warning communication and community engagement.

SESSION CONTENT

This outlines the key messages and discussion points that guide the session. The following important slides are highlighted to help facilitators lead meaningful discussions and emphasize important content.

This module highlights the importance of partnerships and co-production in developing effective impact-based forecasting (IBF) systems, using interactive activities like the "sharpener, blunt pencil, and paper" game to highlight interdependence and collaboration. Participants reflect on stakeholder roles, challenges (e.g., funding gaps, coordination, turnover) and opportunities for strengthening IBF through sustained partnerships including with the media, which plays a critical role in ensuring risk communication is timely, localized, and trusted.

MODULE

DAY 1:
Introduction
MODULE 1:
Introduction to impact-based forecasting (IBF)
MODULE 2:
Understanding user needs

DAY 2:
MODULE 3:
Understanding risk and impacts
MODULE 4:
Building partnerships and collaboration

DAY 3:
MODULE 5:
Communication and dissemination
MODULE 6:
Forecast verification – from prediction to learning
FINAL REFLECTIONS AND RESULTS

ANNEXES

MAIN SLIDES EXPLANATION

Slide 2:
Learning objectives

LEARNING OBJECTIVES
- Summarise the importance of working in partnership for the development, implementation, and future success, of an IBF service.
- Guide participants to describe common engagement strategies used for collaboration between stakeholders, facilitating the co-development, and implementation, of an IBF service.

NOTE:
Do not interfere with group negotiations. During reflection, highlight assumptions participants may have made such as the idea that there would be a single winner, or that the group with the most cards would win. *There is no winner in this game.*

The team will reflect on the challenges of climate negotiations using two games: a negotiation game and the "sharpener, blunt pencil, and paper" game.

Sharpener, blunt pencil, and paper game

Objective: Illustrate interdependence in partnerships and co-production.
Instructions:
- Divide participants into three groups:
  - Group A receives a blunt pencil (one that cannot write)
  - Group B receives a sharpener
  - Group C receives paper.
- Task: Collaboratively write as many relevant words as possible about IBF on the paper.

Reflection:
- This activity visually demonstrates that no group can complete the task alone. Participants will realize that they have to negotiate and partner with each other to achieve the objective.
- It emphasizes the importance of collaboration, resource-sharing and co-production in creating effective IBF systems.

Materials needed:
- 3 blunt pencils (non-functional)
- 1 pencil sharpener
- 20–30 small pieces of paper (approx. 8x8 cm)

Slide 3:
Co-production approach to IBF

Co-production is a collaborative process where users and producers of weather and climate information jointly develop services that are tailored, relevant and actionable. It ensures that IBF services are grounded in the needs and realities of end users.

Key questions:
- Who are the end users?
- What information do they need?
- When and how can they act on it?

Figure 1: Future Climate for Africa

MODULE 4

Slides 5 and 6:
Challenges and opportunities for successful IBF partnerships

Based on the previous stakeholder discussions, including the country or group exercises, provide participants with **15 minutes** to work in groups to address **challenges** of partnership in the following three main pillars:
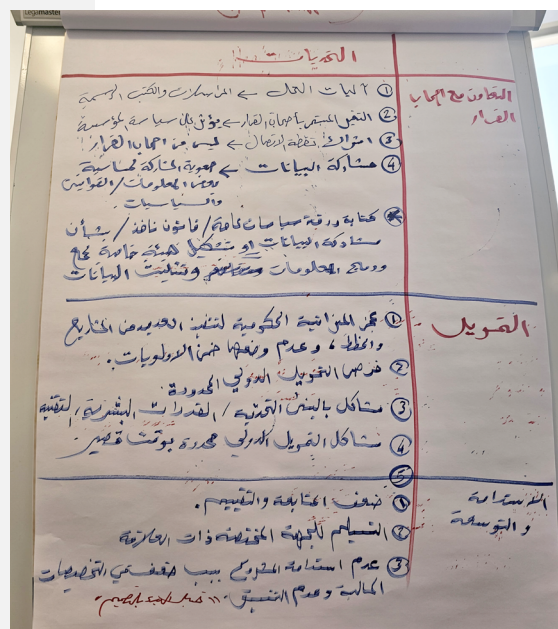
· stakeholder engagement and collaboration
· funding mechanisms and sustainability
· sustainability and scaling up IBF.

