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SAHF IBF Working Group Implementation Plan Project

REGIONAL WORKSHOP ON IMPACT-BASED FORECASTING

Training-of-Trainers and National Demonstration Planning for Temperature-Related Hazards

09-13 February 2026 | Kathmandu, Nepal

SUMMARY REPORT

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List of Acronyms

AI	Artificial Intelligence
BMD	Bangladesh Meteorological Department
CAP	Common Alerting Protocol
DSS	Decision Support System
DRR	Disaster Risk Reduction
EAP	Early Action Protocol
ECMWF	European Centre for Medium-Range Weather Forecasts
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EW4All	Early Warnings for All
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GEDSI	Gender Equality, Disability, and Social Inclusion
GCM	General Circulation Model
HPA	Health Protection Agency (Maldives)
IBF	Impact-Based Forecasting
ToT	Training-of-Trainers
IEC	Information, Education, and Communication
INGO	International Non-Government Organization
LoA	Letter of Agreement
MEL	Monitoring, Evaluation, and Learning
Met Club	Meteorological Club
MMS	Maldives Meteorological Service
NARC	National Agronomy Research Centre
NDMA	National Disaster Management Authority
NMHS	National Meteorological and Hydrological Services
NGO	Non-Government Organization
RCCC	Red Cross Red Crescent Climate Centre
RIMES	Regional Integrated Multi-Hazard Early Warning System
SAHF	South Asia Hydromet Forum
SDMA	State Disaster Management Authority
SOP	Standard Operating Procedure
S2S	Sub-seasonal to Seasonal
THI	Temperature Humidity Index
UKMO	UK Meteorological Office
UTCI	Universal Thermal Climate Index
WFP	World Food Programme
WMO	World Meteorological Organization
WRF	Weather Research and Forecasting Model

Executive Summary

The Regional Workshop on Impact-Based Forecasting (IBF): Training of Trainers and National Demonstration Planning for Temperature-Related Hazards was convened from 9–13 February 2026 in Kathmandu, Nepal, under the WISER Asia Pacific-funded South Asia Hydromet Forum (SAHF) IBF Project. The workshop brought together National Meteorological and Hydrological Services (NMHSs), disaster management authorities, health and sectoral agencies, regional institutions, and development partners to advance operationalization of temperature-related IBF across South Asia.

The workshop provided a platform to translate IBF concepts into practical applications, with a strong focus on heat-related risks and their impacts across key sectors. Through a combination of technical sessions, country presentations, and facilitated discussions, the workshop enabled participants to advance from conceptual understanding toward actionable planning and implementation.

The workshop achieved its primary objective of strengthening participants' technical capacity to design and implement IBF systems. Participants demonstrated improved understanding of hazard-to-impact pathways, thresholds and triggers, and anticipatory action, alongside a clearer appreciation of the need to integrate exposure and vulnerability into forecasting processes. This shift from hazard-based to impact-based thinking was reflected in the development and refinement of national demonstration plans, where countries were able to contextualize IBF approaches within their own institutional and climatic settings.

A key outcome of the workshop was the enhancement of country-specific IBF demonstration plans for temperature-related hazards. These plans incorporated initial approaches to defining thresholds and triggers using indices such as temperature-humidity index, apparent temperature, and percentile-based thresholds, while also outlining strategies for improving forecast dissemination and user engagement. In several cases, the workshop catalyzed progress toward developing standard operating procedures (SOPs) for IBF, particularly in contexts where such frameworks are not yet established. At the same time, countries identified critical gaps in observational data, vulnerability and exposure information, and model capabilities, underscoring the need for continued investment in data systems, analytical tools, and technical capacity.

Several cross-cutting insights emerged from the technical sessions and country presentations:

- IBF is not solely a technical challenge but an institutional one, requiring sustained coordination, clearly defined roles, and integration with national disaster management frameworks.
- Thresholds and triggers must be context-specific and iterative, requiring validation over multiple seasons and incorporation of local impact data.
- Heat risk is multifaceted, influenced not only by temperature but also by humidity, wind, and heat stress accumulation, necessitating the use of composite indices and early warning signals.

- User engagement is critical, particularly in translating forecasts into actionable advisories tailored to sectors such as agriculture, health, energy, and urban planning.
- Communication remains a key gap, with a need to simplify technical information into accessible, impact-based messages that support decision-making at all levels.

The workshop marked a significant step toward operationalizing IBF for temperature-related hazards in South Asia. It demonstrated that countries are moving from conceptual understanding to practical implementation, supported by growing technical capacity and regional collaboration.

Moving forward, priorities include:

(i) implementing and testing demonstration plans during the upcoming heat season;
(ii) refining thresholds, triggers, and impact models based on real-time feedback;
(iii) strengthening institutional coordination mechanisms; and
(iv) enhancing technical capacity through continued training and access to regional data and tools.

Sustained support from regional partners and continued knowledge exchange will be essential to ensure that IBF systems evolve into robust, user-centered services that effectively reduce climate-related risks and support anticipatory action across sectors.

I. Introduction

Background and Rationale

South Asia is increasingly exposed to extreme temperature hazards, including prolonged heatwaves, cold waves, and compound humidity-driven heat stress events. Rising baseline temperatures, urban heat island effects, changing precipitation patterns, and demographic pressures amplify vulnerability across sectors including health, agriculture, livestock, energy, and labor productivity.

Traditional hazard-based early warning systems, while essential, are insufficient to fully inform risk reduction and anticipatory action. IBF addresses this gap by linking hazard forecasts with exposure, vulnerability, and sector-specific consequence information to support decision-making and protective action.

In November 2025, the SAHF IBF Project held its first regional workshop to develop a regional framework and toolkit for IBF of temperature-related hazards. The workshop helped establish common concepts and approaches and initiated discussions on how the framework could be applied through national demonstration activities. Building on this foundation, South Asian countries began identifying priority sectors, vulnerable groups, and institutional arrangements for applying the framework in national contexts.

The workshop in 2025 highlighted that long-term institutionalization of IBF depends not only on technical forecasting skills but also on strong facilitation, communication, and coordination capacities. Thus, equally important to the success and sustainability of the national demonstrations is the strengthening of national capacity through a structured Training-of-Trainers (ToT) approach. This model is designed to develop a core group of national trainers who can contextualize IBF tools, support implementation during demonstrations, and cascade knowledge to sectoral partners and sub-national actors.

The SAHF IBF Project 2nd Regional Workshop

In this context, the second regional SAHF IBF Workshop aimed to combine the two initiatives into a National Demonstration Planning with a Training-of-Trainers mechanism. It builds on the first regional workshop by shifting from conceptual understanding to applied, operational, and replicable IBF practice. Held in Kathmandu from 9–13 February 2026, the workshop was designed to strengthen the capacity of NMHSs in South Asia to design, operationalize, and communicate impact-based forecasts for temperature-related hazards. It followed an end-to-end IBF approach that guided participants through the full IBF process, from forecast generation and interpretation, to impact analysis, trigger and threshold development, action-led warnings, and effective communication and dissemination.

The workshop activities were delivered as a Training-of-Trainers, equipping participants not only with technical knowledge but also with facilitation skills and practical tools that can be cascaded at their respective in-country national and sub-national levels. Key thematic areas included exposure and vulnerability analysis, integration of Gender Equality, Disability and Social Inclusion (GEDSI), development of multi-indicator triggers, risk-based decision-making, behavioral insights for communication, and operational IBF workflows.

Throughout the workshop, experts from the Regional Integrated Multi-Hazard Early Warning Systems (RIMES) and UK Met Office (UKMO) facilitated the refinement of the national demonstration plans to help countries apply the concepts and tools introduced during the ToT sessions and develop concrete timeline and milestones for implementation.

Training-of-Trainers (ToT) Nomination Criteria

As the main training mechanism, workshop participants are expected to cascade the knowledge and skills gained from the workshop to their respective country offices. Hence, NMHSs were requested to nominate participants who met the following criteria:

- Has technical background on climate services, forecasting, and/or disaster risk management
- Has experience working with sectoral user agencies (e.g., DRM, agriculture, health, water)
- Familiar with IBF concepts and applications
- Has strong communication and facilitation skills
- Has experience in training delivery, coaching, or mentoring approaches
- Can commit to participate in all ToT activities and national demonstration phases

Workshop Objectives

The workshop pursued the following objectives:

a. Build national capacity through a ToT approach by delivering targeted training on priority technical and operational gaps, and by clarifying roles, cascading mechanisms, and the technical assistance required to sustain IBF implementation beyond the project period.

b. Finalize national IBF demonstration plans for implementation during the 2026 heat and cold seasons, including agreement on objectives, scope, phasing, roles, and institutional arrangements.

c. Strengthen coherence between national demonstrations and the regional IBF framework and toolkit, ensuring technical consistency, effective co-production, and context-specific adaptation across participating countries.

Expected Outcomes and Outputs

Expected Outputs and Outcomes from the workshop include:

- An agreed ToT arrangement, including national focal points, defined roles, and cascading and technical support mechanisms.
- Finalized national IBF demonstration plans for the 2026 heat and cold seasons, covering objectives, priority sectors and locations, implementation phasing, and coordination arrangements.
- Confirmed alignment with the regional IBF framework and toolkit, ensuring consistent concepts, methodologies, and operational approaches across countries.

II. Session Summaries

Session 1: IBF for Temperature-Related Hazards – A Refresher

Dr. KJ Ramesh, RIMES

The session provided a refresher on impact-based forecasting (IBF) for temperature-related hazards, emphasizing the increasing intensity, frequency, and complexity of heat risks driven by climate change. It highlighted how rising temperatures, increasing humidity, and reduced diurnal temperature ranges are amplifying continuous heat exposure and associated physiological stress. The discussion reinforced that IBF must go beyond traditional meteorological variables by incorporating composite indices (e.g., heat index, UTCI), exposure levels, and vulnerability factors to better represent real-world impacts.

The session also underscored the importance of integrating hazard, exposure, and vulnerability into operational frameworks, noting the rapid increase in exposed populations and differentiated impacts across sectors and social groups. Strengthening localized risk assessments and embedding these into heat action plans, early action protocols, and decision-making systems were identified as critical steps toward effective IBF implementation.

Key Insights

Discussions highlighted key technical and operational considerations for advancing IBF:

- Increasing frequency, intensity, and duration of heat events, including warmer nights
- Rising humidity and reduced diurnal temperature range intensifying heat stress
- Significant growth in population exposure to extreme temperatures
- Need to move beyond max temperature to composite heat metrics (e.g., UTCI, heat index)
- Importance of exposure, vulnerability, and adaptive capacity, including GEDSI dimensions
- Availability of high-resolution datasets (e.g., LST, climate projections) for improved analysis
- Persistent gaps in:
    - Localized heat risk and vulnerability mapping
    - Data availability and integration
    - Institutional and legal support for implementation
- Critical role of cross-sector coordination and governance in operationalizing IBF

Recommendations

Countries should prioritize strengthening IBF systems by integrating localized hazard, exposure, and vulnerability assessments into operational frameworks, supported by the use of composite heat stress indicators and high-resolution data. There is a need to embed IBF within national and local heat action plans, SOPs, and early action protocols, while enhancing coordination between NMHSs and sectoral agencies, particularly health and disaster management. Investments in data systems, capacity development, and inclusive approaches—incorporating GEDSI considerations—are essential to ensure that IBF services are actionable, context-specific, and effectively reduce heat-related risks.

Session 2: Regional IBF Framework and Toolkit

Danna Valdez, RIMES

This session presented an overview of the draft Regional framework and toolkit for temperature-related IBF, highlighting its purpose as a practical, adaptable guidance document to support NMHSs and partner agencies in operationalizing IBF across South Asia. It emphasized that while temperature risks are shared across the region, capacities and levels of IBF implementation vary significantly, necessitating a structured yet flexible framework grounded in regional realities.

The framework is designed as a living document that will evolve through national demonstrations and continuous learning. It integrates technical guidance, tools, and co-production approaches, supporting the full IBF value chain—from translating forecasts into impacts and actions, to communication, coordination, and monitoring. The session also outlined the core components of the framework, emphasizing its role in strengthening national implementation through regional alignment and collaboration as follows:

- Introduction to key concepts, terminology, guiding principles for a shared understanding, and inclusivity considerations such as GEDSI, as well as scalability and national ownership.
- The regional context – examining how temperature risks manifest differently across South Asia's diverse geographies—mountains, plains, coastal zones, island states, and arid regions—and how these climatic drivers translate into sector-specific vulnerabilities.
- The enabling environment for IBF, outlining governance structures, institutional roles, coordination mechanisms, and regional collaboration platforms necessary to support effective implementation.
- Operationalizing IBF, that is translating forecasts into impacts and translating impacts into early actions, including guidance on temperature indicators such as the Heat Index, UTCI, and Wet Bulb Globe Temperature; methodologies for integrating exposure and vulnerability assessments; and procedures for establishing thresholds, triggers, alert levels, and corresponding early or anticipatory actions.
- Direction for developing heat and cold action plans, SOPs, and communication strategies that incorporate behavioral considerations.
- Section on monitoring, evaluation, and financing to ensure continuous learning and improvement, offering practical checklists and tools that NMHSs can apply during pilot-scale demonstrations and scale up over time.

Recommendations

NMHSs should actively utilize and contribute to the iterative development of the Regional framework by applying its components in national demonstrations and providing feedback for refinement. Efforts should focus on strengthening co-production with user sectors, operationalizing forecast-to-impact-to-action workflows, and aligning institutional arrangements to support IBF implementation. At the same time, countries should leverage available tools, data platforms, and training mechanisms to build capacity, while ensuring that systems remain adaptable, scalable, and grounded in national contexts.

Session 3: Forecast Generation for Temperature Hazards

Dr. Shiromani Jayawardena & Rabbani Golam, RIMES

This session combined a technical presentation and hands-on training on forecast generation for temperature hazards, focusing on forecast types, lead times, uncertainties, and the usefulness of temperature-related indices in IBF. It emphasized that temperature hazards are better represented through thermal comfort and stress indices—such as UTCI, heat index, WBGT, and wind chill—rather than air temperature alone, since impacts are shaped by humidity, wind, and radiation in addition to temperature. The session also highlighted the value of deterministic and ensemble forecasts across short-, medium-, and extended-range timescales, noting that temperature forecasts generally offer stronger predictability than rainfall forecasts.

The session further introduced practical tools and data sources, including ECMWF thermal comfort products, EFI, and historical UTCI datasets, while demonstrating how these can support threshold-setting and preparedness planning. A second part of the session focused on bias correction, showing how systematic model errors can affect forecast accuracy and the classification of impact levels. Experience from Bangladesh illustrated how station-based bias correction and machine learning approaches can improve temperature forecasts and, in turn, strengthen index-based forecasting, although additional work is needed for extreme events and wider operational scaling.

Key Insights

Discussions centered on the technical use and operational interpretation of forecast products for temperature-related IBF:

- Forecast value for IBF
    - Temperature forecasts generally show higher skill and lower variability than rainfall forecasts
    - Short- to medium-range forecasts are useful for warnings, preparedness, and early action
    - Extended and seasonal outlooks can support planning and awareness
- Importance of indices
    - Temperature alone is insufficient; impacts are better captured through UTCI, heat index, WBGT, and wind chill
    - These indices can support both heat and cold risk assessment
    - Global thresholds are useful starting points, but localized thresholds are still needed
- Role of ensemble information
    - Ensemble forecasts help capture forecast spread and extremes

    - EFI was presented as a useful tool for identifying unusual and extreme conditions
    - Interpretation must account for local climate context
- Bias correction
    - Systematic model bias can significantly affect forecast usefulness and warning categories
    - Station-based and machine learning approaches can improve forecast performance
    - Current operational work is more advanced for temperature than for precipitation or compound extremes
- Operational considerations raised by participants
    - Forecast skill and best-performing models may vary by station, season, and month
    - Some indices may appear inconsistent with local experience if thresholds are not localized
    - Health-sector participants stressed the need to make terminology and concepts more accessible and relevant to sector outcomes
    - Cold impacts may also depend on wind, rain, and wet conditions, not temperature alone

Recommendations
NMHSs should strengthen the use of forecast-based temperature indices and ensemble products in IBF, while investing in localized threshold development, forecast verification, and bias correction to improve operational accuracy. Efforts should also focus on making technical products more interpretable for user sectors, especially health, and on refining methods for extreme events, seasonal variability, and compound conditions so that forecast information can more effectively support impact-based decisions and actions.

Session 4: Overview and Demonstration of INSTANT South Asia

<u>Raihanul Haque Khan, Rabbani Golam, and Asif Udin Bin Noor, RIMES</u>

This session introduced the prototype of the INSTANT South Asia Portal as a regional platform intended to support temperature-related IBF through integrated forecast dissemination, visualization, and analysis. Building on earlier country-level implementations, the portal was presented as an evolving regional tool that brings together hazard information, temperature-related indices, climatology and anomaly analysis, and selected vulnerability and exposure layers to support situational awareness and decision-making for NMHSs, sectoral agencies, and the public.

The session also served as a co-design exercise, emphasizing that the portal is still under development and should be shaped by user needs and operational priorities. Through group-based discussions, participants reviewed the prototype, identified essential and desirable features, and proposed improvements related to data integration, model use, usability, communication, and alerting functions. The exercise highlighted both strong interest in the platform and the need for continued refinement to ensure that the tool is practical, scalable, and aligned with national and regional needs.