Then, allocate another **15 minutes** for participants to identify and discuss the **opportunities** under each of these three pillars.

Later in the workshop, participants can further develop the country-specific sheets by identifying:

· the lead agency responsible for each action
· a proposed timeline
· the level of priority.

(Refer to Annex 2: IBF fact sheet and way forward by country – example).

HERE ARE SOME EXAMPLES FROM A SIMILAR TRAINING:

Key themes

· **Funding and sustainability:** Many actors reported heavy reliance on short-term, project-based humanitarian funding, limiting operational continuity, staffing and scaling efforts. There is a notable lack of core financing and institutional support for long-term services.

· **Stakeholder turnover:** High turnover among key concerned stakeholders such as public institutions and academia disrupts continuity.

· **Coordination and strategy:** While structural coordination may exist, actual implementation often suffers from fragmentation, competition among agencies and no protocols for data sharing. A proposed solution was to establish a **national platform for coordination and data sharing**.

· **Forecast verification and trust:** Forecast quality and public communication emerged as pressing issues. Participants noted: "We don't communicate the skill of the forecast, just the forecast itself," leading to community mistrust. Verification and integrating ground-truthing with remote sensing were flagged as priorities.

MODULE 4

Slide 7:
Summary

As part of the summary, also highlight the role of media
Media organizations are crucial partners in early-warning systems. Please highlight the following important and additional points:

- **Early involvement:** The media should be involved from the start of hazard identification and risk communication to ensure clarity and reach.
- **Understanding audience needs:** They help design "lifeline programming" by researching communication channels and audience behaviours - especially in crises like conflict or flooding.
- **Adaptation to context:** Media strategies must be tailored to the realities on the ground. For example, television alerts are ineffective where electricity or access is lacking.
- **Continuous engagement:** Collaboration with the media should start on day one and remain integral to the early-warning system.

DAY 3 COMMUNICATION AND DISSEMINATION AND REVIEW AND VERIFICATION OF IBF

PREPARATION AND SET-UP

- Have copies of all the module presentations (Module 5: Communication and dissemination and Module 6: Review and dissemination).

- Prepare the agenda (a template is shared under Annex 1).

- One icebreaker for the introductory reflection.

- Prepare sticky notes for the start of the module.

- Prepare two flip charts (varies depending on the number of participants).

LEARNING REFLECTION

W³: what, so what, now what?
Goal: Together, look back on progress to date and decide what adjustments are needed
(See Session Lab Exercise Overview for more details: https://www.sessionlab.com/methods/w-what-so-what-now-what).

Materials
- Flipchart and papers
- Taking object (can be anything you are able to pass from one person to another)

Instructions
Five structural elements
1. **Structuring invitation**
- After a shared experience, ask "WHAT? What happened? What did you notice? What facts or observations stood out?"
Then, after all the salient observations have been collected, ask "SO WHAT? Why is that important?
What patterns or conclusions are emerging? What hypotheses can you make?"
Then, after the sense making is over, ask "NOW WHAT? What actions make sense?"
2. **How space is arranged and materials needed**
- Unlimited number of groups.
- Chairs for people to sit in small groups of 5-7; small tables are optional.
- Paper to make lists.
- Flip chart may be needed with a large group to collect answers.
- Talking object * (optional).

3. **How participation is distributed**
- Everyone is included.
- Everyone has an equal opportunity to contribute at each table.
- Small groups are more likely to give voice to everyone if one person facilitates and keeps everybody working on one question at a time.

4. How groups are configured

- Individuals.
- Groups of 5-7.
- Whole group.
- Groups can be established as teams or mixed groups.

5. Sequence of steps and time allocation

- First stage: WHAT? Individuals work for one minute alone on "What happened? What did you notice? What facts or observations stood out?" Then they work for 2–7 minutes in small groups. Total: 3–8 minutes.
- Second stage: SO WHAT? People work for one minute on "Why is that important? What patterns or conclusions are emerging? What hypotheses can I (we) make?" Then they work for 2–7 minutes in small groups. Total: 3–8 minutes.
- Salient patterns, hypotheses and conclusions from small groups are shared with the whole group and collected. Total: 2–5 minutes.
- Third stage: NOW WHAT? Participants work for one minute alone on "Now what? What actions make sense?" Then they work for 2–7 minutes in small groups. Total: 3–8 minutes.
- Actions are shared with the whole group, discussed and collected. Additional insights are invited. Total: 2–10 minutes.

Tips and traps

- Practice, practice, practice ... then the *"what, so what, now what?"* exercise will feel like breathing.
- Check with small groups to clarify appropriate answers to each question (some groups get confused about what fits in each category) and share examples of answers with the whole group if needed.
- When sharing with the whole group, collect one important answer at a time. Don't try to collect answers from each group or invite a long repetitive list from a single group. Seek out unique answers that are full of meaning.
- Don't jump over the "so what?" stage too quickly. It can be challenging for people to link observations directly to patterns. It is the most difficult of the three "whats". Use the ladder of inference as a reminder of the logical steps "up the ladder" from observations to action.
- Appreciate candid feedback and recognize it.
- Build in time for the debrief—don't trivialize it, don't rush it.
- Make it the norm to debrief based on the W3 approach, however quickly, at the end of everything.

MODULE 5
COMMUNICATION AND DISSEMINATION

LEARNING OUTCOMES

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

- describe strategies for effective communication and dissemination of impact-based forecasts and warnings

- recognize good practices in the communication of impact-based forecast and warning information

- explain the importance of agreeing on communication methods—including language, tone and format – among all producers and users of forecast and warning messages.

SESSION CONTENT

This document outlines the key messages and discussion points that guide the session. It includes explanations for each slide, as well as additional sessions and activities that take place beyond the slide content to support deeper discussion and learning.

This module prosents the participants with an approach to design and deliver actionable early-warning communication across diverse channels (e.g., SMS, radio, social media) for specific at-risk populations (e.g., farmers, displaced people), translating technical forecasts into clear instructions on what is happening, what it means and what to do by when. Through interactive exercises, country examples and a BBC Media Action case study, participants explore how to design effective risk communication messages.

MODULE 5

MAIN SLIDES EXPLANATION

Slide 2:
IBF for AA summary

The IBF framework: three key pillars
Over the past sessions, we have explored the foundational pillars of impact-based forecasting (IBF):
1. **Partnerships:** Aligning roles, responsibilities and collaboration across actors.
2. **Data and analytics:** Using forecasts, risk information and impact data to inform decisions.
3. **Communication:** Ensuring that forecast messages are timely, clear and actionable for diverse users.

Why it matters: from forecast to early action
Impact-based forecasting enables **anticipatory action (AA)** – the activation of pre-agreed interventions before a disaster strikes. This approach is critical because it:
· **saves lives and resources:** early action is more cost-effective than post-disaster response
· **builds resilience:** protecting livelihoods and infrastructure helps communities bounce back faster
· **is data-driven:** combines forecasts with vulnerability and exposure data to prioritize who, where, and when to act.

By integrating IBF into AA planning, we turn uncertainty into opportunity – empowering communities to act before a crisis escalates.

Participant reflection
Before diving into today's session, let us take a moment to reflect.
"What key insights or takeaways stood out to you from the past two days? What themes or concepts resonated most?"

You may invite 3–5 quick reflections in plenary or ask participants to turn to a neighbour to share highlights. Capture a few responses on a flipchart or whiteboard to reinforce collective learning and create continuity across the training.