Key Insights
Discussions focused on both the current prototype and the future design priorities of the portal:

- Portal purpose and scope
    - Intended as a regional support platform for temperature-related IBF
    - Builds on earlier country-level versions rather than creating a fully new system
    - Aims to serve NMHSs, sectoral users, and the public
- Key functionalities discussed
    - Display of maximum/minimum temperature and temperature-related indices
    - Integration of climatology, anomalies, and selected stress indicators
    - Inclusion of vulnerability and exposure layers
    - Potential for impact-oriented guidance and data export/download
- User groups and access
    - Public-facing interface for monitoring and awareness
    - More advanced analytical functions envisioned for meteorological users
    - Interest in linking the portal with other regional data and analysis platforms
- Priorities identified through co-design
    - Strong demand for:
        - High-resolution forecast and observational data
        - Verification and validation features
        - Localized thresholds and advisories
        - User-friendly visualization and infographicsSector-specific outputs and multilingual communication
        -
    - Repeated interest in alerting functions, including CAP-related features
- Design and implementation considerations
    - Need to clarify the scope of the portal, particularly the boundary between hazard information and broader impact assessment
    - Need for clear choices on model resolution, data sources, and country-specific inputs
    - Suggestions included:
        - Model comparison features
        - Playback/animation functions for maps
        - Integration of national observations
        - Feedback mechanisms for continuous improvement

Recommendations
Further development of the portal should prioritize a clear and phased design approach, focusing first on essential functionalities such as reliable hazard information, observational and forecast integration, verification tools, localized thresholds, and user-friendly communication products. The platform should continue to be refined through co-

design with NMHSs and sectoral users, while clarifying its operational scope, strengthening interoperability with existing systems, and ensuring that future enhancements—such as alert dissemination, sector-specific advisories, and impact guidance—are grounded in practical national and regional workflows.

Session 5: Translating Forecasts into Impacts

Helen Caughey, UKMO and Ramiz Khan, RCCC

This session focused on preparing participants to facilitate national-level IBF workshops through a ToT approach, emphasizing process over content. It introduced impact tables as a core tool for translating meteorological forecasts into actionable, sector-relevant impacts, highlighting their role in bridging the gap between hazard information and decision-making. The session stressed that effective IBF requires co-production with stakeholders, as NMHSs alone cannot fully define impacts, vulnerabilities, or appropriate responses.

Through guided exercises, participants practiced constructing impact tables by identifying hazards, defining sectoral impacts, and differentiating impact levels using severity, spatial extent, and duration. The session also introduced the concept of likelihood in IBF—not just the probability of a hazard occurring, but the likelihood of that hazard causing specific impacts—underscoring the importance of agreed terminology and communication with stakeholders. Overall, the session reinforced that impact tables are iterative, evolving tools that improve through experience, testing, and stakeholder engagement.

Key Insights

Discussions emphasized both technical understanding and facilitation strategies for IBF:

- Role and value of impact tables
    - An impact table translates meteorological conditions into sector- and context-specific impacts, including direct and cascading/secondary impacts.
    - It helps stakeholders align on meaning: the same hazard metric (e.g., rainfall amount or a temperature threshold) can imply different impacts across countries, seasons, and coping capacity.
    - Impact tables also underpin the risk matrix, supporting consistent categorization of severity—and reminding forecasters that “no warning” may still mean business-as-usual impacts that systems can manage.

- How to build the impact table (as a facilitation process)

  The session ran a short two-step exercise to demonstrate facilitation:
    - Step 1: Identify general impacts of extreme heat (e.g., health, agriculture, water, transport, energy).
    - Step 2: Differentiate each impact across Very Low / Low / Medium / High using three lenses:

        - Severity (e.g. discomfort □ illness □ mortality)
        - Spatial extent (localized □ widespread impacts)
        - Duration (short-term □ prolonged stress on systems)

  Groups shared example differentiations:
    - Health: discomfort/dehydration → heat stress → heat stroke/death.
    - Agriculture: leaf stress/drying → slowed growth → reduced yields → crop failure.
    - Energy: limited disruption → short outages → prolonged shortage/transformer failure.
    - WASH: low water/sanitation stress → outbreaks (e.g., diarrheal disease) → drought/humanitarian crisis impacts.
- Facilitation insights for ToT:
    - Process is more important than the final output
    - Co-production is essential—multi-sector participation required
    - Use real experiences and past events to guide discussions
    - Differentiating low vs medium impacts is often the most challenging
    - Allow sufficient time—impact table development can take a full day
- Understanding likelihood in IBF
    - Not just probability of hazard, but probability of impacts occurring
    - Requires combining forecast confidence with vulnerability and exposure
    - Communication should use agreed, context-specific language, not just percentages
- Operational and contextual considerations
    - Impacts vary by location, season, and societal context
    - Economic and livelihood impacts (e.g., agriculture, livestock, energy) may occur before health impacts
    - Impact thresholds evolve with adaptation and experience
    - Importance of testing, iteration, and continuous refinement

Recommendations

For national ToT facilitation and workshop design:

- Treat impact table development as a core deliverable: allocate sufficient time—often a full day—and avoid rushing.
- Start by defining the warning audience and scope (public vs sector-specific) before drafting impacts, to reduce confusion and improve relevance.
- Facilitate in structured passes:
    - First draft impacts and categorize by severity,
    - Then refine by extent/location,
    - Then refine by duration/timing/seasonality.
- Use event narratives and stakeholder “storytelling” to differentiate low vs medium impacts (the hardest but most operationally important distinctions).

For content and system usefulness:

- Ensure impact tables explicitly document the business-as-usual baseline (the “very low” column) so forecasters can judge escalation.

- Build tables to include cross-sector impacts, including livelihoods and economic impacts (e.g., livestock productivity) alongside health outcomes.

For implementation, learning, and sustainability:

- Require that impact tables are co-produced (NMHS should not develop them alone) to secure buy-in, realism on feasible actions/lead times, and consistent interpretation.
- Plan for iteration: test via tabletop exercises, review after events, and recalibrate thresholds/impact levels as resilience, infrastructure, and behaviors change over time.
- Develop a simple guidance note (FAQ-style) for forecasters on assessing impact likelihood (not just hazard likelihood), incorporating antecedent conditions and dynamic vulnerability—since this is a recurring area of uncertainty.

Session 6: Exposure, Vulnerability, and GEDSI in IBF

Nina Karla Jaim, Asif Uddin Bin Noor, & Raihanul Haque Khan, RIMES

This session introduced the concepts of exposure and vulnerability in IBF, emphasizing that impacts from temperature hazards are shaped not only by the hazard itself but by who is affected, where they are, and their capacity to cope. It highlighted that vulnerability is multi-dimensional—covering demographic, health, socioeconomic, and environmental factors—while exposure reflects the presence of people and assets in hazard conditions. The session underscored that impacts differ significantly across contexts, even under the same hazard scenario.

A dedicated segment on GEDSI reinforced the need for inclusive, people-centered IBF, showing how gender, age, disability, and social inequalities influence risk. Through a hands-on exercise, participants applied a simplified methodology to compute exposure, vulnerability, and impact across different scenarios, demonstrating that variations in these factors—not hazard intensity alone—drive differences in risk outcomes.

Key Insights

Discussions focused on conceptual understanding, indicator selection, and practical application:

- Understanding vulnerability and exposure
    - Vulnerability depends on who is affected and their conditions (health, age, income, housing, etc.)
    - Exposure reflects who/what is present during the hazard (e.g., outdoor workers, dense urban populations)
    - Impacts result from the interaction of hazard, exposure, and vulnerability
- Key vulnerability drivers identified
    - High-risk groups: elderly, children, persons with disabilities, chronically ill, low-income populations
    - Important factors:
        - Occupational exposure and livelihoods
        - Built environment (housing materials, ventilation)

        - Socioeconomic conditions and access to services
- Exposure considerations
    - Dynamic and context-specific (e.g., population movement, seasonal changes)
    - Key indicators:
        - Population density
        - Housing conditions
        - Urban heat island effects
        - Outdoor labor and mobility patterns
- GEDSI integration
    - Impacts are unequally distributed due to social and structural inequalities
    - Women, informal workers, elderly, and marginalized groups face higher risks and fewer coping options
    - Importance of:
        - Inclusive data (or proxies where data is limited)
        - Tailored communication and interventions
        - "Leave no one behind" approach in IBF design
- Hands-on exercise insights
    - Same hazard can produce different impact levels across areas
    - Urban informal settlements showed highest impact due to combined high exposure and vulnerability
    - Planned areas showed lower impacts due to better infrastructure and access
    - Key drivers of impact included:
        - Built heat load
        - Housing quality
        - Livelihood type
        - Health and demographic factors

Recommendations
NMHSs should systematically integrate exposure, vulnerability, and GEDSI considerations into IBF by using context-specific indicators, including proxy data where necessary, and engaging stakeholders to validate and refine assessments. Practical application—such as simplified risk calculations and scenario-based exercises—should be embedded in capacity building to strengthen understanding of how impacts are generated, ensuring that IBF outputs are inclusive, locally relevant, and actionable across different population groups and settings.

Session 7: GEDSI Integration in IBF

<u>Helen Caughey, UKMO and Ramiz Khan, RCCC</u>

This session combined an interactive workshop and a technical presentation to deepen understanding of how GEDSI considerations influence access to forecasts, capacity to act, and overall risk in IBF. The role-playing exercise demonstrated that individuals experience different levels of access, decision-making power, and coping capacity depending on their socioeconomic context, highlighting that unequal outcomes are driven not only by hazard exposure but also by structural and social factors.

The presentation then translated these insights into practical IBF implementation, emphasizing the need to systematically integrate exposure, vulnerability (including dynamic vulnerability), and stakeholder knowledge into risk assessment. It reinforced that IBF must move beyond static data and thresholds, incorporating participatory approaches, sectoral engagement, and real-time feedback mechanisms to ensure inclusive, context-specific, and actionable forecasting and warning systems.

Key Insights

The session highlighted both experiential learning from the workshop and operational guidance from the presentation:

- Insights from the role-play exercise
  - Clear disparities in: access to weather information, ability to interpret forecasts, capacity to take action, recovery potential after impacts
  - Key barriers identified:
    - Lack of technology or connectivity
    - Limited decision-making power (e.g., workers dependent on employers)
    - Financial constraints and livelihood pressures
    - Social roles (e.g., female-headed households, migrants)
  - Demonstrated that:
    - Access ≠ ability to act
    - Information alone does not ensure protection
- GEDSI as a foundation for IBF design
  - Importance of "putting yourself in others' shoes" when designing warnings
  - Need for: diverse stakeholder representation, multiple dissemination channels, and context-sensitive communication strategies
- Clarifying core IBF concepts
  - Continued confusion between hazard, exposure, and vulnerability
  - Reinforced that:
    - Exposure = presence of people/assets
    - Vulnerability = coping capacity and susceptibility
- Dynamic vulnerability and exposure
  - Vulnerability and exposure are not static:
    - Seasonal migration
    - Festivals and population movements
    - Ongoing disasters or recovery efforts
  - It requires continuous updating and validation, and real-time or near-real-time information flows
- Practical tools and approaches
  - Participatory mapping to capture local knowledge where data is limited
  - Use of focal persons and sectoral networks for ongoing updates
  - Simple feedback mechanisms (e.g., messaging platforms) to track evolving conditions

    - Integration of:
        - Calendars (e.g., agricultural cycles)
        - Local experience and historical impacts
- Thresholds, impacts, and decision-making
    - Thresholds remain a starting point but must be adjusted for context, duration, and antecedent conditions
    - Importance of sector-specific thresholds and cumulative effects (not just peak values)
    - Need to align forecasts with user risk appetite (most likely vs reasonable worst case)
- Co-production and trust
    - IBF effectiveness depends on strong collaboration between NMHSs and stakeholders and shared understanding of uncertainty and decision triggers
    - Emphasis that successful mitigation (no impacts) does not mean forecast failure

Recommendations
IBF implementation should systematically integrate GEDSI by embedding participatory, inclusive, and context-driven approaches into both design and operations. Countries should strengthen co-production with stakeholders, use practical tools such as participatory mapping and focal point networks to capture dynamic exposure and vulnerability, and ensure that warning systems account for differences in access, decision-making power, and risk perception. Clear communication of uncertainty, alignment with user risk appetite, and continuous updating of contextual information are essential to ensure that IBF remains actionable, equitable, and responsive to real-world conditions.

Session 8: Introduction to ESCAP's Risk and Resilience Portal

Madhurima Sarkar-Swaisgood & Parvathy Subha, ESCAP

This session introduced the ESCAP Risk and Resilience Portal as an integrated platform designed to support risk-informed decision-making across the Asia-Pacific region. The portal aggregates hazard, climate, and socioeconomic datasets and translates them into actionable insights through a suite of tools covering the full risk timeline—from historical analysis to early warning and long-term projections. Key tools highlighted included the Risk Atlas, Country Decision Support Systems, RapidIBF, and policy storyboards, all aimed at bridging the gap between scientific data and operational decision-making.

The session also included a live demonstration of the portal's functionalities, particularly the Rapid IBF tool and its offline QGIS plugin. Participants explored how hazard data (e.g., seasonal forecasts) can be overlaid with exposure datasets (e.g., population, agriculture) to generate near real-time impact assessments. Additional discussions covered emerging ESCAP initiatives, including heat risk assessment, AI-enhanced analytics, and probabilistic loss and damage estimation in agriculture, emphasizing future-oriented and scalable approaches to IBF.

Key Insights
The portal demonstrates how integrated data systems can operationalize IBF by linking hazard information directly to impact and decision-making.

- End-to-end decision support: Tools span the full risk continuum—from historical analysis to early warning and long-term planning
- High-resolution data enhances usability: Downscaling to 1 km resolution enables more localized and cross-border analysis
- Rapid IBF accelerates workflows: Automated processing reduces analysis time from days to minutes, enabling faster early action
- Flexible and scalable application: Supports multi-sector analysis (population, agriculture, infrastructure) and subnational targeting
- Online–offline integration is critical: QGIS plugin allows use in low-connectivity or high-resolution contexts
- Data accessibility remains a constraint: Users still rely on external sources (e.g., seasonal forecasts) and may need support accessing raw data
- Growing role of AI and advanced analytics: Emerging features (e.g., machine learning, AI tools) aim to improve analysis and decision translation

Recommendations
Strengthening the use of platforms like the ESCAP portal requires improving accessibility to both hazard and exposure datasets, including clearer pathways for users to obtain and upload their own data. Capacity building should focus on enabling NMHS and partners to effectively use both online and offline tools, particularly for subnational and sector-specific analysis. Further integration of tools, simplification of workflows, and incorporation of user feedback will be essential to enhance usability. Finally, continued investment in high-resolution data, AI-enabled analytics, and alignment with regional processes will help ensure these tools translate consistently into actionable IBF outcomes.

Session 9: Trigger and Threshold Development for Temperature Hazards

Rabbani Golam, RIMES

This session focused on trigger and threshold development for temperature hazards, using heatwaves as a practical example. The presentation emphasized that heatwaves are context-specific phenomena, varying across countries depending on climatology, geography, and societal exposure. A key distinction was made between hot days and heatwaves, highlighting that heatwaves are driven not only by high daytime temperatures but also by elevated nighttime temperatures and cumulative heat stress, which prevent physiological recovery.

Using Bangladesh as a case study, the session demonstrated how existing national thresholds—often lacking a scientific basis—can misrepresent risk. Analysis of long-term station data showed that thresholds derived from hotspot regions can lead to under-warning in cooler regions and over-warning in already hot areas, reducing the effectiveness of impact-based forecasting and response systems.

Key Insights

- Heatwave definitions vary across countries
  - Some countries use fixed temperature thresholds (e.g., ≥40°C for consecutive days), while others apply percentile-based thresholds (e.g., 90th–99th percentile) or heat indices
  - No universal definition exists; thresholds must reflect local climate and impact context
- Heatwaves vs. hot days
  - Hot days allow nighttime cooling and recovery
  - Heatwaves occur when night temperatures remain high, leading to cumulative physiological stress and higher impacts
- Limitations of uniform national thresholds
  - In Bangladesh, thresholds were found to be implicitly based on hotspot regions
  - This results in:
  - False negatives: heat stress not detected in cooler or coastal regions
  - False positives / over-warning in already hot regions
  - Urban areas (e.g., Dhaka) experience higher perceived heat stress despite not meeting thresholds
- Mismatch with sectoral impacts
  - Agricultural thresholds (e.g., crop stress above ~35°C) and energy demand responses do not align with national heatwave categories
  - Public health impacts can occur below official thresholds, especially in less heat-adapted regions
- Importance of cumulative and lagged impacts
  - Heat impacts persist beyond the event (heat inertia), requiring continued response even after temperatures drop
  - Impacts are driven by accumulated heat exposure, not just threshold exceedance
- Operational challenges in threshold design
  - Trade-off between:
  - Simple national thresholds (easy to communicate)
  - Region-specific thresholds (more accurate but complex)
  - Need to distinguish between:
  - Meteorological declaration (for records)
  - Forecast-based early warning (for action)
- Evolving approaches
  - Use of percentile-based and departure-from-normal thresholds
  - Potential integration of impact data (mortality/morbidity) where available
  - Increasing emphasis on dynamic and updateable thresholds under climate variability

- The hands-on activity highlighted significant spatial variability (e.g. plains vs. coastal vs. mountainous regions) thus reinforcing the need for localized threshold development.

Recommendations
Countries should move toward data-driven, impact-aligned threshold development, prioritizing region-specific or clustered thresholds over uniform national values where geographic variability is high. Thresholds should be derived using long-term climatological data (e.g., percentiles and departures from normal) and regularly updated to reflect changing climate conditions. At the same time, thresholds must remain operationally practical and simple enough for communication and decision-making, with clear distinction between meteorological definitions and actionable early warnings. Finally, integrating sectoral impacts (health, agriculture, energy) and, where possible, impact data (e.g., morbidity/mortality) will ensure thresholds are meaningful and support effective impact-based forecasting and early action.

Session 9 Continuation: Partners' Presentations

START Network: Experience on Start Fund Anticipatory Action Activation

<u>Pranav Dahal & Raj Acharya, START Network</u>

START Network presented its work as a global humanitarian network operating through locally led, rapid financing mechanisms, with a strong focus on anticipatory action. In Nepal, the network operates a nationally managed Start Fund, enabling funding decisions within 72 hours based on forecast information, expert judgment (via the 4.1 network), and ground-level inputs. Their recent cold spell activation in the southern plains demonstrated how anticipatory action can be triggered through a combination of forecast monitoring, real-time community observations, and institutional advisories, reaching vulnerable populations before peak impacts.