MODULE 5

Slide 7:
Communicating risk and uncertainty

Hazard Likelihood		Minimal	Minor	Significant	Severe
	High	🟩	🟨	🟧	🟥
	Medium	🟩	🟨	🟧	🟧
	Low	🟩	🟩	🟨	🟧
	Very Low	🟩	🟩	🟨	🟨
		Minimal	**Minor**	**Significant**	**Severe**
		Impact magnitude			

Impact-based forecasting (IBF) combines hazard likelihood with the potential impact to guide early action. Use this slide to explain how a risk matrix helps us communicate both the potential impacts of weather-related hazards and the uncertainty around them. Emphasize that the matrix is not just a technical tool, but a **practical decision-making aid** that supports early and informed action.

Key components:
- **Hazard likelihood (probability)** – the chance of a specific weather event occurring (e.g., 80 per cent probability of heavy rainfall).
- **Impact** – assesses the potential consequences based on exposure and vulnerability.

Impacts are classified as:
Minor: Localized effects (e.g., minor crop damage)
Significant: Wider disruption (e.g., displacement of households)
Severe: Critical outcomes (e.g., risk to life, infrastructure collapse)

Slide 9:
UKMO perspective NHMS

Invite participants to share how they currently handle and communicate uncertainty in their systems. Ask them: *"How would you like to receive a warning if you were the end user?"*, *"Who else needs to know right away?"* or *"Have you experienced any breakdowns in this process before?"* This helps ground the discussion in real-world experience while highlighting the importance of clear, timely and trust-based communication.

MODULE
5

Communication exercise
Session 10:45 – 12:00 (Role-play based on risk assessment and IBF products)

Instructions
Following the hazard and empathy mapping exercise, each team or country is requested to develop an impact-based warning for a simulated flood, including visual alerts, SMS messages and social media posts.

Objective
Each country team will design an impact-based early-warning message for a simulated flood scenario. The goal is to translate risk information into actionable, audience-specific messages that can be communicated through different channels.

Your Task (per country/team)
Develop an early-warning message package that includes the following:
· visual alert (infographic or poster)
· SMS message
· social media post (e.g., Facebook or Twitter).

Key questions to guide your message design:
· Who is at risk? (farmers, displaced people, elderly, children, etc.)
· What will happen? (flooding, crop damage, road disruption)
· What should people do? (evacuate, protect assets, stay informed)
· Which channels are most trusted and used locally?

REAL COUNTRY **EXAMPLES** TO INSPIRE YOU

Palestine
· Focused on heatwaves: *"Stay out of the sun after 13:00, drink water, increase watering for dragon fruit, cover plastic greenhouses, follow agri-guidelines."*
· Channel: Local radio, SMS, agriculture extension groups.
Iraq
· Proposed **SMS alert chain** through agricultural unions:
"Heavy rain forecasted. Secure crops and machinery. Check irrigation drainage. Contact agri office if waterlogging risk is high."
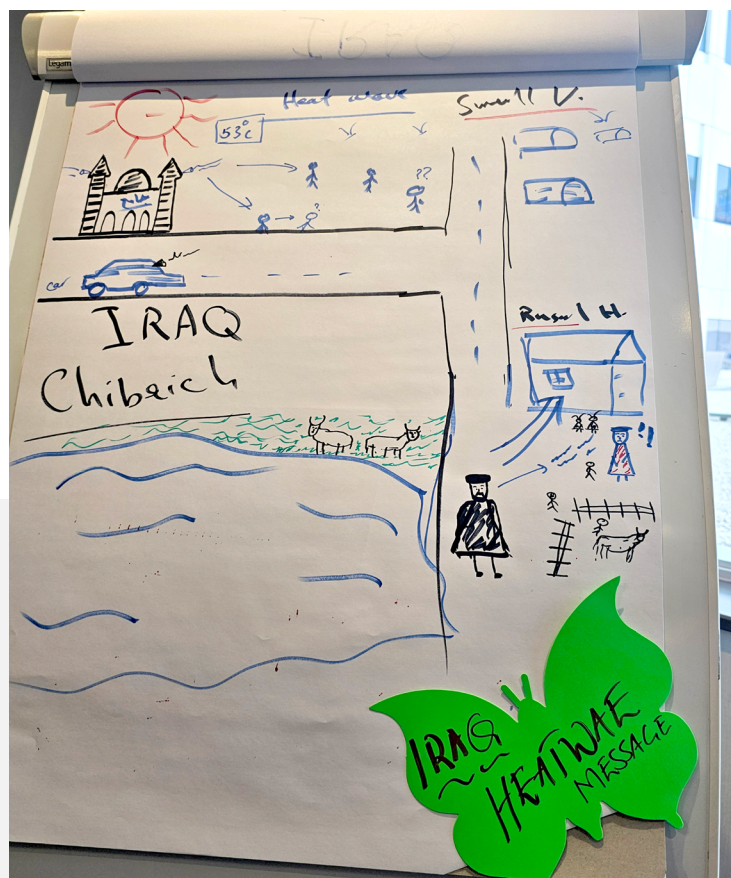
MODULE 5

BBC MEDIA ACTION CASE STUDY

Slide 11-18:
BBC Media Action case study: communication for development (C4D) in anticipatory action

Play the WISER MENA x BBC Media Action: communication for development (C4D) in anticipatory action video: "WISER MENA – early warnings for all" by BBC Media Action.

This case study showcases how **C4D** strengthens early-warning systems by making forecasts **understandable, accessible and actionable**. It highlights BBC Media Action's people-centred approach to co-producing media content that is timely, trusted and rooted in local realities.

The slides illustrate:

· **C4D**: Community-driven, evidence-based, and focused on outcomes.

· **SBCC**: Tackles behaviour and social norms through targeted strategies.

· **Lifeline communication**: Prepares media actors and content creators to respond fast and effectively when a forecast is triggered.

Example: In Algeria, BBC Media Action used inclusive language, trusted messengers and local media to improve access to climate information.

MODULE 5

Slide 21:

Action plan to identify stakeholders' needs, challenges and opportunities in IBF for the MENA region (groupwork)

Instructions:

Explain to the participants how to develop an impact-based forecasting action plan using the table format below. The goal is to consolidate the ideas and discussions from previous sessions on stakeholder collaboration, communication, funding and sustainability into a practical, prioritized action matrix.

Start by reminding participants that this exercise builds directly on their earlier group work and discussions (especially those on challenges and opportunities in partnerships, community engagement and media collaboration). Ask them to revisit their inputs and organise them under four key domains:
1. stakeholder engagement and collaboration (including data)
2. communication and dissemination
3. funding
4. sustainability and scaling-up

For each domain, they will fill in six columns:
- Gaps/Challenges: What barriers or problems currently exist in this area?
- Assets/Opportunities: What strengths or existing resources can be leveraged?
- Required actions: What practical steps or interventions are needed to address the gap?
- Responsible: Who will lead or coordinate the action (agency or actor)?
- Timeline: When can the action be realistically implemented?
- Priority level: Is this a high, medium or low priority for the country?

Encourage teams to be specific and realistic. Remind them of the earlier example shared in the workshop where some countries identified the lack of coordination platforms or forecast verification systems as key challenges, while others highlighted active media partners or local NGO networks as opportunities.

Finally, let them know that these action plans can serve as a starting point for coordination with donors, national platforms or regional support mechanisms. They are not meant to be perfect or final, but they should reflect collective thinking and help shape what comes next.

You will find a sample of a briefly filled in template in Annex 2.

Domain	Gaps/ challenges	Assets/ Opportunities	Required Action	Responsible	Timeline	Priority level
Stakeholder engagement and collaboration (including on data)						
Communication and dissemination						
Funding						
Sustainability and scaling up						

MODULE

6

FORECAST VERIFICATION – FROM PREDICTION TO LEARNING

(ANNEX MODULE 6: REVIEW AND VERIFICATION OF IBF SERVICES)

LEARNING OUTCOMES

- Describe the purpose and process of forecast verification.

- Identify methods to verify forecast quality and user relevance.