Key insights highlighted the importance of ground-level intelligence in complementing forecasts, particularly where community perceptions (e.g., fog, cloud cover) influence experienced impacts. The experience also underscored persistent challenges, including defining hazards (e.g., cold wave vs. cold spell), acting under forecast uncertainty, and aligning thresholds with real impacts. START emphasized the value of flexible, low-regret approaches, strong local delivery mechanisms (e.g., community health volunteers), and rapid decision-making systems.

The presentation concluded with recommendations to strengthen two-way communication between NMHS and humanitarian actors, improve impact-based threshold development, and institutionalize coordination through technical working groups. Greater integration of forecast data, ground observations, and sectoral impacts was identified as critical to improving anticipatory action effectiveness and scaling.

WMO/FAO – Anticipatory Action Technical Working Group

Jochen Luther (WMO) / Damien Riquet (FAO)

WMO and FAO presented a regional perspective through the Anticipatory Action Technical Working Group, highlighting the rapid expansion of anticipatory action frameworks across Asia-Pacific, now numbering around 170. Their work focuses on trigger development, harmonization of methodologies, strengthening impact-based forecasting, and improving coordination platforms that connect forecast, vulnerability, and impact information. They also emphasized efforts to clarify the relationship between anticipatory action, early warning systems, and Early Warnings for All initiatives.

A central insight was the growing fragmentation of trigger methodologies, with multiple frameworks operating within the same countries and hazards, often leading to inconsistent or uncoordinated activations. The distinction between public early warnings (hazard-focused, general) and anticipatory action triggers (impact-based, decision-oriented) was emphasized, alongside the increasing need for quantitative impact forecasts (e.g., expected damage, affected populations) to justify early action and financing. Case examples (e.g., Philippines) demonstrated progress toward linking triggers with government systems and financing mechanisms, including legislation enabling anticipatory action funding.

The presentation recommended advancing toward harmonized trigger frameworks, developing shared data and analysis platforms, and strengthening collaboration with NMHS to integrate impact forecasting into national systems. It also highlighted the need to address multi-hazard and cascading risks, improve evidence generation, and align humanitarian and government anticipatory actions for greater scale and efficiency.

People In Need: RAIN Project
Anuj Tiwari

People in Need shared field-level implementation experience from Nepal under the RAIN project, focusing on anticipatory actions for both floods and temperature hazards. Their approach combines forecast monitoring (e.g., 7-day outlooks), locally derived thresholds (e.g., 95th percentile), and community-based targeting to trigger early actions. In the absence of formal heatwave warnings, they demonstrated how forecast trends alone can support early action decisions, particularly when aligned with local vulnerability contexts.

Key insights emphasized that impacts on vulnerable populations occur below official hazard thresholds, especially for outdoor workers and marginalized communities. This highlighted the need for localized, impact-sensitive thresholds rather than relying solely on national definitions. The use of community-based communication channels, including local radio in local languages and mobilization of community health volunteers, proved effective in disseminating early warnings and supporting behavioral change.

The presentation concluded with recommendations to integrate local vulnerability and exposure into threshold design, strengthen community-level engagement in IBF systems, and ensure that early action frameworks are context-specific and inclusive of marginalized groups. It also reinforced the importance of post-event analysis and learning to refine thresholds and improve future anticipatory action effectiveness.

Red Cross Red Crescent Climate Centre (RCCC)
Ramiz Khan & Madhab Uprety, RCCC

RCCC presented its humanitarian approach to anticipatory action, focusing on the design and application of trigger models that enable timely interventions before impacts fully materialize. Their framework is structured around two core components: “when to act”—based on forecasts, thresholds, and anticipated impact levels—and “where to act”—based on hazard, exposure, and vulnerability. RCCC emphasized that trigger development is not only a technical exercise but also an operational one: thresholds must reflect the purpose of the action, the type of actor involved, and the resources available, rather than relying only on meteorological definitions.

Using examples from Bangladesh, Myanmar, and Nepal, RCCC showed how impact-based trigger thresholds can be developed under different data conditions. In data-rich settings, thresholds can be linked to observed impacts such as hospital admissions and health outcomes.

In data-scarce contexts, proxy methods such as historical event reviews, household surveys, percentile analysis, and trigger frequency assessments can still provide a reasonable basis for anticipatory action. The presentation underscored that thresholds are highly context-specific: different places, sectors, and agencies may require different trigger levels depending on the type of risk they seek to manage. RCCC also highlighted that humanitarian actors often need to target the more extreme or less frequent events, since their anticipatory actions must be feasible within finite operational and financial resources.

The discussion also illustrated how RCCC complements broader impact-based forecasting efforts by translating forecast information into actionable humanitarian triggers. In addition to defining timing thresholds, RCCC demonstrated the importance of spatial prioritization, using hotspot and vulnerability mapping to identify which wards, communities, or households should be prioritized for support. The overall conclusion was that anticipatory action systems should combine forecast information with localized exposure and vulnerability analysis, and that threshold-setting should be iterative, evidence-based, and continually refined through validation with communities and sectoral actors.

Summary of the question-and-answer discussion

The discussion that followed focused mainly on the relationship between IBF thresholds and anticipatory action triggers, the use of heat indices, and the practical implications of limited data and resources. One key question raised was whether establishing a trigger threshold somewhere between lower and higher percentiles might result in missing some events. RCCC clarified that this depends on the purpose of the trigger: humanitarian anticipatory action does not necessarily aim to respond to all events, but rather to those that exceed an agreed level of severity and justify the use of limited resources. In this sense, trigger thresholds for anticipatory action may differ from the broader thresholds used in public IBF systems, which may need to provide more frequent advisories.

Another important line of discussion explored the difference between IBF products and humanitarian triggers. RCCC explained that, ideally, well-developed IBF systems would already provide the information needed by humanitarian actors. However, in practice, humanitarian organizations often still need additional trigger definitions that are tailored to their own mandates, intervention capacities, and risk tolerances. Participants also discussed the strengths and limitations of the heat index. RCCC noted that while heat index can be useful in some contexts, its relevance depends on local conditions and data quality, particularly for humidity. In some locations, maximum temperature alone may be more meaningful; in others, combined indicators may better reflect health risks. The exchange reinforced that trigger development must remain flexible, context-sensitive, and linked to actual impacts, rather than depending on a single indicator or formula.

Session 10: End-to-End IBF Process: IMD Experience

Dr. Radheshyam Sharma & Dr. Sourish Bandopadhyay, IMD

This session presented the India Meteorological Department's end-to-end approach to impact-based forecasting (IBF) for temperature hazards, especially heatwave and cold wave. The presentation emphasized that IMD's system is built on a seamless forecasting chain—from seasonal and extended-range outlooks to medium- and short-range forecasts—combined with climatology, threshold definitions, vulnerability analysis, and a growing decision support system (DSS). While IBF for heatwave and cold wave has been operationalized in recent years, it continues to evolve through updated impact tables, new heat-related products such as heat index, and more localized GIS-based warning tools.

A key message was that forecasting agencies cannot work in isolation. IMD's experience shows that effective IBF depends on close coordination with health, agriculture, disaster management, media, and state authorities, since different stakeholders need different kinds of information and levels of detail. The system therefore combines technical meteorological analysis, sector-specific advisories, multi-channel dissemination, and continuous stakeholder interaction to convert forecasts into practical action.

Key Insights

The presentation highlighted that accurate hazard forecasting remains the foundation of IBF, but that this must be complemented by contextual thresholds, vulnerability information, sectoral translation, and effective dissemination.

- Forecasts are issued across timescales, but IBF is mainly operational in the medium- and short-range, where location-specific action becomes possible.

- Heatwave thresholds vary by geography—separate criteria are used for plains, coastal areas, and hilly regions, with additional use of departure from normal to classify severity.
- IMD also tracks related conditions such as warm night and hot and humid weather, recognizing that impacts are not driven by daytime maximum temperature alone.
- The system relies on historical climatology and hazard analysis, including maps of heatwave frequency and district-level vulnerability, to provide context for warnings.
- Impact tables differ by sector: a simple temperature-and-warning summary may be enough for sectors like power, while agriculture requires much more specific crop and livestock advice.
- IMD's Decision Support System (DSS) brings together observations, forecasts, GIS tools, and hazard products in one platform, but final warnings are still screened by forecasters.
- Dissemination is multi-channel, using websites, social media, media briefings, CAP, SMS, and local-language products, with recognition that different users prefer different formats.
- A key operational lesson was that stakeholder coordination must start before the event, not only at warning stage, so agencies can prepare based on evolving forecast confidence.

Conclusion / Recommendations

The IMD experience demonstrates that an effective end-to-end IBF system for temperature hazards must combine strong hazard forecasting with contextual thresholds, climatological analysis, vulnerability information, and tailored communication. A major lesson is that not all users require the same product: some need concise warning summaries, while others need highly specialized sectoral advisories. Countries developing IBF systems should therefore design their services around stakeholder use cases rather than assuming one bulletin can serve all audiences equally.

The session also showed that operational IBF depends on more than technical tools. Dense observation networks, reliable forecast models, continuous screening by forecasters, and multi-channel dissemination are all necessary, but so is regular engagement with stakeholders before, during, and after events. Moving forward, countries may benefit from starting with practical, operationally manageable systems—clear thresholds, simple impact tables, and a few strong dissemination pathways—then gradually strengthening automation, localization, exposure-vulnerability integration, and feedback loops as institutional capacity grows.

TOT Workshop Activity

<u>Helen Caughey, UKMO</u>

This session shifted from technical content to facilitation practice, helping participants think through how to guide national-level discussions on anticipatory action, uncertainty, and sector-specific early actions. Rather than focusing on technical forecasting outputs alone, the session emphasized how NMHSs and partners can facilitate conversations with stakeholders to understand what actions are possible, when they need to be taken, and how risk appetite differs across sectors.

The session combined two interactive exercises. The first used a game-based approach to illustrate uncertainty, resource constraints, and decision-making under changing probabilities. The second focused on stakeholder role-play, where participants identified actions that different sectors might take at different lead times before and during an extreme heat event. Together, these exercises highlighted that effective IBF depends not only on forecast skill, but also on understanding stakeholder decision cycles, preparedness options, and the operational value of early information.

Key Insights
The first exercise used a simple game with dice, flood and drought "protection" gestures, and repeated rounds of decision-making to simulate how stakeholders make anticipatory choices under uncertainty. Participants were asked to decide how many years in a decade they would prepare for drought, flood, or normal conditions based on probability. In the second round, the probabilities changed to reflect climate variability and increasing extremes, showing how decisions based only on historical assumptions can quickly become inadequate.

This exercise helped participants reflect on several key ideas:
- anticipatory action is fundamentally about decision-making under uncertainty
- the challenge is not eliminating uncertainty, but optimizing limited resources despite it
- "normal" assumptions may fail as climate risks shift
- wrong or delayed decisions can lead either to wasted resources or to crisis conditions when protection is insufficient
- this kind of exercise can be used at national level as an accessible way to introduce stakeholders to the logic of forecast-based action

The second exercise placed participants in sectoral roles such as transport, utilities, education, and health, and asked them to identify actions that could be taken at different lead times before a heat event. Participants first listed actions for a general high-temperature scenario, then revisited those actions under a sequence of forecast updates: two to three weeks ahead, one to two weeks ahead, a few days ahead, and finally while the event was ongoing.

A key insight from this exercise was that many meaningful actions begin well before a meteorological threshold is formally reached. At longer lead times, stakeholders identified low-cost preparedness actions such as:
- reviewing and activating plans
- checking protocols and staff readiness
- conducting maintenance
- pre-positioning supplies
- starting awareness activities

- preparing cooling arrangements and support systems

As the event approached, actions became more operational and resource-intensive, including:

- shifting schedules and routes
- opening cooling spaces
- deploying staff and volunteers
- issuing advisories and warnings
- coordinating with other agencies
- preparing health services, supplies, and response mechanisms

During the event itself, participants identified response-oriented actions such as water distribution, active monitoring, incident reporting, and continued communication with affected populations.

The discussion underscored that if action begins only when a heatwave is formally declared, many important opportunities for preparedness are already lost. The exercise reinforced that early information may not always need to be a formal warning; it can also be an alert, outlook, bulletin, or coordination message that gives sectors enough lead time to prepare. This helps reduce both exposure and vulnerability before impacts intensify.

Recommendations

National demonstration workshops should include simple facilitation exercises like these to help stakeholders internalize the principles of anticipatory action, uncertainty, and lead-time-dependent decision-making. These methods are especially useful because they allow participants to explore their own risk appetite, operational constraints, and possible actions in a practical and non-technical way. They also help NMHSs understand what kinds of forecast information are actually useful to different sectors.

Going forward, facilitators should use these exercises not as ends in themselves, but as entry points for deeper discussion on warning design, stakeholder needs, and action protocols. The session showed that stakeholders often have many more possible actions at earlier lead times than forecasters may initially assume. This makes it essential for IBF systems to support not only final warnings, but also earlier forms of communication that can trigger preparedness, coordination, and low-regret action.

Session 11: Action-led Warnings for Temperature Hazards

Heat Risk Perception

Dr. KJ Ramesh & Raihanul Haque Khan, RIMES

This discussions emphasized that temperature warnings should be designed to trigger practical action, not only to classify hazards meteorologically. The presentations highlighted that thresholds and triggers need to reflect the needs of vulnerable groups, especially those affected by age and health conditions, social marginalization, and occupational exposure, while also accounting for accumulated heat, warm nights, seasonal onset, and local coping capacity. It was also stressed that different actors respond differently to forecast uncertainty, so action-led warning systems must consider the varying risk appetites of NMHSs, humanitarian agencies, sectoral departments, private actors, and media.

The presentations underscored that heat action planning should be grounded in the realities of who is most affected and when impacts begin, often before a formal heatwave threshold is reached. Existing heat action plans and national guidelines were recognized as useful foundations, but the discussion stressed the need to translate them into trigger-action systems that can activate timely sectoral responses.

A second key theme was that trigger design depends heavily on institutional purpose and risk appetite. Humanitarian actors may accept more uncertainty in order to avoid inaction, while NMHSs and other agencies may require higher confidence before acting. The presentations therefore distinguished between:

- deterministic triggers, which are fixed and easier to operationalize
- scenario-based triggers, which are more flexible and better suited to complex, uncertain, or multi-sector situations

Examples from Bangladesh, Vietnam, and landslide and flood anticipatory action showed that trigger design must be context-specific and impact-oriented. The discussion also highlighted the value of low-regret actions, such as preparedness measures that still strengthen resilience even if the hazard does not fully materialize.

Recommendations
Countries should move toward action-led warning systems that connect thresholds and triggers directly to the decisions different users need to make. Rather than relying only on fixed meteorological cutoffs, trigger development should incorporate vulnerability, sectoral exposure, historical impacts, operational capacities, and acceptable levels of uncertainty. Deterministic thresholds can still be useful for operational clarity, but scenario-based approaches may be more effective for complex hazards and anticipatory action. National systems should therefore continue strengthening coordination between NMHSs, sectoral agencies, and humanitarian actors so that warnings can support timely, proportionate, and user-relevant action.

Early Action Protocol
Ramiz Khan, RCCC

RCCC’s presentation focused on early action protocols (EAPs) as structured frameworks for anticipatory action, explaining how they define who should act, what actions should be taken, when and where they should happen, and how they should be operationalized. The presentation clarified that anticipatory action can happen without a formal protocol, but such responses tend to be more ad hoc and less scalable. Drawing on examples from Bangladesh, Myanmar, Nepal, and city-level heat planning, RCCC showed how EAPs, simplified EAPs, heat action plans, and SOPs can all serve as operational tools for turning forecast information into practical early action.

The presentation explained the usual process for developing an EAP: hazard identification, historical analysis, trigger and hotspot development, stakeholder and community consultation, early action design, simulation, validation, and final approval. RCCC stressed that consultations at national, local, and community levels are critical because they help identify feasible actions, validate thresholds, and ensure that the resulting protocol reflects real needs and capacities.

Key discussion points included:

- EAPs answer four core operational questions: who acts, what action is taken, when and where it is triggered, and how it is implemented.
- A distinction was made between full EAPs, simplified EAPs, heat action plans, and localized SOPs, depending on scale, complexity, and funding.
- Examples from Bangladesh and Myanmar showed how EAPs are often linked to humanitarian financing mechanisms, while city heat action plans may be supported through municipal budgets, donor funds, or corporate social responsibility contributions.
- RCCC described how early actions are prioritized through consultation and feasibility screening, including criteria such as social acceptability, technical feasibility, institutional capacity, and economic return.
- The Nepal examples highlighted practical interventions such as cooling centers, water ATMs, public warnings, household visits by trained volunteers, and water-break systems in schools.

Recommendations
RCCC's presentation recommends that countries adopt formal anticipatory action frameworks wherever possible, while also recognizing the value of simpler localized tools such as SOPs and heat action plans. These frameworks should be developed through sustained co-production with government, sector agencies, and communities, and should include not only triggers and hotspots but also financing, logistics, communication, and institutional roles. For temperature hazards in particular, cities and national agencies should consider combining immediate early actions with longer-term adaptation measures so that anticipatory action also contributes to broader resilience building.

IBF: Through Anticipatory Action for Flood
Man Kshetri & Sunil Bogati, WFP Nepal

WFP's presentation framed anticipatory action as a practical decision-support approach that helps humanitarian agencies mobilize resources before impacts escalate. Using Nepal's flood anticipatory action experience, the presenters showed how hazard, exposure, and vulnerability information can be combined through geospatial tools and scenario-based analysis to estimate likely impacts and guide readiness or activation decisions. The presentation also linked this work to broader national processes such as Nepal's evolving anticipatory action framework and the Early Warnings for All roadmap, emphasizing that forecasts only become meaningful when they support timely, life-saving action.