- Understand how verification supports iterative improvement and service value.

- Appreciate the role of communication in shaping forecast usefulness.

SESSION CONTENT

This module presents the forecast verification as a critical component within IBF for assessing the accuracy and value of forecasts by comparing them to observed outcomes, both meteorological and impact-based. It emphasizes that verification serves operational, scientific, economic, and institutional goals resulting in enhancing model performance, informing user decisions, and building trust, accountability and shared learning through co-production with end users.

MODULE

MAIN SLIDES EXPLANATION

Slide 4:

What do you think verification means?

Introduction and importance of verification

Begin with an interactive activity to engage participants, centred around the word "*verify*" – described as "a particularly powerful" concept in forecasting. Highlight that verification enables agencies to measure how close the forecast was to reality and whether predicted events occurred, ultimately improving accountability and system quality. Present the following definition:

- Forecast verification is the process of assessing the accuracy of forecasts by comparing them to relevant observations. What these observations are will vary depending on the hazard being forecast and the type of forecast i.e. traditional threshold or impact-based.

Slide 6:

Why do we need to verify?

Introduce verification as a core element of forecast learning, administrative, serving scientific, operational, and economic purposes. Explain **why verification matters**:

- **operationally**, it helps monitor model performance and justify improvements
- **scientifically**, it allows assessment of which models performed better under which conditions
- **economically**, it links forecast accuracy to the effectiveness and efficiency of user decisions
- **institutionally**, it supports transparency, justifies funding and builds trust with stakeholders
  "Verification helps to evidence the value of the service and the work that has gone into it."

Explain that verification supports in 'improving the overall forecast process, right through from the science and the NWP models, understanding of output strengths and weaknesses as well as the forecasters' own perception of the behaviour of the weather, to the value we can offer to stakeholders and users, and their experience of the forecast output we transmit.

Provide an example that verification:

- Can also then be used to provide more detailed information about forecast quality, which is often what our customers want to know about. E.g.;
  - What went wrong? What went right?
  - How can the forecast be improved?
  - How do two forecasts differ from each other, and in what ways is one better or worse than the other?

MODULE

6

Slide 8, 9, 10 and 11:
Example of observed and forecast
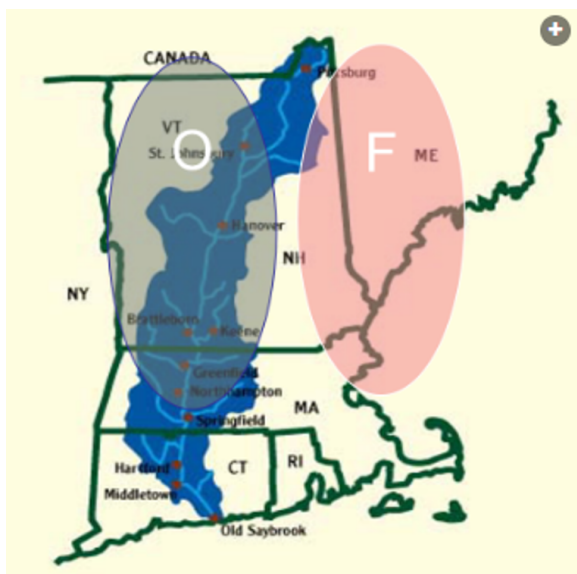
User-centred verification
Ask the participants to vote for good or bad. You may want to say the watershed is the area in blue! Then explain in slide 11 why it is a bad forecast.

The point of this graphic is to show that the same forecast, for different types of users, will be perceived very differently.
Slides 8 and 9: For the watershed manager, this is a bad forecast because nearly all the observed rainfall fell in the catchment. Had it come after water shortage, they would have been happy to have some rain.

Slides 10 and 11: For the pilot, it is actually quite good. It highlights the importance of understanding your users and their decision-making.

- The value of a forecast is not only in its meteorological accuracy, but also in whether it l*ed to the right decision for the user.*

- Example: A rainfall forecast may be accurate, but if not relevant to a water manager's specific catchment, its value is diminished.