The presentation demonstrated how WFP and partners operationalize anticipatory action for floods through a decision-support system that integrates historical flood extent, exposure layers, vulnerability indicators, forecast rainfall, and modeled flood likelihood. Rather than relying only on rainfall forecasts, the system uses scenario-based analysis to estimate who and what may be affected and what type of action is appropriate under different trigger levels.

Key discussion points included:

- Anticipatory action must be end-to-end, linking forecasts to early action rather than stopping at prediction.
- Hazard mapping used historical flood extent, while exposure included settlements, roads, hospitals, schools, agricultural land, households, and population.
- Vulnerability layers included groups such as children, elderly people, pregnant and lactating women, persons with disabilities, households with unsafe water or sanitation, and weak housing structures.
- A scenario-based traffic-light system was used to connect rainfall outlooks and flood likelihood with readiness or activation actions.

Recommendations

The presentation suggests that countries should strengthen flood and temperature anticipatory action systems by investing in integrated decision-support platforms that combine forecasts with localized exposure and vulnerability data. These systems should be improved gradually through collaboration with NMHSs and sector agencies, incorporating better hydrological, terrain, and environmental inputs where available. The main recommendation was to move beyond forecast production alone and ensure that trigger systems are directly tied to sectoral action plans that can be activated in time.

Session 12: Behavioral Insights and Risk Communication

<u>Helen Caughey, UKMO and Ramiz Khan, RCCC</u>

This session examined how people perceive heat risk, how warnings are understood and acted upon, and why communication often fails to reach the most vulnerable groups. Drawing on perception studies from five cities in Nepal and Bangladesh, the first presentation showed that extreme heat is already widely recognized by communities as a serious and growing risk, especially for older persons, children, women, outdoor workers, and low-income households. However, many people still lack timely warnings, practical guidance, and the resources needed to act. The session emphasized that effective risk communication is not only about issuing forecasts, but about ensuring messages are accessible, locally relevant, understandable, and actionable, especially for last-mile communities.

Key Insights

- Many vulnerable groups still do not receive heat warnings early enough, or only hear of them through word of mouth.

- Communities want warnings to include expected temperature, duration, likely impacts, and clear protective actions.
- Trusted channels such as radio, local leaders, schools, health volunteers, loudspeakers, and community networks are often more effective than websites or technical bulletins.
- Warnings should be localized and contextualized, since the same temperature can be experienced very differently depending on housing, livelihoods, and neighborhood conditions.
- Communication should avoid jargon and instead use simple, locally meaningful language, visuals, and examples from past events.
- People are more likely to act when they perceive the threat as real, understand what to do, and have access to the resources needed to respond.
- The closing discussion also noted that communication strategies should remain practical and manageable, especially for national demonstrations, rather than becoming overly complex at the outset.

Recommendations
MHSs and partner agencies should strengthen heat risk communication by designing warning systems around the realities of vulnerable communities rather than around technical dissemination alone. This means co-producing messages with local actors, using multiple trusted channels, tailoring content to different groups and locations, simplifying language, and linking warnings to concrete actions and support services. Risk communication should also be treated as a sustained engagement process, not a one-way message, so that communities can build trust, recognize their own risk, and respond before heat impacts become severe.

Session 13: Operational IBF Workflows and Decision Support

Enhancing IBF in Nepal: Findings from the Stimson Center Assessment
Jeevika Khadka, Stimson Center

This presentation shared findings from an independent assessment of IBF implementation in Nepal, conducted with DHM and national stakeholders. The assessment covered IBF pilots for heavy rainfall across multiple municipalities and drew on extensive consultations with government agencies, local authorities, and communities. It highlighted both progress and variability in implementation across locations.

While IBF has demonstrated value—especially where local ownership is strong—its effectiveness depends heavily on coordination, local capacity, and alignment with existing disaster risk management systems. The assessment reinforced that IBF must be embedded within institutional processes and supported by continuous stakeholder engagement to be sustainable.

IBF performance in Nepal is shaped primarily by institutional coordination and local capacity.

- Uneven implementation: Strong outcomes where there is local ownership and coordination; weaker where momentum and alignment are lacking
- Coordination gaps: Activities are often fragmented across actors and not fully aligned with DHM
- Operational constraints: Challenges in forecast downscaling, data gaps, and impact data collection
- Critical role of local actors: DRR focal persons are key but overburdened and not formally institutionalized
- Communication gaps: Bulletins are not easily usable by communities; accessibility and feedback mechanisms need improvement
- Link to action: IBF effectiveness depends on clear connection to early/anticipatory action systems

Strengthening IBF in Nepal requires improving coordination across national and local actors, formalizing roles (especially DRR focal persons), and integrating IBF within existing DRM systems rather than treating it as a parallel process. Efforts should focus on enhancing local capacity, improving impact and vulnerability data systems, and refining communication products to be more accessible and actionable. Sustained progress will depend on stronger local ownership, better feedback mechanisms, and closer alignment with anticipatory action frameworks to ensure forecasts consistently lead to effective early action.

Operational Warnings in the UK
Helen Caughey, UKMO

The discussion outlined how IBF is embedded into structured operational workflows for issuing warnings. It demonstrated a mature system where hazard forecasts, vulnerability information, and stakeholder inputs are integrated through coordinated, time-bound processes supported by clear institutional mandates.

A key feature of the system is the integration of multiple actors—forecasting teams, liaison officers, and sectoral partners—into a unified decision-making process. This enables warnings to reflect both meteorological conditions and real-time contextual factors, ensuring they are relevant, consistent, and actionable.

Operational IBF is enabled by structured workflows and strong coordination mechanisms.

- Workflow-driven system: IBF is embedded in daily, time-bound decision processes
- Liaison roles add value: Dedicated advisors integrate real-time local and non-meteorological information
- Multi-agency coordination: Inputs from sectors and partners ensure consistent and aligned warnings
- Expert judgment remains essential: Decisions combine tools, data, and forecaster interpretation
- Early engagement matters: Pre-warning coordination improves preparedness and response

- Communication is evaluated: Warning effectiveness is assessed through user response and feedback

The discussions show that effective IBF depends on institutionalizing workflows, strengthening coordination across agencies, and integrating dynamic vulnerability information into decision-making. Countries should focus on developing clear operational processes, improving collaboration with sectoral partners, and introducing mechanisms—such as liaison roles—to bridge forecasting and response communities. Even in resource-constrained contexts, adopting simplified versions of these practices, along with continuous evaluation and user feedback, can significantly improve the effectiveness and consistency of IBF systems.

Early Warning for All (EW4All) Roadmap Nepal
Dr. Popular Gentle, WFP

This presentation outlined Nepal's progress in developing a national roadmap for the Early Warning for All (EW4All) initiative, aligned with the global target of universal early warning coverage. The roadmap is structured around the four global pillars—risk knowledge, forecasting, dissemination, and preparedness—each led by designated government agencies with support from UN and technical partners. Nepal has adopted a coordinated, multi-stakeholder approach, supported by a technical working group and anchored within government systems.

The roadmap development followed a highly consultative and inclusive process, incorporating national and subnational inputs to reflect Nepal's federal structure and diverse risk context. A costed draft roadmap (2025–2030) has been completed and is currently undergoing validation and endorsement. While the plan is technically robust and well-aligned with national policies, key challenges remain in securing financing, mainstreaming into government systems, and sustaining multi-sector coordination.

Nepal's EW4All roadmap demonstrates a well-structured and inclusive national approach, but its success will depend on transitioning effectively from planning to implementation. Priority actions include mobilizing sustainable financing, strengthening cross-sector integration—particularly with health and other non-traditional sectors—and embedding EW4All into existing governance and planning systems at all levels. Continued coordination through established institutional mechanisms and technical partnerships will be essential, alongside efforts to operationalize data sharing, enhance feedback systems, and ensure that early warning services translate into timely and effective early action across all sectors.

Session 14: TOT, Cross-Country Synthesis of National Pilor Demos, and Roadmap to Implementation & Post-Workshop Support

Helen Caughey, UKMO

This session consolidated the week's learning by synthesizing tools, approaches, and country experiences into a practical pathway for implementing national IBF demonstrations. Through an interactive exercise, participants identified a wide range of tools and methodologies introduced during the workshop, forming a collective “toolkit” that countries can selectively apply based on their readiness, context, and priorities. Emphasis was placed on realism—countries are not expected to adopt all tools immediately but to prioritize feasible, high-impact actions for initial implementation.

The session then shifted toward operational planning, where country teams developed detailed short-term timelines (next 1–2 months) for their IBF demonstrations. This included defining milestones such as data analysis, threshold setting, stakeholder engagement, and pilot implementation. Complementary group exercises further explored coordination mechanisms by assigning participants different stakeholder roles (e.g., NMHS, health, CSOs, sector agencies), highlighting the interdependencies required for effective IBF delivery and reinforcing the importance of co-production.

Key Insights

The session emphasized transitioning from knowledge to action through prioritization and coordination.

- Toolkit approach: IBF implementation should be context-driven, selecting only relevant tools rather than applying all
- Phased implementation: Countries should focus on immediate, realistic steps aligned with seasonal timelines
- Detailed planning is critical: Clear timelines, milestones, and responsibilities are essential for post-workshop momentum
- Coordination is central: IBF requires multi-sector collaboration (NMHS, health, DRR, CSOs, sector agencies)
- Role clarity matters: Understanding who does what improves efficiency and reduces duplication
- Co-production mindset: Effective IBF depends on two-way engagement, including data sharing and feedback loops
- Learning-by-doing: National demonstrations are iterative pilots, with lessons informing future scaling and multi-hazard applications
- Capacity transfer (ToT): Exercises are designed to be replicated at national level, especially for stakeholder engagement

Recommendations

The session underscored that successful IBF implementation depends on maintaining momentum beyond the workshop through structured follow-up actions. Countries should prioritize finalizing short-term implementation timelines, identifying key stakeholders and their roles, and developing clear agendas for upcoming national workshops. Strengthening coordination mechanisms—such as technical working groups and regular multi-sector engagements—will be essential to operationalize IBF effectively. Additionally, adopting a phased and adaptive approach, supported by continuous learning and feedback, will enable countries to progressively refine their systems and expand IBF applications across hazards and sectors.

Session 15: Monitoring, Evaluation, and Learning (MEL) in IBF

Thanut Rittichai, RIMES

This session introduced Monitoring, Evaluation, and Learning (MEL) as a critical component of national IBF demonstrations, emphasizing its role in tracking progress, assessing effectiveness, and generating evidence for scaling. MEL was positioned not only as a reporting mechanism but as a continuous feedback system that supports adaptive implementation, refinement of IBF products, and long-term institutionalization. It highlighted the need to establish clear baselines, define measurable indicators, and integrate MEL early in the project cycle.

Within the SAHF context, MEL is essential for validating regional frameworks and toolkits in country-specific settings while ensuring both scientific rigor and operational relevance. The session outlined how MEL supports co-production processes, user engagement, and decision-making by linking technical performance (e.g., forecast accuracy, timeliness) with societal outcomes (e.g., user understanding, behavioral response, reduced impacts). It also stressed the importance of inclusive data practices, particularly disaggregation by gender, age, disability, and geography.

Key Insights

MEL enables evidence-based IBF implementation and continuous improvement.

- Three core functions:
    - Monitoring: Tracks progress, performance, and delivery
    - Evaluation: Assesses effectiveness and societal impact
    - Learning: Drives adaptation, refinement, and sustainability
- Dual focus of indicators:
    - Technical: Forecast accuracy, lead time, data reliability
    - Operational: Dissemination reach, coordination effectiveness, user uptake
- Importance of baseline and targets: Clear pre-implementation benchmarks are essential for meaningful evaluation
- User-centered evaluation: Understanding perception, trust, and behavior change is as important as technical performance
- Data disaggregation is critical: Enables inclusive and targeted IBF, especially for vulnerable groups
- Mixed-method approaches preferred: Combining quantitative (metrics) and qualitative (FGDs, surveys, case studies) provides deeper insights
- Post-event analysis is key: Tools like PERM (Post-Event Review Mechanism) help identify bottlenecks and improve workflows
- Evidence supports scaling: MEL outputs strengthen government buy-in, funding, and institutionalization

Recommendations

Integrating MEL into national IBF demonstrations is essential to ensure that implementation is not only technically sound but also impactful and scalable. Countries should prioritize defining a small set of practical, context-specific indicators, establishing baselines before implementation, and adopting a mixed-method approach to capture both technical performance and user outcomes. Regular monitoring, structured post-event reviews, and continuous learning loops should be institutionalized to refine IBF products and processes. Ultimately, MEL should be used strategically to generate credible evidence that supports policy uptake, resource mobilization, and the transition from pilot demonstrations to sustained, nationwide IBF systems.

III. Country Demo Planning Presentations

Bangladesh

Bangladesh's demonstration will be led by the Bangladesh Meteorological Department (BMD), with a strong sectoral focus on livestock, which is identified as the primary co-lead sector. Additional partners include local government, NGOs, community-level organizations, and extension services. While the focal person is not yet finalized, it is proposed that leadership will be anchored at the Director level of BMD.

The demonstration has been refined to focus specifically on heat-related risks affecting livestock, incorporating both heatwave conditions and persistent "hot day" conditions, recognizing that impacts occur even without formal heatwave classification. The project is planned as a one-year pilot (March 2026 – February 2027), with two proposed pilot regions:

- Western Bangladesh (e.g., Rajshahi) – highly prone to heatwaves
- Northern sandy soil regions – with high livestock concentration and vulnerability

A key refinement from earlier discussions is the explicit integration of the Temperature Humidity Index (THI) as the core indicator for livestock-related impacts, moving toward a more sector-specific IBF approach.

Planned Implementation During the Season

The demonstration will operationalize heat-related IBF for livestock, building on existing but not yet fully tested products. BMD has already begun generating THI-based products using WRF and ECMWF outputs, but these have not yet been widely validated or operationalized.

Implementation will include:

- Development and testing of specialized heat early warning products for livestock
- Use of THI as the primary hazard-impact linkage indicator
- Integration of meteorological data (including long historical records in some regions) with livestock and sectoral data
- Regular coordination meetings (twice monthly) before, during, and after the season
- Development of sub-seasonal outlooks and improved advisories

Dissemination strategies will include:

- Leveraging BMD communication platforms and social media
- Collaboration with BBC Media Action and RIMES for communication products

- Use of school-based meteorological clubs ("Met Clubs") and youth groups as dissemination channels
- Engagement with livestock extension officers and service providers, who act as intermediaries to farmers

The demonstration also aims to begin formalizing forecast-to-action pathways, which are currently absent, including the development of SOPs and advisory frameworks.

Coordination with Sector/User Agencies
Coordination is currently one of the weakest areas identified in Bangladesh's system. There is:

- No established SOP for heatwave or cold wave services
- Limited coordination across sectors, particularly between BMD and livestock agencies
- No formalized multi-sector IBF coordination mechanism

The demonstration aims to address this by:

- Establishing regular coordination meetings with stakeholders
- Initiating coordination at the national level, followed by expansion to pilot areas
- Strengthening engagement with livestock sector agencies, extension services, and local actors

A notable proposal is to replicate an existing technical working group model (used in Bangladesh's landslide early warning system), which could serve as a continuous interaction platform between BMD and user sectors. This reflects a shift toward more institutionalized and sustained coordination.

Design Questions, Gaps, and Uncertainties

- Absence of SOPs for temperature-related hazards
- Limited inter-agency coordination mechanisms
- Need to test and localize THI thresholds for Bangladesh conditions
- Limited availability of livestock and exposure data at local levels
- Uneven availability of historical meteorological data across regions
- Uncertainty on how long a pilot period is sufficient (noting that one season may not be enough for robust validation)

Technical questions include:

- How to refine thresholds and triggers for livestock impacts
- How to integrate multiple forecast sources (WRF, ECMWF, AI-based models)
- How to develop effective communication strategies, given BMD's limited mandate for direct dissemination
- How to link forecast outputs to actionable advisories for farmers and livestock managers

Immediate Plans and Activities After the Workshop

- Finalize the pilot locations and project structure

- Establish or adapt a technical working group for coordination
- Begin testing and validation of THI-based products
- Initiate stakeholder engagement at national level, followed by pilot-area activities
- Continue organizing and leveraging the National Climate Application Forum
- Develop training programs for forecasters and sector stakeholders
- Begin drafting SOPs and advisory frameworks for heat-related IBF

The immediate priority is to move from concept to operational testing, particularly for THI-based advisories and coordination mechanisms.

Expert Comments / Suggestions (UKMO / RIMES)
RIMES emphasized the importance of establishing a technical working group with user sectors, noting that this would create a continuous and interactive coordination platform. Bangladesh confirmed that a similar model already exists for landslide early warning and could be replicated for this demonstration.

A key technical recommendation from RIMES was to consider heat stress accumulation over time, rather than relying solely on instantaneous temperature thresholds. Specifically:

- Heat impacts on livestock may begin 5–7 days before peak temperatures
- Changes in diurnal temperature range (difference between day and night temperatures) can serve as an early signal
- These indicators should be incorporated into trigger development and early warning design

WMO experts also offered support through extreme heat factor analysis, which could help Bangladesh:

- evaluate and validate its demonstration outputs
- refine thresholds and improve scientific robustness
- co-develop analytical products for long-term scaling

Overall, experts encouraged Bangladesh to build on its existing THI work, prioritize coordination and SOP development, adopt a progressive testing approach, recognizing that refinement will require multiple cycles, and leverage available regional and technical support rather than waiting for a fully mature system before implementation.

The overarching recommendation was to start operational testing with available tools and data, while iteratively improving thresholds, coordination, and communication through the demonstration process.

Bhutan

Bhutan presented an updated plan for IBF for temperature extremes, with NCHM as lead and the Department of Public Health as co-lead. Since the previous workshop and consultations, key refinements include the completion of a 30-year climatological dataset, initial testing of Tmax-based thresholds (2025 experimental monitoring), and expanded stakeholder engagement, particularly with health and training institutions already experiencing heat impacts.