- Impact-based verification asks, *"Did the forecast result in timely, informed action?"* "The forecast is only as good as your communication."

Explain the verification cycle
- Verification should be integrated as part of the co-production and service improvement cycle.
- It supports iteration: learning from both successes and failures.
- Ideally, verification should be done after the hazard event, although delays in collecting impact data can pose challenges.

MODULE 6

Slide 13:

What do we need to verify as part of an impact-based forecast (IBF) service?

Introduce this slide by explaining that verifying an IBF service goes beyond checking if the weather forecast occurred. It is about assessing whether the entire system worked effectively. Ask participants to take five minutes in groups to discuss the following:

- What do we need to verify in an IBF service?
- Invite each group to share one or two ideas.
- Key areas to highlight include: whether the forecasted weather happened (objective).
- Whether the expected impacts occurred (more subjective).
- What actions did people take in response?
- How well was the forecast communicated, and did it actually reach those at risk?
- Remind participants that understanding these elements helps improve future forecasts, communication and decision-making.

Slide 14:

What different sources of information might we use to help verify an impact-based forecast?

Ask the participants to take five minutes to discuss:
What different sources might we use to gather verification or feedback on a forecast?
After the discussion, invite each group to share a couple of ideas. Emphasize that sources can include both technical and community-based inputs such as:
- data from observation networks (e.g., weather stations, satellite imagery)
- feedback from stakeholders
- post-event public surveys
- reports from NGOs or INGOs
- media coverage, social media activity
- and even informal channels like friends and family.

The goal is to collect a broad range of perspectives to understand not only what happened, but how forecasts were received, understood and acted upon.

MODULE

6

Slide 15:

When should a forecast be verified?

Help participants understand that verification is not just a post-event task. It should happen at multiple points throughout the forecast lifecycle.

- Verification can start before a forecast becomes valid. For instance, if new data or model runs suggest a different outcome, the forecast or warning should be updated or even cancelled.
- Monitoring during the event is a form of real-time verification. If observed impacts don't match the forecast, this feedback should trigger updated communications or new warnings.
- Post-event verification remains crucial for learning. Reviewing whether the weather, impacts, communication and responses aligned helps improve future forecasts and decision-making.

Slide 16:

What do we need to be careful of when conducting verification?

Emphasize that challenges include the accuracy and reliability of observation data, especially when using informal or crowd-sourced inputs. Personal accounts, while valuable, can be subjective and emotionally influenced, and might not always align with broader-scale impacts. The scale of the event also matters if a severe impact was experienced by one person or a small area. It is still important, but the forecast may not have been expected to capture such fine detail. Also, timing is crucial. Many impacts may not be reported in real-time, which affects our ability to update forecasts during an event. Lastly, highlight the role of perception. People may exaggerate impacts based on personal experience, and we need to think about how to correlate and standardize this information, so it informs future improvements without skewing our overall assessment.

KEY TAKEAWAYS

- Forecast verification is essential for service credibility, funding justification and continuous improvement.
- It must include both technical accuracy and user relevance.
- Verification is not just retrospective. It informs future design, thresholds and communication strategies.
- Co-producing verification practices with end users (e.g., disaster managers, community leaders) ensures shared learning and enhanced impact.

FINAL REFLECTIONS AND RESULTS

In the closing session, invite the participants to reflect on the key takeaways and concrete actions they will pursue in their countries. This can include:

· **enhanced technical understanding** of IBF and anticipatory action across 30+ participants from the MENA region.

· **country-specific action plans** initiated for IBF integration at the national level

· **tools developed and tested:** hazard-threshold matrices, stakeholder maps, community message prototypes and risk scenario analyses.

· **peer-to-peer learning:** Strengthened regional networks and opportunities for cross-border collaboration.

Moving forward, the success of IBF will depend on sustained political commitment, data-sharing across institutions and meaningful engagement with at-risk communities. This workshop lays the foundation for a more proactive, collaborative and inclusive model of climate risk management in the MENA region.