The initial plan to implement both heat and cold demonstrations across multiple regions has been reconsidered. Bhutan is now moving toward a more focused and operationally feasible approach, acknowledging constraints in staffing, data availability, and time before the upcoming season.

Planned Implementation During the Season
The demonstration follows a seasonal operational workflow:

- Pre-season: Coordination with sectors to define thresholds, SOPs, roles, and communication channels
- During season: Regular forecast briefings, issuance of advisories/warnings, and sector-led early actions
- Post-season: Joint review, user feedback collection, and refinement of thresholds and processes
- For the upcoming summer, Bhutan is considering narrowing the pilot to a priority area and sector, enabling a more manageable and effective implementation.

Coordination with Sector/User Agencies
Coordination has strengthened, particularly with:

- Department of Public Health: Active co-lead with strong interest in heat-health applications
- Training academies/schools: Direct engagement based on observed student heat exposure
- Agriculture and livestock agencies: Initial discussions on sectoral impacts
- National Statistics Bureau and local governments: Engagement for exposure and demographic data

However, coordination remains at an early stage, with key datasets (e.g., health impacts, agriculture losses) still under discussion or not yet accessible.

Design Questions, Gaps, and Uncertainties
Key areas requiring expert support include:

- Transitioning from climatology-based (Tmax) thresholds to impact-based, multi-variable thresholds
- Addressing lack of historical impact data and limited vulnerability/JEDC information
- Need for clear, practical methodologies for integrating hazard, exposure, and vulnerability
- Determining the appropriate scale and scope for initial implementation
- Managing capacity constraints (limited staff and competing responsibilities)

Immediate Plans / Activities after the Workshop

- Refine thresholds and IBF design using workshop learnings
- Conduct national stakeholder consultations and capacity-building workshops

- Strengthen data collection and integration, especially with health and agriculture sectors
- Prepare for pilot implementation in the upcoming summer season
- Develop monitoring, documentation, and learning processes, with support from RIMES

Expert Comments / Suggestions (UKMO / RIMES)
Experts emphasized adopting a practical, iterative approach to implementation rather than waiting for complete datasets or systems. Bhutan was encouraged to:

- Start with available data (e.g., Tmax thresholds) and progressively refine using additional variables and sector feedback
- Leverage existing strong partnerships, particularly with public health and academies, as entry points for impact data and co-production
- Use participatory approaches (e.g., stakeholder consultations, storytelling, community inputs) to compensate for limited historical impact data
- Prioritize a focused pilot (one area, one sector) to ensure quality implementation and generate early success for scaling
- Apply trend analysis and hotspot identification (e.g., temperature trends, land-use changes) to guide geographic prioritization
- Treat IBF as a learning-by-doing process, where initial outputs are improved through post-event reviews and feedback

India

India's presentation showed that impact-based forecasting for temperature hazards is already operational in parts of the country and is now moving into a phase of further refinement and localization, rather than first-time piloting. The India Meteorological Department (IMD) remains the lead on forecasting, while the National Disaster Management Authority (NDMA) and the State Disaster Management Authorities (SDMAs) anchor action planning at national and state levels. The presentation also made clear that India's stakeholder landscape has expanded significantly: beyond disaster agencies, users now include irrigation, flood agencies, dam managers, aviation, fisheries, defense, ports, and even event organizers.

Compared with earlier discussions, the demonstration concept appears to have evolved from a broad national framing toward a more focused demonstration lens, with Rajasthan highlighted as a likely hotspot for concentrated work, while coastal/humid contexts remain important comparators. The emphasis is now less on creating an entirely new system and more on strengthening existing heat and cold IBF systems, improving city- and sector-specific tailoring, refining impact tables, and making products more user-specific and operationally actionable.

Planned Implementation During the Season
Operationally, India's approach is built on systems already in place. IMD already produces heat and cold hazard maps, vulnerability maps, thresholds for plains, hills, and coastal areas, and multiple impact tables to reflect regional differences. The

demonstration would therefore focus on applying and refining these tools during the season, especially in priority hotspots, rather than starting from scratch.

The implementation approach includes using:

- existing climatological and hazard hotspot maps to identify priority locations;
- operational forecast SOPs within IMD;
- NDMA and SDMA action plans for preparedness and response;
- multi-hazard assessment where relevant, such as combining cold wave with dense fog;
- multiple dissemination channels, including bulletins, videos, social media, websites, and media partnerships.

The presentation also stressed that temperature hazards are not treated only through formal heatwave criteria. India already accommodates marginal but impactful cases, such as hot and humid conditions below official heatwave thresholds, through additional warning categories. That gives the demonstration a more realistic operational basis for heat stress, not just extreme temperature exceedance.

Coordination with sector/user agencies

Coordination is one of the strongest features of the India model. IMD described an extensive and growing user network, with sectors already interacting regularly with the service and using forecast products for operational decisions. Sectoral coordination appears to happen through a combination of:

- direct consultation with relevant agencies;
- state and city disaster management structures;
- sector expert groups, especially for agriculture;
- ongoing refinement of products based on stakeholder feedback.

A strong point highlighted in the presentation is that sector-specific expertise is embedded into the service chain. For example, agriculture advisories are not issued solely by meteorologists; they are developed with designated agricultural universities and research institutes. This helps ensure that the IBF products are credible and usable from the end-user perspective.

At the same time, India noted that city-specific action planning is becoming increasingly important, since state-level plans alone are not always sufficient to capture local variation in impact, exposure, and response requirements.

Design Questions, Gaps, and Uncertainties

Even though India is relatively advanced, the presentation still identified several areas where expert input would be valuable. These include:

- Refining demonstrations to be more location-specific and sector-specific;
- Further integrating heat stress accumulation before formal heatwave onset;
- Keep improving impact tables and make them more dynamic;
- Digitizing and accessing impact data for faster updating;
- Continue improving automation without losing necessary expert screening;

- Strengthening urban- and city-scale threshold design, especially in humid/coastal conditions.

A practical question also emerged during the discussion: whether the demonstration should focus only on Rajasthan or include a contrasting coastal/humid state as well. This reflects a useful design consideration for India, since dry heat and humid heat create different impact pathways and may need different operational treatment.

Immediate plans and activities after the workshop
India indicated that the demonstration concept will be discussed further with competent authorities before finalizing the exact scope. The immediate next steps appear to be:
- deciding the geographic focus for the demonstration, with Rajasthan already highlighted and a coastal counterpart suggested;
- continuing refinement of existing IBF products rather than building new systems from zero;
- incorporating lessons from the workshop, especially around heat stress accumulation, percentile monitoring, and economic impact assessment;
- exploring use of tools such as the ESCAP portal to strengthen economic loss and exposure analysis;
- continuing collaboration with state and sector partners to sharpen user-oriented products.

Because India already has operational systems, the main post-workshop task is not basic setup, but selective enhancement and focused testing of improved methods within existing workflows.

Expert Comments / Suggestions (UKMO / RIMES)
The expert feedback on India was largely affirmative, with the UK Met Office and RIMES highlighting India as an example of a system that is already mature and can now support deeper refinement.

The main suggestions were:
- Use Rajasthan plus one coastal/humid state for the demonstration, rather than only one dry-heat context. This would help test how the framework performs under different heat regimes.
- Do not focus only on formal heatwave onset. Experts emphasized the need to monitor heat stress accumulation before full heatwave conditions develop, especially because agriculture and other sectors may already be affected before official thresholds are crossed.
- Continue using percentile-based monitoring and integrate it more clearly into operational heat stress tracking.
- Build on existing strengths: India was specifically recognized as a strong example of how relatively simple temperature thresholds, when linked to strong heat action plans and sector coordination, can still deliver major benefits.
- Keep refining city-specific and sector-specific action plans, since local tailoring is increasingly where the next gains in effectiveness will come from.

A particularly important UKMO/WMO reflection was that India demonstrates how success does not always require the most complex indicator. What matters is the combination of usable thresholds, trusted institutional coordination, action plans at the right level, and strong stakeholder uptake.

Maldives

The Maldives demonstration will be led by the Maldives Meteorological Service (MMS), with key sector partners including the Health Protection Agency (HPA), Ministry of Agriculture and Animal Welfare, State Electric Company, Ministry of Education, and implementing partners such as Maldives National University, NDMA, Red Crescent, local councils, and Malé City Council. The demonstration is explicitly focused on Malé, the most densely populated urban area.

The plan is clearly refined around a heat-only, urban-focused demonstration, recognizing that Maldives' primary risk is not extreme heat waves but persistent high temperature and heat stress conditions, particularly during March–May. The project is titled "Inclusive Heat Risk Mitigation of Malé, Maldives" and reflects a strong emphasis on urban vulnerability, exposure, and service delivery. A key refinement is the recognition that existing temperature information (probabilistic outlooks) is not actionable for the public, and therefore needs to be translated into impact-based, user-relevant advisories.

Planned Implementation During the Season

The demonstration will follow a three-phase approach:

Before the season (pre-March):

- Analyze ~30 years of temperature data to identify trends and extremes
- Develop temperature hazard maps and thresholds
- Select appropriate indices (e.g., apparent temperature, heat index)
- Develop impact tables and identify vulnerable groups
- Conduct media briefings and stakeholder engagement

During the season (March–May):

- Monitor conditions using available forecasts and observations
- Issue advisories and warnings based on severity, certainty, and urgency
- Provide regular updates to sector focal points
- Conduct media briefings, which are critical for last-mile communication

After the season:

- Conduct public perception surveys
- Assess exposure and vulnerability
- Review performance with stakeholders
- Refine thresholds, advisories, and formats

Operationally, Maldives already has:

- Forecast and dissemination systems (including CAP-based alerts)
- Strong multi-channel communication pathways reaching national to island level

However, the key shift in this demonstration is toward embedding impact information into warnings, rather than just disseminating hazard-based messages.

Coordination with Sector/User Agencies

Coordination will involve a broad multi-sector group including health, agriculture, energy, education, disaster management, local government, and media

A key strength identified is that dissemination mechanisms are already well-established, including:

- CAP messaging systems
- Coordination with NDMA, police, defense, and media
- Strong last-mile reach through institutional networks

However, the main coordination gap lies not in dissemination, but in:

- Data sharing across sectors (especially vulnerability data)
- Lack of temperature-specific SOPs and thresholds
- Limited integration of impact-based information into messaging

The demonstration aims to address this by:

- Establishing a working group for continuous interaction
- Strengthening data sharing and co-development of thresholds and triggers
- Enhancing coordination with media as a core operational partner

Design Questions, Gaps, and Uncertainties

- No temperature-specific SOPs or thresholds, despite having multi-hazard SOPs
- Lack of impact-based messaging, even though dissemination systems are strong
- Limited access to vulnerability and sectoral data, despite availability within agencies
- Need for improved forecast products, including:
    - High-resolution temperature forecasts
    - Bias correction and verification
    - Additional regional datasets

Technical questions include:

- Which indices are most appropriate (apparent temperature vs heat index vs WBGT)
- Properly calculating and validating heat-related indices
- Integrating humidity and wind effects into impact assessments
- Developing sector-specific anticipatory actions

There is also a practical challenge of very limited time before implementation (March), requiring rapid prioritization.

Immediate Plans and Activities After the Workshop

- Immediately share workshop learnings internally and initiate technical work
- Begin threshold analysis and refinement using existing data

- Establish a technical working group for continuous coordination
- Start issuing improved advisory information even if initial thresholds are not perfect, especially due to:
    - the imminent heat season
    - additional urgency due to Ramadan period, when heat exposure risks increase

The approach is explicitly “start now, refine later”, recognizing the urgency of providing actionable information to the public.

Expert Comments / Suggestions (UKMO / RIMES)
Experts acknowledged Maldives as one of the most time-sensitive cases, given the immediate onset of the heat season.

On approach and timing:

- UKMO strongly supported the decision to start with available tools and refine iteratively, rather than delaying implementation.
- The emphasis was on providing actionable advice immediately, even if thresholds are still being improved.

On indices and methodology:

- RIMES emphasized the importance of using combined indicators (temperature + humidity + wind) rather than relying on temperature alone.
- Experts recommended exploring:
    - heat index / humidex
    - apparent temperature
    - additional indices available from ECMWF and regional platforms
- It was noted that earlier calculations (e.g., extreme heat index values) may contain methodological errors, and should be:
    - verified against ECMWF products
    - recalibrated using consistent formulas

On data and tools:

- use ESCAP and other regional datasets for trend analysis
- explore high-resolution spatial products (e.g., 1 km datasets)
- develop geospatial maps of heat risk and sector exposure

On coordination and system development:

- RIMES recommended establishing a technical working group to:
    - co-develop thresholds and triggers
    - continuously test and refine products
    - enable day-to-day collaboration across sectors
- Experts also emphasized that thresholds define sectoral risk levels and triggers define actions for agencies

Overall recommendation:

- leverage its strong dissemination systems immediately
- focus on improving content (impact-based messaging and thresholds)
- adopt a rapid, iterative implementation approach
- build toward a more robust IBF system through continuous refinement and stakeholder engagement

Maldives was highlighted as a case where operational urgency and strong communication capacity can enable rapid early gains, even as technical components continue to evolve.

Myanmar

Myanmar presented a refined and narrowed demonstration concept compared with the earlier plan submitted in December. The original proposal covered a broader central dry zone, but following project timeline considerations, technical constraints, and available capacity, the demonstration has now been focused on one pilot location in Mandalay. This is a significant refinement, making the demo more realistic and manageable operationally.

The demonstration will focus first on extreme heat only, rather than both heat and cold. While the team noted interest in eventually expanding to cold-related impacts in hilly and mountainous areas, the immediate priority is to test a heat-focused IBF demonstration in Mandalay during March–May, when the heat risk is highest. The plan is led by the Department of Meteorology and Hydrology (DMH), with intended sectoral engagement from health, livestock, agriculture, energy, transport, disaster management authorities, MRCS, local authorities, CSOs, academia, and schools.

Planned Implementation During the Season

Operationally, Myanmar intends to use the demonstration to pilot an impact-based framework for temperature extremes in Mandalay, using over 30 years of climate data and, where possible, socioeconomic and sectoral data. The main aim is to connect forecast temperature conditions with community vulnerability and sectoral impacts, and then translate these into clear advisories and response actions.

The demonstration will seek to:

- Identify high-risk urban and community zones in Mandalay
- Develop impact-based warnings and advisories for heat
- Support preparedness and early response among local authorities, the health sector, and communities
- Improve risk communication and community outreach, especially for vulnerable groups such as low-income households, women, outdoor workers, persons with disabilities, students, and farmers

Myanmar also noted that current warning services mainly provide temperature anomaly information and basic warning messages, but do not yet operationalize an IBF approach with standardized impact-based SOPs or EAPs. The demonstration is therefore intended as a first operational step toward that system.

Coordination with Sector/User Agencies
Coordination is recognized as a major requirement and also a major gap. DMH identified key coordination needs with:

- Public health
- Disaster management
- Agriculture
- Myanmar Red Cross Society
- Local government authorities
- Community-level stakeholders

The team noted that before implementing the demonstration, they will need to explain the IBF concept clearly to partner agencies, since many do not yet fully understand what IBF is, what data are needed, or how they can use the resulting forecast products in their own work. Myanmar plans to use the National Monsoon Forum as an entry point to begin this sensitization and consultation process, since it is an existing coordination platform that already brings stakeholders together.

However, current coordination mechanisms remain limited. Myanmar does not yet have a formalized multi-agency IBF coordination mechanism, nor sector-specific SOPs for impact-based temperature forecasting, so these will need to be developed progressively.

Design Questions, Gaps, and Uncertainties
Myanmar raised a number of important technical and operational questions where expert support would be valuable:

- Moving from percentile-based temperature monitoring to a more complete impact-based heat forecasting framework
- Integrating meteorological data with sectoral datasets
- Methodology to use to combine hazard, exposure, and vulnerability information
- Types of additional meteorological variables beyond Tmax to be used
- Using or overlaying sectoral and exposure data in practical IBF design
- Building a heat-focused dashboard or portal
- How to proceed when ground data are incomplete or outdated, especially after the earthquake
- Obtaining more accurate and updated population, housing, and exposure data, given that many conditions changed after the earthquake

A central uncertainty is that while DMH has meteorological data, the sectoral data needed for impact-based analysis are limited, fragmented, and difficult to access. This makes threshold design, hotspot mapping, and risk targeting more challenging.

Immediate Plans and Activities after the Workshop

- Continue refining the pilot focus on Mandalay and heat-only implementation
- Use the coming period before the season to engage partner agencies and explain the IBF concept

- Explore integration of high-resolution data and available tools
- Begin discussions on how to revise or develop SOPs to include IBF
- Use the National Monsoon Forum as a platform to initiate stakeholder consultation and awareness
- Explore the use of available tools such as the ESCAP portal and related datasets
- Seek support for initial workshops, meetings, and capacity building
- Clarify what sector data can realistically be obtained and used for the first demonstration cycle

Myanmar also emphasized the need for financial support for consultations, workshops, and initial implementation steps, alongside technical support.

Expert Comments / Suggestions (UKMO / RIMES)
On focus and scale:

- The decision to reduce the demonstration to one pilot area was seen as a sensible refinement.
- Experts encouraged Myanmar to build on existing coordination platforms, especially the National Monsoon Forum, instead of creating entirely new structures immediately.

On vulnerability and post-earthquake context:

- UKMO noted that the post-earthquake situation may actually make the Mandalay pilot highly relevant, since damaged housing, disrupted services, and increased outdoor labor may have heightened vulnerability to heat.
- Even where formal data are incomplete, Myanmar was encouraged to gather qualitative and local knowledge from sector agencies and communities to begin identifying hotspots and vulnerable groups.