ANNEXES

ANNEX 1: TRAINING AGENDA

IMPACT-BASED FORECASTING TRAINING OF TRAINERS
XXXX (PLACE) – DATE

Day 1: Foundations of impact-based forecasting (IBF) and anticipatory action

Time	Session
8:30 – 9:00	Arrival and registration
9:00 – 9:30	Welcome and introduction
9:30 – 10:00	Icebreaker and participant introductions and expectations
10:00 – 11:00	Module 1a: Introduction to impact-based forecasting (IBF) and AA, benefits and linkages
11:00 – 11:30	Break
11:30 – 12:30	Module 1b: Understanding stakeholders in IBF and AA
12:30 – 13:30	*Exercise*: Mapping stakeholders and needs (country)
13:30 – 14:30	Lunch break
14:30 – 15:30	Presentation of group work (Sample 3 countries)
15:30- 16:00	Wrap-up

Day 2: Risk and impact assessment, and production of IBF products

Time	Session
8:30 – 9:00	Recap and introduction to Day 2
9:00 – 10:30	Module 2a: Introduction to risk and impact assessment
	Risk assessment tools and methods
10:30 – 10:45	Break
10:45 – 12:15	Module 2b: Partnership and collaboration in IBF
12:15 – 13:00	Module 3: Co-Production of IBF products UK MET
	Case studies on IBF production
13:00 – 14:00	Lunch break
14:00 – 15:30	*Group work* on risk assessment scenario risk assessment
15:30 – 16:00	Wrap-up

Day 3: Communication, dissemination, and review of IBF services

Time	Session
8:30 – 9:00	Recap and introduction to Day 3
9:00 – 10:30	Module 4: Communication and dissemination of IBF
10:30 – 10:45	Break
10:45 – 12:00	Module 4: Communication exercise (role-play based on risk assessment and IBF products)
12:00 – 13:00	Module 4: *Action plan* to identify stakeholders' needs, challenges and opportunities in IBF for the MENA (Group)
13:00 – 14:00	Lunch break
14:00 – 14:30	Module 5: Review and verification of IBF services
14:30 – 15:30	*Plenary session* on action plan way forward
15:30 – 16:00	Evaluation and wrap-up

ANNEX 2: IBF FACT SHEET AND WAY FORWARD EXAMPLE

Domain	Gaps/ challenges	Assets/ Opportunities	Required Action	Responsible	Timeline	Priority level
Stakeholder engagement and collaboration (including on data)	Bureaucracy necessitating official communication for sharing of information and data Change in focal points Sharing of data base Legal process	Productive partnerships. Establishment of an information hub. Highlighting the importance and benefits of IBF and AA.	Establish formal agreements and MoUs for data sharing; organize regular multi-stakeholder meetings	Ministry of Environment, Ministry of Water Resources, MoT, UN agencies and Local G.	8 Months	High
Communication and dissemination	Trust in official media. Lack of access to information channel. The difference between the message dissemination and targeted community.	Localized trusted communication channels. Clear and comprehensive messages with guidance.	Develop a communication strategy; create public awareness materials and dissemination channels	National Meteorological Organization, NGOs, Media partners	6 Months	Medium
Funding	No dedicated governmental budget and not set as a priority Limited international funding Problems in infrastructure, human resources Existing skills, international support, limited in time	Promote the financial benefits and savings of AAs and IBF. Introduce modern climate financing. Include AAs and IBFs in governmental plans and vocabulary.	Integrate IBF into national development plans; mobilize donor support and explore blended finance options	Ministry of Planning, Ministry of Finance, International Donors	8 Months	High
Sustainability and scaling up	Lack of monitoring and evaluation Lack of transition to ensure sustainability Lack of sustainability due to lack of further funding and lack of coordination	Development of two-way feedback mechanisms. Constant verification.	Design M&E framework; develop sustainability strategy; establish transition planning with stakeholders	WFP and UN agencies and other international NGOs, MoA, MoT, MoEnv, MoWR, local NGOs and L.G.	2-3 years	High

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