On technical development:

- RIMES recommended that Myanmar start using the ESCAP portal and available data layers immediately, alongside DMH forecast products, to better understand how heat risk patterns evolve spatially and temporally.
- Experts advised Myanmar to explore additional parameters beyond temperature, including humidity and wind, since heat impacts are not determined by temperature alone.
- The team was encouraged to compare how heat stress or heat index patterns change over time and across areas, rather than relying only on Tmax percentiles.

The overall recommendation was to start with a manageable, operationally feasible heat demonstration in Mandalay, then gradually expand the methodology and partnerships once the first cycle generates lessons and confidence.

Nepal

Nepal's proposed demonstration is led by the Department of Hydrology and Meteorology (DHM), with intended sector co-leads and partners including NDRRMA, NARC, AITC, the health sector, private sector actors, NGOs, and INGOs. The project is framed as the implementation of temperature-based IBF piloting in Nepal, with a geographic focus on the Tarai areas of Lumbini and Madhesh Provinces, where both heat-related hazards in summer and cold, fog, and cold-day conditions in winter are significant.

Compared with the earlier workshop discussions, the Nepal plan is now more clearly structured as a full annual pilot cycle, covering both warm- and cold-season implementation. The current concept is to run the heat-focused demonstration from March to June 2026, review and analyze it during September to November, and then implement a cold-season demonstration from December 2026 to February 2027. The presentation also reflected a refinement in thinking from a general temperature-service approach toward a more explicit temperature-based IBF framework, building on Nepal's prior experience with rainfall IBF, which has already expanded from four districts and 16 local levels in 2021 to 11 districts and 35 local levels.

Planned Implementation During the Season
Operationally, the demonstration will build on DHM's existing forecasting and communication capacities, including:

- Hourly temperature, humidity, wind, and solar radiation from automatic weather stations
- NWP outputs for precipitation, temperature, and wind for the next three days
- Existing climate products such as normals, anomalies, percentiles, and extremes
- Existing communication channels such as bulletins, graphics, audio/video products, website, email, media, phone calls, and SMS

The intent is to use these existing systems as the operational base for the seasonal demos, while gradually introducing temperature-based IBF products and advisory workflows. Nepal's plan aims to generate:

- 72-hour early warning capacity
- Better temperature and anomaly forecasts
- Heat-related indices such as heat index
- More targeted advisories with verification and feedback mechanisms

Sector use of these warnings for protective action, including health preparedness, school decisions, agriculture response, and water-related planning

The pilot area selection reflects the operational rationale: the southern lowland areas of Lumbini and Madhesh already experience very high summer temperatures, while also facing winter fog and cold-day conditions, allowing Nepal to test both hazard types within one broader pilot geography over one year.

Coordination with Sector/User Agencies
Coordination is already partially in place through DHM's existing relationships with several agencies. Nepal indicated that:

- DHM already exchanges climate data and products with the health sector and agriculture/NARC

- Warnings are also passed to NDRRMA, which then disseminates further through government channels
- There is also collaboration with the tourism sector

However, the key limitation raised was that most of these coordination arrangements are still stronger at the national level than at the provincial and local levels. For the upcoming national demonstration, Nepal acknowledged the need to develop a clearer operational mechanism to connect DHM and national agencies with the actual local implementation level, where communities and sector actors will use the warnings.

This is especially relevant because the temperature demo will require stronger engagement not only with national-level ministries and agencies, but also with:

- Local governments
- Health facilities
- Schools
- Agricultural extension actors
- Possibly tourism, water supply, and other local service providers

Nepal noted that this local-level coordination mechanism still needs to be clarified and developed further after the workshop.

Design Questions, Gaps, and Uncertainties

- Limited local-level data availability, especially for:
    - agriculture
    - socioeconomic conditions
    - land use/land cover
    - schools and hospitals
    - health case data and demographics
    - crop calendars and crop varieties
    - groundwater and water supply systems
- The need for better medium-range and longer lead-time forecasting, beyond the current short-range operational capacity
- Technical support needs around:
    - NWP validation and downscaling
    - WRF improvement and possible data assimilation
    - extending the lead time of usable forecast products
    - server and computing support
- The need to develop or refine:
    - thresholds and indices
    - risk maps
    - exposure analysis
    - early action protocols and SOPs for heat and cold

A central question is how to make progress operationally even while these technical limitations remain unresolved. Nepal's team emphasized that they see these modeling and forecasting issues as real constraints, particularly for scaling beyond current short-range products.

Immediate Plans and Activities After the Workshop
Immediately after the workshop, Nepal plans to continue refining the demo concept and coordination structure, especially because the focal person and internal institutional arrangements are still being finalized due to an internal transition within DHM. The team indicated that they will:

- clarify internal responsibilities and focal persons
- discuss the proposed mechanism with sector agencies and stakeholders
- refine how the demo will connect national institutions with local implementation
- continue planning for a March start to the heat-season pilot
- identify which technical needs must be prioritized immediately versus later

The immediate next phase will therefore likely focus on:

- internal DHM coordination
- stakeholder planning
- technical prioritization
- linking the upcoming pilot to existing rainfall-IBF experience and partner relationships

Expert Comments / Suggestions (UKMO / RIMES)
UKMO and RIMES experts acknowledged Nepal's strong base, especially its prior experience with rainfall IBF, but emphasized the need to stay focused on what is feasible for the upcoming season.

On forecasting and NWP:

- UKMO noted that while Nepal's longer-term goal of improving WRF, data assimilation, and medium-range capability is valid, this should not become a blocker to beginning the temperature IBF demonstration now.
- Experts encouraged Nepal to make the best possible use of the tools already available, including: the RIMES platform, available forecast indicators, and ECMWF-based products such as extreme forecast indicators discussed during the workshop
- UKMO suggested that the demonstration itself could help Nepal better understand where forecasters can add value, including identifying local biases and mesoscale adjustments.

On coordination:

- RIMES asked Nepal to clarify the operational coordination mechanism for the demo, particularly how DHM will work with user agencies during the coming season.
- Nepal was encouraged to use existing national relationships but to develop a more deliberate way of reaching the local level, since current arrangements depend heavily on national-level channels or intermediary NGOs/INGOs.

On local engagement:

- UKMO suggested that Nepal could work through intermediaries and local leaders, rather than trying to connect directly with every individual exposed person. This was seen as both practical and operationally realistic.
- The advice was to structure local workshops in ways that help identify:
    - who the local focal actors are
    - what communication channels already exist
    - how local institutions can summarize and relay impacts and needs back to DHM

On wider SAHF support:

- It was also noted that Nepal's technical issues around NWP and verification are not isolated and can be linked to broader SAHF working group efforts, especially the NWP-related activities already being advanced regionally.
- RIMES emphasized that for this demo, the immediate focus should remain on creating a practical operational mechanism for heat-related warnings and actions this season, while longer-term technical improvement continues in parallel.

Overall, the expert recommendation was for Nepal to prioritize a workable operational demonstration using current systems, strengthen local coordination arrangements, and treat this first cycle as a platform for learning and refinement rather than waiting for all technical issues to be fully solved first.

Pakistan

Pakistan presented a more advanced and experience-driven IBF demonstration, building on ongoing work since 2021 with support from the UK Met Office and other partners. Unlike countries in earlier stages, Pakistan's approach reflects mature operational experience, with IBF already implemented and scaled across multiple districts. The current proposal refines this experience into a dual-district demonstration (Faisalabad and Chitral), representing contrasting risk contexts—heat in agricultural plains and cold in mountainous regions.

Key refinements include the integration of both heat and cold hazards, incorporation of sector-specific applications (agriculture, health, energy), and the use of existing operational systems (AgroMet advisories, SOPs, and dissemination platforms). The plan also emphasizes measurable outcomes (e.g., reduction in impacts, targeted advisories), indicating a shift toward results-oriented implementation and scaling.

Planned Implementation During the Season

The demonstration is structured around hazard-specific seasonal windows:

- Heat (Faisalabad):
    - Heat stress (May–June)
    - Heat index (July–August, monsoon period)
- Cold (Chitral): Peak winter (December–January)

Implementation includes:

- Regular forecast generation and impact analysis using existing systems
- Dissemination of tailored advisories to farmers, volunteers, and sector users
- Use of established platforms and portals for communication and service delivery
- Pre- and post-season reviews to assess effectiveness and refine products

The plan leverages existing operational workflows, allowing immediate implementation without requiring full system development from scratch.

Coordination with Sector/User Agencies

Pakistan demonstrated strong institutional coordination, supported by prior IBF initiatives:

- Pakistan Meteorological Department (PMD): Lead and technical coordinator
- Agriculture extension services and farmer networks: Key for dissemination and uptake
- Disaster management authorities (PDMA): Coordination for risk response
- RIMES Pakistan team: Technical and implementation support

Coordination mechanisms include:

- Planned regular (weekly/monthly) coordination meetings
- Use of Letters of Agreement (LoAs) to formalize collaboration (adapted to government constraints)
- Establishment of technical working groups to support co-production and sustainability

Design Questions, Gaps, and Uncertainties

Despite strong experience, several technical and operational questions remain:

- Need for localized heat index thresholds (temperature–humidity relationships) specific to South Asia
- Whether to develop separate impact matrices for different user groups/sectors
- Challenges in integrating multi-source data (local, regional, global)
- How to account for cumulative or prolonged exposure impacts, not just threshold exceedance
- Requirement for IT systems, logistics, and operational support for scaling

Immediate Plans / Activities after the Workshop

- Conduct inception workshops in both pilot districts (March)
- Undertake field surveys and stakeholder consultations
- Organize training and capacity-building sessions for users and partners
- Establish or strengthen technical working groups and coordination mechanisms
- Operationalize the demonstration for the upcoming heat season and continue into winter
- Continue scaling and replication of the IBF model to other regions

Expert Comments / Suggestions (UKMO / RIMES)

Experts highlighted Pakistan as a good practice example of iterative IBF development, emphasizing that:

- IBF should be seen as a progressive, learning-by-doing process, starting small and scaling through experience
- Other countries can learn from Pakistan's phased expansion and stakeholder engagement model
- Additional technical suggestions included:
- Exploring compound and cumulative impacts, not just single-threshold exceedance
- Continuing co-development of thresholds with sector stakeholders, ensuring relevance to local conditions
- Considering sector-specific impact matrices, while balancing complexity and operational feasibility
- Leveraging Pakistan's experience to support peer learning across SAHF countries

RIMES reaffirmed continued support through technical assistance, coordination facilitation, and integration with ongoing national efforts, particularly where additional expertise or resources are required.

Sri Lanka

Sri Lanka's national demonstration will be led by the Department of Meteorology, with sector co-leads and partners including the Ministry of Health, Disaster Management Centre, Department of Agriculture, Department of Education, Sri Lankan universities, provincial councils, local governments, and mass media. The focal leadership will come from the Department of Meteorology, with the Director General and the designated director serving as responsible leads for the demonstration.

Compared with earlier discussions, Sri Lanka's concept is now more clearly refined around heat stress rather than both heat and cold hazards. The team explained that Sri Lanka does not typically experience heat waves in the same way as some other countries, but does experience heat spells, so the demonstration will focus operationally on that reality. The plan has also narrowed to a district-level demonstration, centered on a dry-zone district with persistent high temperatures, especially during the pre-monsoon and inter-monsoon seasons. Priority sectors have been identified more clearly as health, agriculture, and education, with target groups including outdoor workers, farmers, schoolchildren, the elderly, patients with chronic illnesses, pregnant women, and low-income households in poorly ventilated or urban heat-prone settings.

Planned Implementation During the Season

Sri Lanka plans to begin implementation around March, though the team noted that timing may be affected by human resource limitations and ongoing post-disaster pressures following the cyclone situation. The demonstration will build on the country's existing system for issuing heat index products, which has already been in place since 2018.

Operationally, the demonstration will aim to move from the current hazard-based advisory approach to a more impact-based advisory system, with warnings ideally issued at least 48 hours in advance. Current operational products already include:

- UTCI / heat index-based warning products
- maximum and minimum temperature monitoring
- temperature anomalies
- monthly probabilistic temperature outlooks
- weekly maximum and minimum temperature anomaly products, especially for agricultural users

The demonstration intends to strengthen this existing service by linking threshold levels more explicitly to sector-specific impacts and actions, including:

- health preparedness measures
- adjustments to work schedules
- school guidance
- public awareness messaging

Sri Lanka has already categorized conditions into watch, alert, and warning levels, and indicated that work is underway to refine area-specific thresholds, potentially differentiated by elevation and local climate context.

Coordination with Sector/User Agencies

Coordination is expected to involve the Department of Meteorology, Disaster Management Centre, Ministry of Health, Ministry of Agriculture, Irrigation Department, local authorities, schools, hospitals, and media partners. Before the target season, Sri Lanka plans to conduct:

- seasonal coordination meetings
- discussions on thresholds and trigger levels
- refinement of SOPs and dissemination arrangements

During alert periods, the system is expected to rely on:

- weekly briefings
- the Disaster Management Centre’s grassroots links
- mass media dissemination
- sector focal points to translate forecasts into action

A key strength highlighted in the presentation is that Sri Lanka already has an operational history of working with stakeholders through the existing heat index system. The team noted that school principals, outdoor worker groups, health actors, agriculture services, irrigation, and disaster management agencies are already familiar with and responsive to these products. This indicates a good base of trust and established collaboration on which the demonstration can build.

At the same time, Sri Lanka noted that while stakeholder relationships already exist for rainfall and other hazards, the specific focal points for this temperature-focused demonstration still need to be finalized.

Design Questions, Gaps, and Uncertainties
Sri Lanka identified several areas where expert feedback would be useful:

- Threshold refinement and trigger validation, especially for a context where the main concern is heat spells rather than classic heat waves
- Development of impact tables and more operationally useful impact-action links
- Better integration of health data and health surveillance systems
- Further strengthening of communication design and user-centered advisory formats
- Clarifying how to tailor thresholds and products by elevation and local climate variability

The team also highlighted practical implementation constraints:

- limited human resources
- the need to finalize stakeholder focal points
- competing demands due to the recent cyclone/post-disaster context

Even with strong existing products, the main design challenge is how to translate an already functioning heat index warning service into a more formalized, sector-linked impact-based forecasting workflow.

Immediate Plans and Activities After the Workshop

- Identify and confirm the stakeholder focal points from partner agencies
- Develop a more detailed timeline for the next one to two months
- Continue work on threshold refinement
- Strengthen collaboration with health, agriculture, education, and disaster management partners
- Prepare for the operational launch of the district-level demonstration during the next heat season

The team already has a practical starting point because the heat index service is operational, so immediate work will likely focus less on inventing a new system from scratch and more on refining products, formalizing coordination, and linking warnings to clearer impact-based action protocols.

Expert Comments / Suggestions (UKMO / RIMES)
RIMES noted that Sri Lanka already appears to have a strong foundation, with existing products and user familiarity already in place. The key recommendation was to move quickly to:

- identify the specific stakeholders and focal points
- define a short-term operational timeline
- clarify how the national demo will be launched and supported over the next one to two months

UKMO highlighted the importance of Sri Lanka's existing heat index product, especially because it already contains elements of an impact-based approach – to which the DoM representative responded that the product has already proven valuable, especially for schoolchildren, outdoor workers, and health-related preparedness.

They noted that this usefulness has helped build trust, and that many stakeholders now actively contact the Department of Meteorology and collaborate around these warnings. UKMO emphasized that this is a very important lesson for other countries: building trust through practical, actionable products over time can create strong stakeholder ownership and demand.

Overall, the expert recommendation was for Sri Lanka to build on the success of the existing heat index system, use it as the entry point for the national demo, and focus the next phase on refining thresholds, formalizing coordination, and translating an already credible service into a more explicit impact-based forecasting framework.

IV. Feedback Summary

The workshop gathered 23 feedback respondents, predominantly from government/public sector institutions (91%), with a smaller representation from NGOs/civil society (9%). The cohort was composed of mid- to senior-level professionals (ages 25–64), reflecting a technically experienced audience relevant for cascading IBF knowledge. Gender representation was relatively balanced, with 61% male and 39% female participants.

Notably, 35% of the respondents reported specific learning needs, mainly related to deeper technical content (e.g., ESCAP tools) and more hands-on exercises, indicating demand for more advanced and practical training components.

Pre- and Post-Workshop Knowledge Gain

The training resulted in substantial knowledge improvement across all key areas, with overall scores increasing from moderate to good levels.

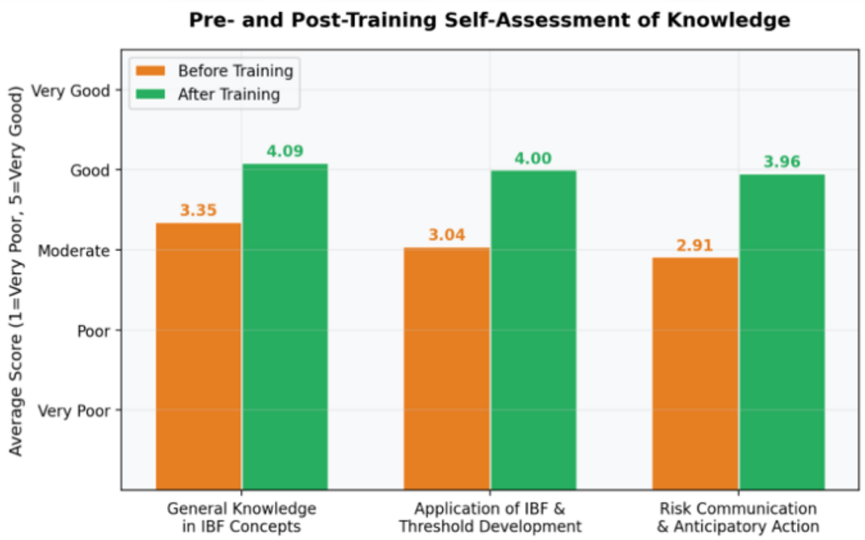


Figure 1. Pre- and post-training self-assessment of knowledge levels (n=23)

- General IBF Concepts: Increased from 3.35 to 4.09 (+22%), reflecting already strong baseline knowledge.
- IBF Application & Threshold Development: Increased from 3.04 to 4.00 (+31%), showing effective skill-building in technical application.
- Risk Communication & Anticipatory Action: Increased from 2.91 to 3.96 (+36%), the largest gain, indicating this was the most critical capacity gap addressed.

Importantly, 35% of respondents initially reported low knowledge in at least one area, but post-training results converged toward a "good" level across all topics, demonstrating consistent effectiveness of the training across varying baseline capacities.

Training Evaluation Across Five Dimensions of Satisfaction and Success

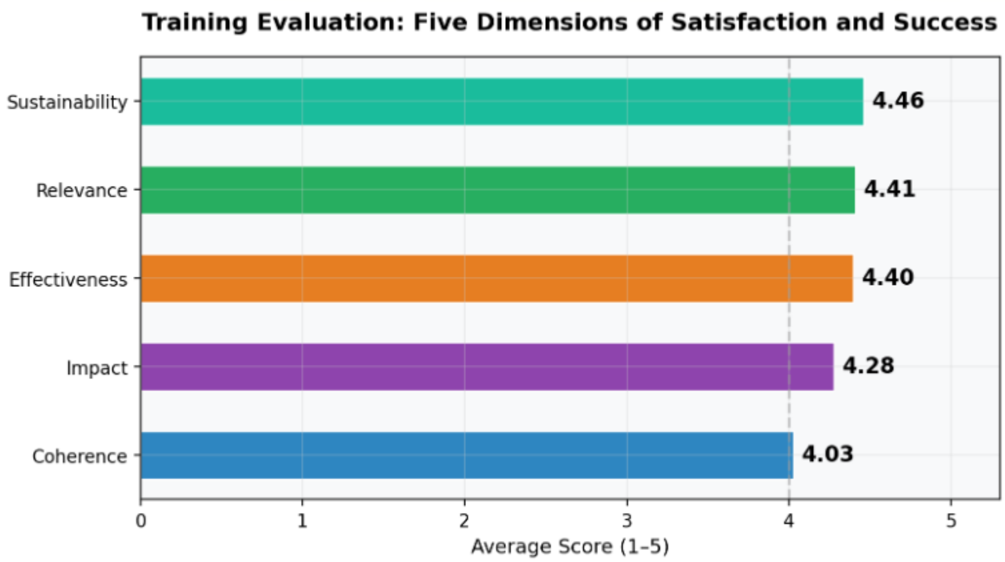


Figure 2. Average scores across the five evaluation dimensions (n=23)

Respondents rated the training very highly overall (average score: 4.32/5), with strong performance across all five dimensions:

- Sustainability (4.46 – highest) – Strong confidence in cascading knowledge, with 100% committing to share materials and high expectations for strengthened inter-agency collaboration.
- Relevance (4.41) – Training content was highly aligned with respondents' work, with 91–96% positive ratings and no negative feedback.
- Effectiveness (4.40) – Trainers, logistics, and delivery were rated highly, particularly trainer expertise (65% strongly agree). However, respondents noted the need for more practical and hands-on sessions.
- Impact (4.28) – Most respondents expect the training to influence their work and policies, though a small minority highlighted the need for additional technical support to translate learning into institutional impact.
- Coherence (4.03 – lowest) – While still positive, this dimension showed relatively more neutral responses, particularly regarding alignment with national policies and GEDSI integration, suggesting areas for improvement.

Overall, 96% of respondents found the training useful, indicating strong satisfaction and perceived value.

The training was highly successful in building both technical capacity and confidence for IBF implementation, particularly in areas with previously lower baseline knowledge such as risk communication and anticipatory action. Strong ratings across relevance, effectiveness, and sustainability confirm that the training design and ToT approach are well-suited for regional capacity development and knowledge cascading.

However, the evaluation highlights clear areas for strengthening future iterations, particularly the need for more hands-on, scenario-based learning, deeper technical content, stronger policy linkages, and enhanced GEDSI integration. Addressing these will be critical to ensure that knowledge gains translate into sustained operational impact at national and sectoral levels.

To view the full report, go to: [LINK].

ANNEX 1: PARTICIPANTS LIST

NMHSs and User Sectors

Bhutan	Pema Syldon	Senior Hydromet Officer	NCHM
Bhutan	Ranjit Tamang	Senior Hydromet Technician/ Weather Forecaster	NCHM
Bhutan	Sonam Yangchen	Assistant Program Officer	Department of Public Health
India	Sourish Bandopadhyay	Scientist D	IMD
India	Radheshyam Sharma	Scientist D	IMD
Maldives	Azeema Ahmed	Meteorologist	MMS
Maldives	Khadeeja Nusra	Meteorologist	MMS
Maldives	Mohamed Mahid	Met. Technician - Climate Application	MMS
Myanmar	Dr. Tin Mar Htay	Deputy Director	DMH
Myanmar	Daw Su Myat Naing	Assistant Forecaster	DMH
Myanmar	Pyae Phyo Aung (Mr.)	Deputy Director	Dept. of Public Health, Ministry of Health
Nepal	Archana Shrestha	Acting Director General	DHM
Nepal	Suman Kumar Regmi	Deputy Director General, Flood Forecasting Division	DHM
Nepal	Bikram Shrestha Zoowa	Deputy Director General, Flood Forecasting and Hydrology and Cryosphere Divisions	DHM
Nepal	Barun Paudel	Senior Divisional Meteorologist, Weather Forecasting Section	DHM
Nepal	Subash Rimal	Senior Divisional Meteorologist, Climate Data and Network Section	DHM
Nepal	Binu Maharjan	Meteorologist, Weather Forecasting Section	DHM

Nepal	Sanjib Adhikari	Meteorologist, Weather Forecasting Section	DHM
Nepal	Nirmala Regmi	Meteorologist	NDRRMA
Nepal	Hemraj Pandey	Public Health Administrator	Ministry of Health and Population
Nepal	Nava Raj Joshi Jaishi	Medical Officer	Ministry of Health and Population
Nepal	Rameshwar Rimal	Agrometeorologist	NARC
Nepal	Ms. Stuti Acharya	Plant Protection Officer	Agriculture Information and Training Centre (AITC)
Nepal	Dr. Shanti Kunwor	Veterinary Doctor	Agriculture Information and Training Centre (AITC)
Pakistan	Dildar Hussain Kazmi	Deputy Director	National Agrometeorological Centre
Pakistan	A.L.K. Wijemannagge	Director	PMD
Pakistan	Mr. A. W. S. J. Kumara	Meteorologist	PMD

Development Partners

David Corbelli	Senior International Development Manager	UKMO
Helen Caughey	Deputy Chief & International Meteorologist	UKMO
Vikki Osborn	Project Support Officer	UKMO
Sumit Dugar	Resilience Adviser	FCDO
Sanchita Neupane	Disaster Risk Reduction Specialist / RAIN Programme Manager	People in Need
Anuj Tiwari	Hydrometeorologist	People in Need
Ramiz Khan	Urban Adviser	RCCC
Madhab Uprety	Senior Technical Adviser and Asia - Pacific Focal Point	RCCC
Parvathy Subha	Expert, Disaster Risk Reduction Section	ESCAP
Leila Salarpour Goodarzi	Associate Economic Affairs Officer	ESCAP

Madhurima Sarkar-Swaisgood	Deputy Chief	ESCAP
Armel Castellan	Extreme Heat Services Technical Advisor	WMO, GHHIN Team
Popular Gentle		WFP Nepal
Man Bahadur Kshetri	RS/GIS Analyst	WFP Nepal
Sunil Bogati	Program Associate	WFP Nepal
Jeevika Khadka	Project Coordinator	Stimson Center
Pranav Dahal	Crisis Anticipation and Risk Financing Technical Specialist	START Network
Birendra Bajracharya	Senior Intervention Manager - Regional Information Service	ICIMOD
Kiran Shakya	Geospatial Application Development Specialist	ICIMOD
Meghraj Rasaili	Strategic Communication Expert	BBC Media Action Nepal
Kiran Bhandari	Editor	BBC Media Action Nepal

RIMES

Anshul Agarwal	SAHF Lead / Project Technical Lead
K.J. Ramesh	SAHF Adviser
Raihanul Haque Khan	Bangladesh Country Program Lead
Khan MD Golam Rabbani	Weather Expert
Asif Udin Bin Noor	Climate Service Expert
Danna Valdez	Climate Information Product Design and Marketing Officer / Project Officer
Thanut Rittichai	MEL Specialist
Peter Ferrer	Capacity Development Specialist
Raissa Jean Ancheta	ICKM Specialist / Documentation Expert
Virinya Piromrungkit	Administrative Officer
Puja Shakya	Country Program Lead, Nepal
Surajan Shrestha	Web Developer

Online Participants

Dr. Shiromani Jayawardena	SAHF Adviser	RIMES
Mitesh Sawant	Agriculture Specialist / Project Manager	RIMES
Dr. Madhurima Sarkar-Swaisgood	Deputy Chief	ESCAP
Jochen Luther	Technical Coordinator (Services), Regional Office for Asia and the South-West Pacific	WMO
Damien Riquet	Regional Anticipatory Actions Specialist	FAO
Fawad Auobi	Head of Forecast	AMD
Mohammad Khalid Halim	Manager of Forecast	AMD
Mustafazadran	Manager of Early Warning Services	AMD
Soma Popalzi	Member of Research Department	AMD
Quamrul Hassan	Deputy Director	BMD

ANNEX 2: WORKSHOP AGENDA

DAY 1 (February 9): Regional IBF Context & Forecast-to-Impact Pathway

TIME	ACTIVITY
08:30 – 09:00	**Registration**
09:00 – 09:30	**Opening Session** Welcome Remarks RIMES, UKMO, and DHM Workshop Overview Dr. Anshul Agarwal, Danna Valdez, and Peter Ferrer, RIMES Participant Introduction / Group Photo
09:30 – 10:00	**Session 1: IBF for Temperature-related Hazards – Refresher (Applied)** Dr. KJ Ramesh, RIMES • End-to-end IBF value chain for temperature hazards • IBF as a process supporting decision-making, not standalone product • Temperature Hazards in South Asia
10:00 – 10:20	**Session 2: Regional IBF Framework and Toolkit** Danna Valdez, RIMES • Regional IBF Framework Overview • IBF Toolkit components
10:20 – 10:40	**Morning Break**
10:40 – 11:30	**Session 3: Forecast Generation for Temperature Hazards** Dr. Shiromani Jayawardena & Rabbani Golam, RIMES • Forecast types, lead times, and uncertainties • Strengths and limitations of temperature forecasts for IBF • Bias correction for temperature hazards forecasting to address how biases translate into indices
11:30 – 12:30	**Session 4: Overview / Demo of Regional Tool (INSTANT South Asia)** Rabbani Golam, Raihanul Khan, & Asif Udin Bin Noor, RIMES • Co-design session of the INSTANT Tool (show demo, followed by group work to get user feedback on the design)
12:30 – 13:30	**Lunch Break**
13:30 – 14:30	**Session 4 Cont'n: INSTANT Tool Co-Design Session** Rabbani Golam, Raihanul Khan, & Asif Udin Bin Noor, RIMES • Co-design session of the INSTANT Tool (show demo, followed by group work to get user feedback on the design)
14:30 – 14:45	**Afternoon Break**
14:45 – 16:45	**Session 5 + Group Exercise 1: Translating Forecasts into Impacts** Helen Caughey, UKMO and Ramiz Khan & Madhab Uprety, RCCC • Introduction to Impact Tables and their role in IBF • Examples of Impact Tables for temperature related hazards • Introduction to facilitating national co-production of impact tables • Development of temperature related impact tables
16:45 – 17:00	**Wrap-up and Reflections**

DAY 2 (February 10) – Exposure, Vulnerability, GEDSI, and Impact Prioritization

TIME	ACTIVITY
08:30 – 09:00	**Signing of Attendance**
09:00 – 09:15	**Daily Recap**
09:15 – 10:45	**Session 6: Exposure, Vulnerability, and GEDSI in IBF** Asif Uddin Bin Noor/Raihanul Haque Khan, RIMES • Understanding exposure and vulnerability in the context of temperature-related hazards • Why GEDSI is a critical consideration for temperature hazards Nina Karla Jaim, RIMES • Indicators and data limitations, practical GEDSI integration (i.e., health-related vulnerability, socio-economic and livelihood sensitivity, urban and environmental factors, GEDSI, etc.) Asif Uddin Bin Noor/Raihanul Haque Khan, RIMES • Hands-on exercise for assessing and generating vulnerability and exposure indices • Discussion on the inclusion of exposure and vulnerability layers/datasets for the regional tool
10:45 – 11:00	**Morning Break**
11:00 – 12:30	**Session 7: GEDSI Integration in IBF** Helen Caughey, UKMO and Ramiz Khan & Madhab Uprety, RCCC • Aligning impact severity to alert levels with sector and decision thresholds • Prioritization and linking scientific information with sector decision needs
12:30 – 13:30	**Lunch Break**
13:30 – 15:00	**Group Exercise 2** Helen Caughey, UKMO and Ramiz Khan & Madhab Uprety, RCCC • Refinement of Impact Tables with GEDSI Lens • Considering different approaches needed for IBF warnings
15:00 – 16:00	**Session 8: Introduction to ESCAP's Risk and Resilience Portal** Madhurima Sarkar-Swaisgood & Parvathy Subha, ESCAP • Introduction to ESCAP's Risk and Resilience Portal • Hands-on Training
16:00 – 16:15	**Afternoon Break**
16:15 – 17:15	**National Pilot Demonstration Clinic – Round 1 (3 countries)** 1. Bhutan 2. Pakistan 3. Myanmar
17:15 – 17:30	**Wrap-up and Reflections**

DAY 3 (February 11) – Triggers, Thresholds, and Decision-Making

TIME	ACTIVITY
08:30 – 09:00	**Signing of Attendance**
09:00 – 09:15	**Daily Recap**
09:15 – 10:00	**Session 9: Trigger and Threshold Development for Temperature Hazards** Raihanul Khan & Rabbani Golam, RIMES • Why Local Level Thresholds are Important? • How to define location- and sector-specific thresholds? • Localized Threshold Determination - a hands-on exercise
10:00 – 10:15	**Morning Break**
10:15 – 11:30	**Session 9 Cont'n:** Helen Caughey, UKMO & Pranav Dahal, START Network • Overview of Start Network's recent activation in Nepal for Cold Wave Ramiz Khan & Madhab Uprety, RCCC • Triggers and thresholds development for temperature related hazards • Aligning triggers with decision timelines • Linking triggers with institutional decision protocols • Examples of how thresholds are defined for AA and used in various sectors/settings Anuj Tiwari (People In Need Nepal) • Translating temperature-related forecast to locally actionable early warning (PIN's Experience) Damien Riquet (FAO) / Jochen Luther (WMO) (Online) • Triggers of Anticipatory Action vs public early warnings, and harmonisation challenges
11:30 – 12:30	**Session 10: End-to-end IBF Process: IMD Experience** • IMD's approach, triggers, thresholds and alerts for different geographical zones and user sectors • Temperature forecasting and verification approach • Live Demonstrations of DSS Tools / Hands-On Exercise
12:30 – 13:30	**Lunch Break**
13:30 – 15:30	**Group Exercise 3** Helen Caughey, UKMO and Ramiz Khan & Madhab Uprety, RCCC • ToT action orientated advice in warning. A practical exercise which delegates can lead in their national contexts to encourage stakeholders to approach IBF from an action orientated perspective.
15:30 – 15:45	**Afternoon Break**

15:45 – 17:00	**National Pilot Demonstration Clinic – Round 2 (3 countries)** 4. Nepal 5. Bangladesh 6. Sri Lanka
17:00 – 17:15	**Wrap-up and Reflections**

DAY 4 (February 12) – Communication, Operations, and Training-of-Trainer Skills

TIME	ACTIVITY
08:30 – 09:00	**Signing of Attendance**
09:00 – 09:15	**Daily Recap**
09:15 – 10:45	**Session 11: Action-led Warnings for Temperature Hazards** Dr. KJ Ramesh, Raihanul Khan, & Asif Uddin Bin Noor, RIMES • Generic Elements of SOPs and EAPs • Designing advisories linking IBF forecasts, impacts, and recommended actions to SOPs and EAP activation • Aligning alert levels with actions for different user groups Ramiz Khan & Madhab Uprety, RCCC • Experience in early action protocols • Examples of action-oriented advisories for heat- and cold-related hazards Man Kshetri & Sunil Bogati, WFP Nepal • Case Example: Operationalizing IBF through anticipatory action in Nepal (Flood Example)
10:45 – 11:00	**Morning Break**
11:00 – 12:30	**Session 12: Behavioral Insights and Risk Communication** Helen Caughey, UKMO and Ramiz Khan & Madhab Uprety, RCCC • ToT approach to engage stakeholders at a national level in risk communication. • Critical review of communication approaches and messaging • Communication challenges in temperature-related forecasts and warnings. • Tailoring messages for different sectors and different levels of risk
12:30 – 13:30	**Lunch Break**

13:30 – 13:45	**Session 10 Cont'n: End-to-end IBF Process: IMD Experience**
	• Examples of action-oriented advisories for heat- and/or cold-related hazards
	  ○ Experience of ICMR and Agriculture (and other sectors) (end-to-end comprehensive SOP/EAP)
	  ○ Communication of action-led warnings for various sectors (e.g. public health, agriculture, etc)

13:45 – 15:30	**Session 13: Operational IBF Workflows and Decision Support**
	Helen Caughey, UKMO
	• Integrating IBF into existing NMHS operational workflows (Examples of integration from UK Met Office and DHM Nepal) and Draft IBF Competency Framework
	
	Raihanul Khan & Asif Uddin Bin Noor, RIMES
	• Coordination between NMHSs and sector partners: An Interactive Activity
	
	Jeevika Khadka, Stimson Center
	• Minimum operational requirements and ensuring sustainability beyond IBF pilot demonstrations
	  ○ Enhancing Impact-Based Forecasting in Nepal: Findings from the Stimson Assessment
	
	IMD
	  ○ Minimum operational requirements needed for heatwave and coldwave IBF with allowance for future expansion and scale up

15:30 – 15:45	**Afternoon Break**

15:45 – 16:45	**Session 13 Cont'n**:
	Parvathy Subha, ESCAP
	• Use of DSS tools and templates
	  ○ ESCAP's Relevant Initiatives and Available Tools
	  ○ Intro and Hands-on Training to IBF Tool
	    ▪ Loss and damages assessment
	    ▪ Seasonal forecast translated to sectoral impacts

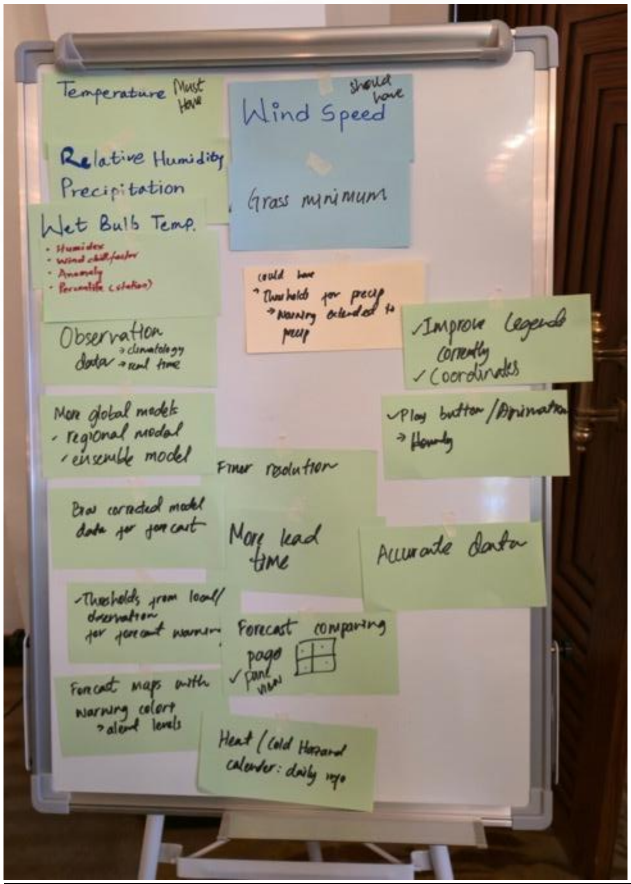
16:45 – 17:00	**Wrap-up and Reflections**

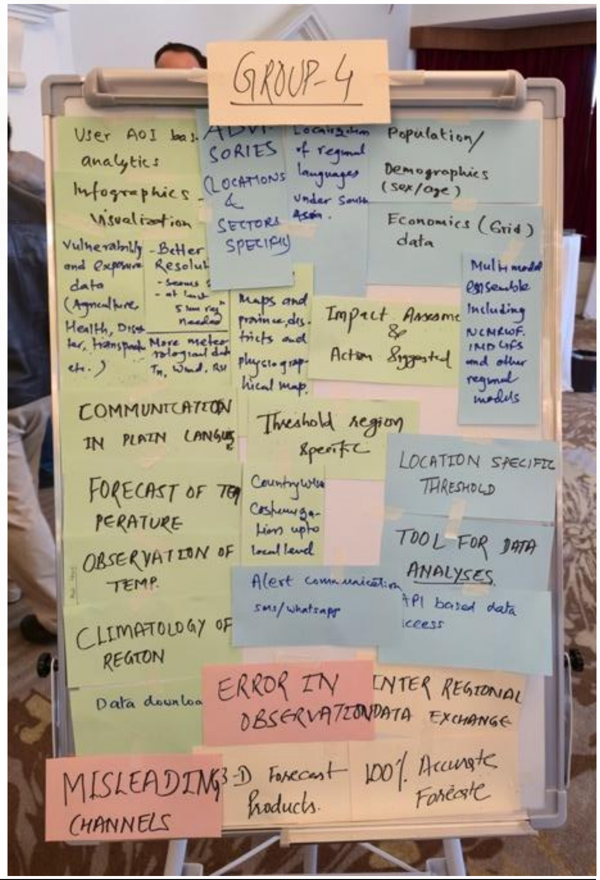
DAY 5 (February 13) – Synthesis, Summary, and Next Steps for Training-of-Trainers and National Demonstration Plans

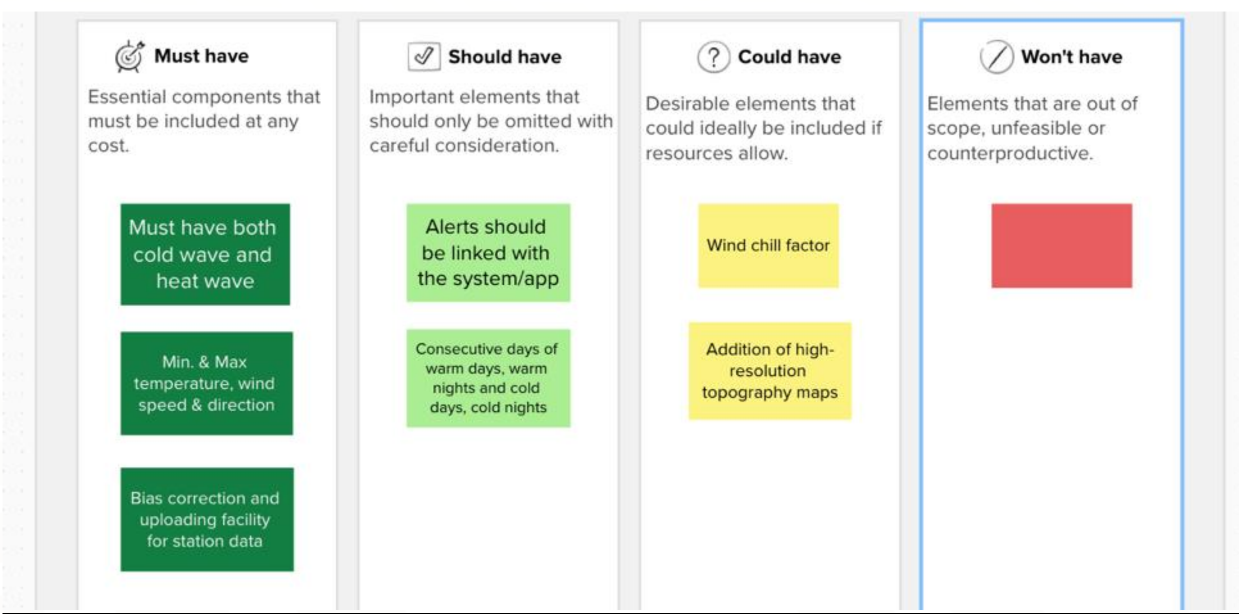
TIME	ACTIVITY
08:30 – 09:00	**Signing of Attendance**
09:00 – 09:15	**Daily Recap**
09:15 – 10:30	**National Pilot Demonstration Clinic – Round 3 (3 countries)** 6. Bangladesh 7. Maldives 8. India 9. Afghanistan (tbc)
10:30 – 10:45	**Morning Break**
10:45 – 13:00	**Combined Sessions 14-16** **(Training-of-Trainers, Cross-Country Synthesis of National Pilot Demos, and Roadmap to Implementation & Post-Workshop Support)** Helen Caughey (UKMO) and Dr. Anshul Agarwal, Raihanul Khan & Asif Uddin Bin Noor (RIMES) • Bringing together various ToT components and tools made available from through the week • Guidelines and structuring for National Cascading of IBF • Country-wise planning of national demonstration activities • Coordination between NMHSs and sector partners: An Interactive Activity
13:00 – 14:00	**Lunch Break**
14:00 – 15:00	**Con't of Combined Sessions 14-16** **(Training-of-Trainers, Cross-Country Synthesis of National Pilot Demos, and Roadmap to Implementation & Post-Workshop Support)** Helen Caughey (UKMO) and Dr. Anshul Agarwal (RIMES) • Planning of national level workshops • Key principles of effective adult learning and facilitation • Practical tips for facilitating group exercises and discussions • "Clinic" on helping to address common challenges experienced by participants in their efforts in these areas previously • Next steps in implementation and post-workshop support
15:00 – 15:20	**Session 17: Monitoring, Evaluation, and Learning (MEL) in IBF** Thanut Rittichai, RIMES and Anat Prag, UKMO • Purpose and focus of MEL for IBF operationalization • MEL tools and their application for national demonstrations
15:20 – 15:40	**Early Warning For All (EW4All) Roadmap Nepal** Dr. Popular Gentle & Haile Girmai, WFP
15:40	**Workshop Closing and Way Forward** RIMES and UKMO
15:40 onwards	**Afternoon Snack and Networking**

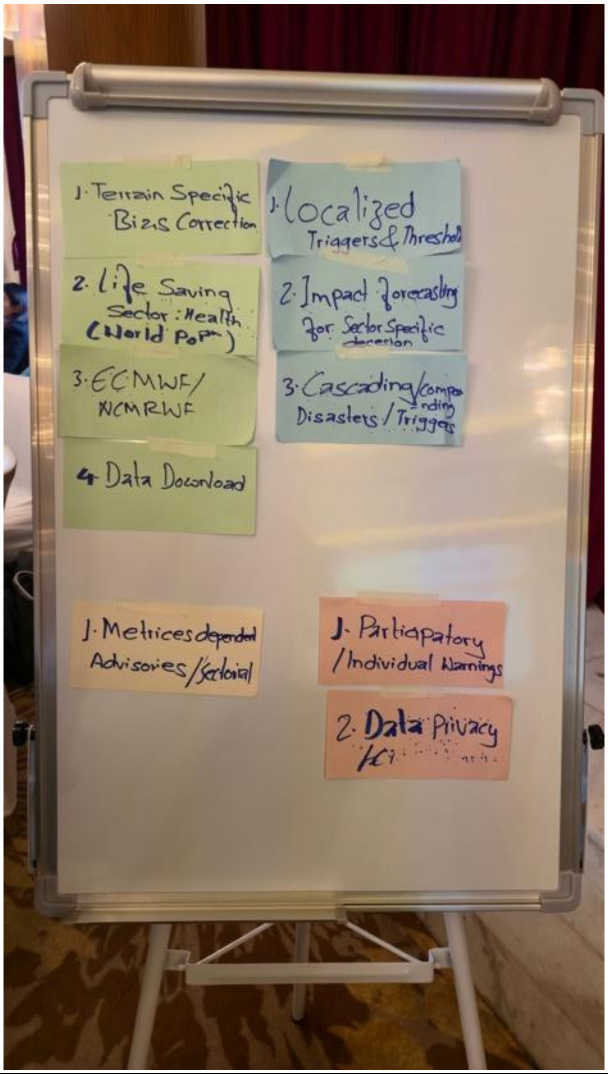
ANNEX 2: WORKSHOP OUTPUTS

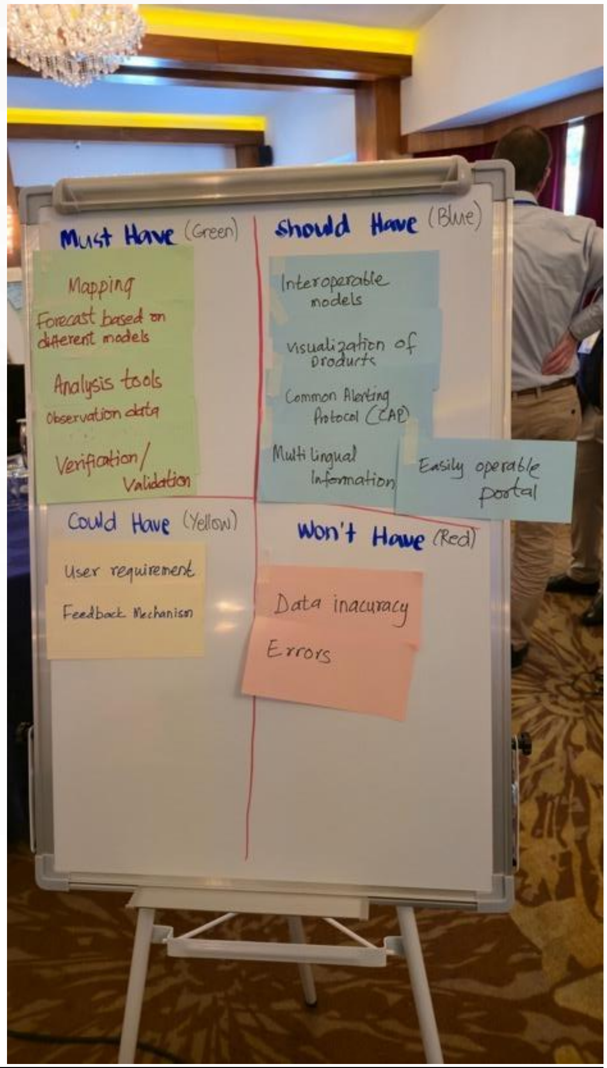
Session 4: INSTANT SA Co-Design Session



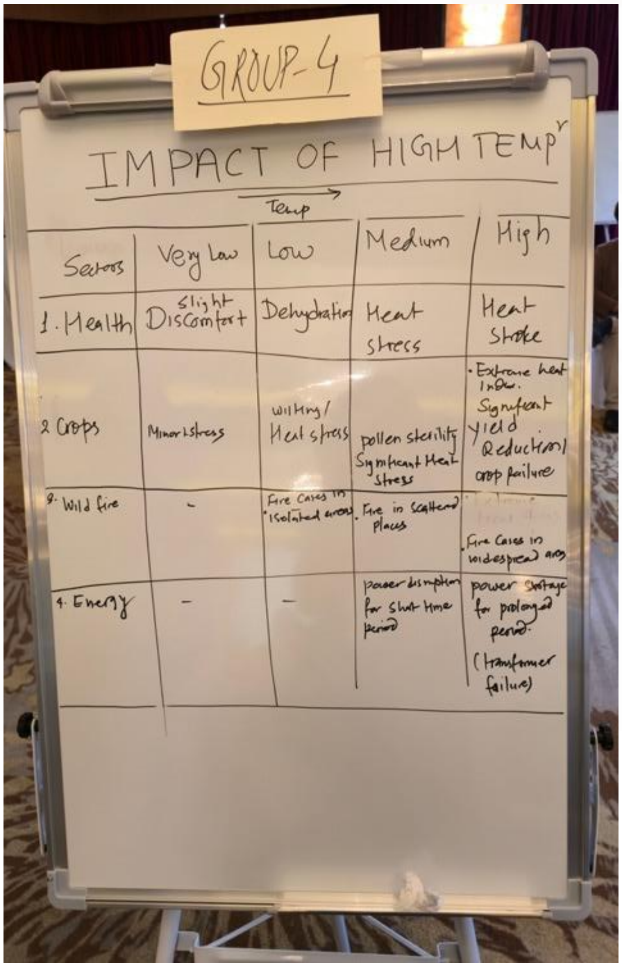


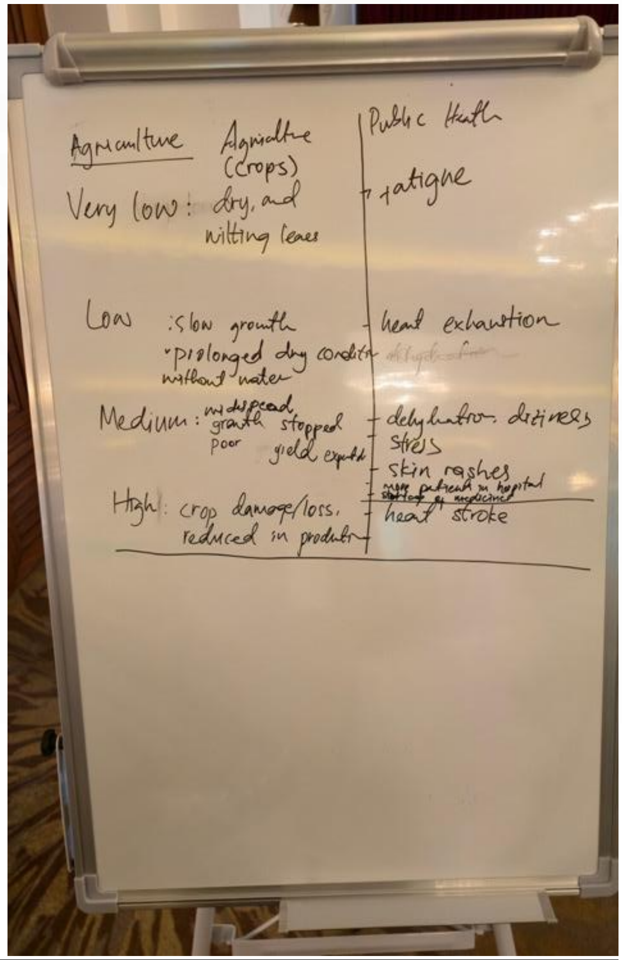



1. Terrain Specific Bias Correction
2. Life Saving Sector: Health (World Pop)
3. ECMWF/ NCMRWF
4. Data Download
1. Localized Triggers & Threshold
2. Impact Forecasting for Sector Specific decision
3. Cascading/Compounding Disasters/Triggers
1. Metrices dependent Advisories/Sectoral
1. Participatory /Individual Warnings
2. Data Privacy


Must Have (Green)
Mapping
Forecast based on different models
Analysis tools
Observation data
Verification/ Validation
Should Have (Blue)
Interoperable models
Visualization of products
Common Alerting Protocol (CAP)
Multi lingual Information
Easily operable portal
Could Have (Yellow)
User requirement
Feedback Mechanism
Won't Have (Red)
Data inaccuracy
Errors

Session 5: Translating Forecasts into Impacts






VL
L
M
H
HEALTH
AGRI
WASH
Outbreak of diarrheal disease
Daily Life
Environment
IMPACT
VL
L
M
H
Health
Agriculture
Livestock
Energy Sector
Transport